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Virtual Reality in Venice
at the Biennale and Film Festival

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Introduction

The present thesis provides an analysis of the impact of virtual reality (VR) in the two most prestigious cultural of the Biennale: the Venice International Art Exhibition and Venice International Film Festival, which have shaped the artistic and cinematographic identity of the lagoon city since their inception.

The main objective of the research is to make an exploration of the use of virtual reality within the two cultural events. In conclusion, a different mode of use and a different attention within the artistic context will emerge compared to the cinematographic one, and will be highlighted the opportunities that this innovation presents for the future of art, but especially of cinema.

In addition, the document aims to provide an in-depth understanding of virtual reality as a cultural and technological phenomenon, highlighting the transformations it has undergone over time and the implications it has had and continues to have in contemporary society. This narrative aims to present the intricate interaction between technology and culture, demonstrating how virtual reality has become a driving force in shaping the future of digital experiences.

To carry out the investigation, a study of the terminology and specific language related to this technology was carried out. The first chapter opens with the definitions of virtual reality and extended realities, which include augmented reality and mixed reality, with the aim of creating a complete picture of the matter. The main differences between the types of extended reality are highlighted, introducing a technical language that will be used throughout the thesis.

To better understand the theme, in the second chapter it is necessary to trace a journey through the history and evolution of virtual reality, starting from its origins up to the technological complexity of today. This takes place through an interdisciplinary approach that encompasses disciplines such as archaeology, art history, technology history and computer science.

The chapter continues with the chronological tracing of a virtual reality timeline and the aesthetics of virtual image spaces. After having provided a general framework on technologies, it is necessary to recognize the broader historical and artistic framework. Virtual reality is perceived as a modern innovation, but in reality, the concept of illusory space has its origins in prehistoric times, it is a concept deeply rooted in human interaction

with images and artistic tradition. The paragraph will illustrate what is called the archaeology of virtual reality, which highlights the evolution of the medium in the pre-digital era, through the various stages of Western art history. Starting from the cave paintings found in the caves, dating back to the Palaeolithic and passing through the Roman era with the cult frescoes of Villa dei Misteri in Pompeii. Later in the Renaissance numerous examples of illusion room were realized, such as the *Sala delle Prospettive* e *Camera dei Giganti* and simultaneously, thanks to the movement of the Sacri Monti, illusion spaces will gain importance in public. In the 18th century the panorama was born as a revolutionary vehicle for painted illusionism, which not only influenced art but also society at large. A century later another invention brought radical changes in the world: cinema, it was a milestone of fundamental importance for the history of virtual reality. Approaching more modern times, the idea of immersive environments can be traced in Monet's paintings and at the same time within Futurism, a movement of literary, cultural, artistic, theatrical and musical avant-garde.

At the beginning of the second chapter, a technological overview of the history of imaging devices over the last century was outlined. The first pioneering examples of virtual reality are extremely significant because they helped shape the perception and implementation of the medium. This section not only analyses the prototypes and their inventors but outlines their evolution over the decades. Thanks to the immense technological advances and the infinite human imagination, step by step it was possible to arrive at the realization of modern devices.

After highlighting the milestones of this path and the key role played by each of the inventions, the second paragraph focuses on the different uses of this extraordinary technology. In fact, virtual reality boasts numerous fields of application, very different from each other, such as education, medicine, army, industry, etc.

In some cases, virtual devices are customized for specific purposes, while in many others, a uniform technology is proposed for the several objectives. In all cases, it is widely demonstrated that virtual reality has a great impact, and its application has brought immense benefits, in terms of cost, time, security, learning, etc.

The third and final paragraph of this chapter deals with the specific integration of virtual reality in the areas of entertainment, video games and culture. These areas have in common the immersive commitment and active participation of the public. In recent

years, there has been a huge interest in virtual reality, thanks to the continuous release of innovative devices (such as headsets and headphones) and especially to their advertising. Starting from the involvement of young people, target more attentive to technological innovations, then the curiosity for the virtual world has conquered the rest of the market. As a result, there has happened a proliferation of virtual video games, virtual museums, theme parks, interactive theatre productions and similar shows. Virtual reality is a powerful tool that radically redefines storytelling, interactions and expands the boundaries of the audience, both in the video game and art sector. One of the intrinsic characteristics of virtual reality technology is to shift the user from a passive to an active role.

In the context of emerging perspectives in the contemporary panorama, it becomes evident that virtual works of all kinds are influencing the experience of enjoyment in the artistic and cinematographic field. In the third and fourth chapters of the thesis, an in-depth investigation of the most recent editions of the Biennale and the Film Festival was conducted. The research was implemented using various sources including academic articles and official catalogues of the exhibition contained in the archives of the Venice Biennale.

In the initial part of the third chapter, an overview of the Venice International Art Exhibition, its history and its structure is given. Later, case studies of works and artists who have integrated virtual reality into their exhibition projects are presented. The selected case studies have in common the belonging to the 58th Art Biennale of 2019 but are very different from each other for the way of exposure and use of virtual reality, in some cases, taking inspiration from the past and its historical background, in others looking to the future. The strategy adopted in the selection of case studies aims to show diversity and variety, while remaining within the framework of the Biennale. For this reason, the projects were chosen from each section of the exhibition.

The project *Virtual Reality* was presented by the Azerbaijan Pavilion within the national participation, it addresses the theme of fake news and the impact that social media and internet have on the contemporary world. *3x3x6* by Shu Lea Cheang and *Living Rocks: A Fragment of the Universe* by James Darling and Lesley Forwood are two collateral events, the first presents a high-tech surveillance space set up inside the Palazzo delle Prigioni, while the second celebrates the microbial life in the exhibition space of the

Arsenale. Dominique Gonzalez-Foerster and Ed Atkins are artists specifically invited by the curator. Gonzalez-Foerster presented two projects: *Cosmorama*, a diorama of a Mars landscape, and *Endodrome*, a virtual reality environment. Ed Atkins created a multimedia installation called *Old Food*.

The last two case studies, *Rising* by Marina Abramović and *Biennale 4D* by University of Applied Sciences and Arts Northwestern Switzerland FHNW and Swiss Institute for Art Research SIK-ISEA, to which a specific paragraph has been dedicated, have not been officially presented within the Biennale, but they share an intrinsic and inseparable link with the event. The decision to include them in the thesis stems from the intention to emphasize the indisputable impact of the Biennale and its thematic elements, beyond the boundaries of Venice. In fact, all the innovative approaches exemplified in the third chapter are transforming and enriching the experience in the field of contemporary art, the transformation is not only taking place at local level, but on a global scale, given the influence of these events on the international cultural scene.

The same methodological and writing approach was used for the fourth chapter. In the opening it reports the history of the Venice International Film Festival and the subdivision of its various sections. Afterwards, the second paragraph deals specifically with the section dedicated to virtual reality, officially inaugurated in 2017. The section has changed its name over the years, from 2017 to 2019 during the first editions it was called *Venice Virtual Reality*, later in the biennium of the global pandemic 2020-2021 the name changed to *Venice VR Expanded*, and now in the last two editions 2022 and 2023 it is called *Venice Immersive*. This simple but significant variation symbolizes the continuous evolution of this technology, which transforms in line with the times and the needs of viewers. The Venice Biennale was the first film festival to introduce a special section for virtual reality, it was the inspiration for other important film festivals around the world that quickly followed in his footsteps.

The third paragraph focused on the use of virtual reality in cinematic works as an empathic machine. First analysing its crucial role as an immersive documentary of reality, which is proposed as a system of direct communication and not manipulated (unlike television). In this way the spectators are teleported to the place and time of the event documented, without their point of view being distorted. According to this discourse and this possibility to live experiences firsthand, virtual reality has been defined by Chris Milk

as a "empathy machine". His theory is based on the ability of this technology to put the viewer in the shoes of the other and thus share feelings and/or emotions. Even if a real incarnation does not take place in the body of others, this medium has the power to assume the point of view of other people.

A particular branch of the virtual empathic machine is represented by immersive installations that have the representation of states altered consciousness as their theme. Virtual environments are ideal for this type of representation because they coincide with the incorporation of the altered state into the user's perception. In these cases, VR is not simply used as an optical device but as a tool at the service of the human sensory apparatus that allows to safely experience psychotic, schizophrenic and hallucinatory experiences.

In the pages of the paragraph are analysed the case studies of immersive films, presented within the section of virtual reality Venice Film Festival, which are based on virtual reality used as a tool to understand diseases or particular conditions of man, and more generally as a machine of empathy. The examples must be considered an important reading key to address these particular declinations of VR. The first case study is the immersive project *Carne y Arena* by Alejandro G. Iñárritu, this work is outside the context of the Biennale, but crucial for understanding the use of virtual reality as an empathic machine. The installation is to be considered a pioneering work in this field, which gave rise to all the subsequent ones that will be examined.

The immersive film *Porton Down* directed by Callum Cooper offers an experimental biography of the true story of Don Webb and his experience with the experiments carried out by the British government with LSD.

Cosmos Within Us directed by Tupac Martin is a virtual film that provides an unique perspective on Alzheimer, allowing viewers to experience firsthand the cognitive and emotional journey of Aiken, a person suffering from the disease.

The virtual documentary *VR Free* directed by Milad Tangshir explores the nature of incarceration in the prison of Turin. It has been realised with an objective perspective, thanks to the use of panoramic cameras that take the perspective of the surveillance system of the structure.

Within the fourth and last paragraph of the chapter, other case studies are presented, always competing in the section dedicated to virtual reality at the Venice Film Festival.

These immersive suggests a diverse perspective on the use of virtual reality in cinematic works and beyond the concept of the "empathy machine".

The Horrifically Real Virtuality directed by Marie Jourden aims to explore the immersive world and its intrinsic bond with cinema. The installation offers a unique mix of live performance and virtual reality, inviting viewers to interact with the evolving relationship between traditional cinema and emerging VR technology.

The virtual film *Le Cri VR* directed by Sandra Paugam and Charles Ayats provides an immersive experience that allows viewers to interact with Edvard Munch's iconic painting *The Scream*. It is a multisensory journey in which users delve into the depths of the artist's mind and at the same time confronting their own fears.

The Key directed by Céline Tricart triumphed at the 76th Venice International Film Festival in 2019, winning the Grand Jury Prize for Best Immersive VR Opera. This short film perfectly blends immersive theatre and virtual reality, offering viewers an interactive experience dedicated to the exploration of memory processes within dreams and navigation through the intricate paths of forgotten memories.

The immersive film *Book Of Distance* directed by Randall Okita tells the touching journey of Okita's great-grandfather. The narrative explores the challenges of immigration, the impact of war and racism on the protagonist's life, through an interactive exploration of emotional history and family dynamics.

Down The Rabbit Hole directed by Ryan Bednar is a VR adventure that represents the prequel to the timeless tale of Lewis Carroll. Spectators are transported to the extravagant Wonderland before the arrival of Alice, where they embark on a mission to help a girl find her lost pet.

Chapter 1. Definition and archaeology of virtual reality

1.1. Definition of virtual reality

The term virtual reality (sometimes abbreviated to VR) identifies various ways of simulating real by computers and the use of specially developed interfaces[1]. The widespread adoption of the term "virtual reality" is attributed to Jaron Lanier since 1987, his research and engineering have contributed to several products for the emerging VR industry. In fact, his company VPL Research, founded in 1985, was the first to commercially introduce immersive virtual reality products.

Virtual reality finds its definition in the use of computer modelling and simulation that enables a person to interact with an artificial three-dimensional (3-D) visual or another sensory environment. Virtual reality simulates the actual reality, in fact VR applications immerse the user in a computer-generated environment that simulates reality through the use of interactive devices such as googles, headsets, earphones, gloves, or body suits, these devices send and receive information and are worn by the user[2].

In a typical VR format, the user is wearing a helmet with a stereoscopic screen and enabling him to view animated images of a simulated environment. The illusion of "being there", called telepresence[3], is affected by motion sensors that pick up the user's movements and adjust the view on the screen, usually in real time, in the instant the user's movement takes place. In this way, the user can experience views and perspectives that change convincingly in relation to their head turns and steps. Additionally, wearing data gloves equipped with force-feedback devices that provide the feel of touch, the user can also collect and manipulate objects that are seen and located in the virtual environment[4].

VR is therefore a technology born from the combination of software and hardware that allows the simulation of a real environment in a three-dimensional environment, captured with cameras composed of multiple lenses capable to shoot the scene at 360 degrees and made to the computer. This environment is explorable by the user using special devices,

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[1] Carobene, A. (2013), *Realtà virtuale*, in Enciclopedia Treccani, https://www.treccani.it/enciclopedia/realta-virtuale/, (last accessed 11-02-24).
[2] Lowood, H. E. (2023), V*irtual reality*, in Encyclopedia Britannica, https://www.britannica.com/technology/virtual-reality, (last accessed 11-02-24).
[3] Definition of telepresence: the use of virtual reality technology to operate machinery by remote control or to create the effect of being at a different or imaginary location.
[4] Lowood, H. E., V*irtual reality*, cit. https://www.britannica.com/technology/virtual-reality, (last accessed 11-02-24).

including headsets, earphones and gloves/controllers that allow to interact with the environment and move freely just as if you were in a "real" environment, it is possible to move around and perform certain actions, depending on the type of experience and especially on which device is started.

The main tool needed to enter virtual reality is the viewer, it is a device to be mounted on the head similar to a pair of glasses. The lenses of the glasses do not project images but serve to deform and enlarge a display placed behind them: in this way, in the eyes of the user, the content reproduced on the display is perfectly substituted for reality.

Virtual Reality is the most radical form of insertion of a user into a virtual environment and a completely fictional dimension (or vice versa), since it puts the screen right in front of the viewer's eyes through a headset or glasses, immersing the user in an artificial world and eliminating or augmenting the physical and real one[5].

The full immersion with all human senses in a simulated world that allows users to interact with every aspect of it is even more a dream than a reality, although technology has made considerable advances. On one level, this form of total virtual reality constitutes a psychology of disembodiment, since it ultimately promises the possibility of leaving the obsolete body behind and inhabiting the datascape as an "avatar"[6]. From this point of view, virtual reality is the manifestation and continuation of an escape from the body that has its origins in the 15th century invention of linear perspective vision[7].

However, the concept of disembodiment radically denies the physicality of our bodies but to experience virtual reality, for the current state of advancement of technology, an interaction with computers is necessary. This interaction is still very much a physical process that in many ways forces to conform to the setup of a machine (e.g. wearing a headset, gloves, etc.).

1.2. Extended realities

Extended reality (XR) is an umbrella term that refers to all the immersive technologies that extend the real world. It contains all the experiences of Augmented reality (AR),

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[5] Lowood, H. E. (2023), V*irtual reality*, in Encyclopedia Britannica, https://www.britannica.com/technology/virtual-reality, (last accessed 11-02-24).
[6] Definition of avatar: personalized graphical illustration that represents a computer user, a character or alter-ego that represents the user. It can be represented either in three-dimensional or in two-dimensional form.
[7] Paul C. (2003), *Digital Art*, Thames & Hudson Ltd., London, pp. 125-132.

Virtual reality (VR) and Mixed reality (MR) that combines augmented and virtual reality[8].

Augmented reality refers to the enrichment of human sensory perception by information, typically manipulated and conveyed electronically, that would not be perceptible with the five senses. The adjective "augmented" precisely indicates the addition of something that is not there, without hiding the existing. In fact in this case, reality is enriched with new additional information, thanks to digital devices and technologies that allows the interaction with real objects[9].

The elements that increase reality can be added via a mobile device, such as a smartphone, with the use of a PC equipped with a webcam or other sensors, with vision devices (glasses), listening devices (earphones) and manipulation (gloves) that add multimedia information to the reality already normally perceived.

Regarding the differences between virtual reality and augmented reality: on the one hand VR allows you to experience a "fake" environment as if it were "true", on the other hand AR produces the experience of a "real" environment as if it were "fake"[10].

In summary, it is possible to say that augmented reality and virtual reality are inverse reflections of each other. VR offers a digital recreation of a real-life environment, while AR provides virtual elements superimposed on the real world. Therefore, it seems that these opposing conditions should complement and compensate each other, at least in an optimistic perspective of the technological and cultural evolution of this type of technology and its use practices in the field of war, medical, industrial, educational, tourist, recreational, artistic, etc[11].

The expression mixed reality includes the whole spectrum of technologies ranging from augmented reality to virtual reality. In this hybrid reality, AR and VR are combined in order to create a new environment and visualizations, where digital content co-exists with the physical environment and interact in real time between them. This type of reality is called "mixed" because the real world is enriched by virtual objects, often called

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[8] Marr, B. (2019), *What Is Extended Reality Technology? A Simple Explanation For Anyone*, in Forbes, https://www.forbes.com/sites/bernardmarr/2019/08/12/what-is-extended-reality-technology-a-simple-explanation-for-anyone/?sh=6dc909ba7249, (last accessed 11-02-24).

[9] Di Bari, V. & Magrassi, P. (2005), *2015 weekend nel futuro: viaggio nelle tecnologie che stanno per cambiare la nostra vita*, Edizioni Il Sole 24 Ore, Milano.

[10] Luigini A. & Panciroli C. (2018), *Ambienti digitali per l'educazione all'arte e al patrimonio*, FrancoAngeli s.r.l., Milano, p. 64.

[11] Ivi. pp. 64-65.

holograms in augmented reality terminology, in fact mixed reality creates 3D holographic models that visually overlap the physical environment.

This type of technology is considered as the subsequent evolution of the interaction between humans, computers and the external environment, giving possibilities of use that were previously only thinkable in the imagination. Despite this, mixed reality remains one of the most delicate and difficult fields to achieve, precisely because of its continuous communication between the real world and the virtual world, which must coincide perfectly with the vision and movements of the user[12].

In 1994, Paul Milgram and Fumio Kishino began to talk about Mixed Reality in *A Taxonomy of Mixed Reality Visual Display*, introducing for the first time the concepts of mixed reality and virtual continuum. Obviously, technology has made great strides since 1994, but the content of this study (although it may seem obsolete) still provides a good theoretical basis for understanding this type of technology. For its characteristics, in the article the mixed reality is defined as the union between the physical and the virtual world, which constitute the final poles of the spectrum called *Virtuality Continuum*[13] (fig. 1). In the left side is placed the Physical Reality, while in the right is placed the Virtual Environment. Moving from left to right, immediately after Physical Reality, there is Augmented Reality: all those experiences that superimpose graphics on the video streams of the physical world; continuing to the right there is the Virtual Reality: the set of experiences that occlude reality to present another alternative reality, the digital reality. Virtual Environment is positioned at the opposite end of Real Environment as the user is completely immersed in the virtual world. Ultimately, the experiences that are positioned between these two poles are identified as Mixed Reality[14].
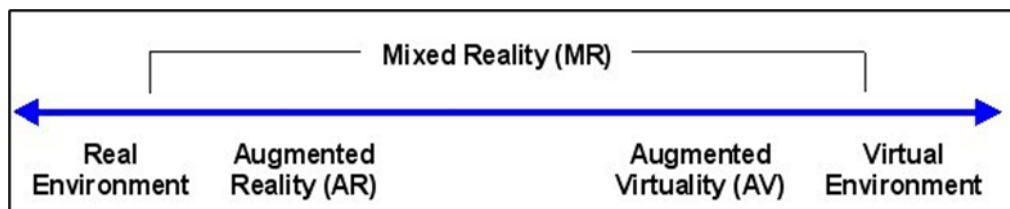
Figure 1. Milgram P. & Kishino F., *Virtuality Continuum*, 1994, scheme, A Taxonomy of Mixed Reality Visual Display.

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[12] Miatto, E. (2019/2020), *Tesi di laurea magistrale: Virtual Reality: sviluppi e prospettive della narrazione*, Relatrice Prof.ssa M. Novielli, Università Ca' Foscari Venezia, p. 21.

[13] Milgram P. & Kishino F. (1994), *A Taxonomy of Mixed Reality Visual Display*, IEICE Transactions od Information Systems, v. E77-D, n. 12, p. 5.

[14] Ibid.

1.3. Archaeology of virtual reality

Virtual reality is viewed as a totally new phenomenon; however, the space of illusion did not make its first appearance with the technical invention of computer-aided virtual realities. On the contrary, virtual reality forms part of the core of the relationship of humans to images and it is grounded in art traditions. The idea of illusory space dates to prehistory and to the classical world, now reappears in the immersion strategies of current virtual art.

Despite the central focus of this thesis is linked to new technologies, it is possible to read the phenomenon through a wider historical framework, which also includes experiences in the pre-digital era.

The intention of this paragraph is to trace chronologically the archaeology of virtual reality and the aesthetics of virtual image spaces, through the various stages of Western art history. It begins with the wide tradition (mainly European) of the image spaces of illusion, which were found since the caves of the Palaeolithic, and then move to the private country villas and houses of cities of Roman times, such as the cult frescoes of the Villa dei Misteri in Pompei, and later the numerous examples of Renaissance illusion spaces, such as the *Sala delle Prospettive* and the *Camera dei Giganti*[15]. Illusion spaces also gained in importance in the public domain, as evidenced by the Sacri Monti movement and later one of the most exceptional vehicles for painted illusionism: the panorama. The latter will lead to a real Rama-mania[16] thanks to the consequent creation of Cineorama, Futurama, Kaiserpanorama, etc.

After the glorious era of panoramas, the idea of immersive environments can be traced in Monet's paintings and simultaneously within Futurism, a literary, cultural, artistic, theatrical and musical avant-garde movement.

All these examples of imaginary spaces that create illusions are not, obviously, technically comparable with the illusions and the outstanding results now possible with the aid of computers, which allow the user to experience virtual reality interactively. The timeline of the archelogy of virtual reality that will be illustrated below, clearly shows how, in every epoch, extraordinary efforts have been made to produce the maximum illusion with the technical means available.

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[15] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 5.

[16] Pinotti, A. (2021), *Alla soglia dell'immagine. Da Narciso alla realtà virtuale*, Einaudi, Torino, p. 111.

1.3.1. Palaeolithic

The cave is an archetype of the cinema, as it sets and organizes a show of lights and shadows that takes place in a dark space, with the viewer in a motionless and frontal position, which is also guided by an act of faith in the reality of what the sight and hearing testify[17].

The caves of the Upper Palaeolithic (Chauvet, Lascaux, Altamira, the Cueva de las Manos, etc.) for the way they surround the observer with their painted surfaces, in certain points all-round, could well be considered as archeo-immersive environments. For example, inside the Cave of Chauvet (fig. 2) are preserved the most ancient cave paintings, dating back to about thirty-two thousand years ago, depicting bison, lions, rhinos and even figures in which they hybridize female bodies and bovine features.

These representations were immersed in darkness and made visible by a complex game of lights and shadows that only torches could produce and that gave them an appearance of dynamism: almost all have more heads and more legs that, illuminated intermittently, were animated before the eyes of the palaeolithic spectator[18].

By virtue of these characteristics, Chauvet is defined by Werner Herzog[19] as a form of "protocinema", a complex visual arrangement aimed at the illusion of the moving image. This, however, was not the only aspect that made this experience functional to the impression of reality; in fact, the reliefs of the walls were exploited to make the three-dimensional representations.

Figure 2. *Horses Fresco*, upper Palaeolithic, cave paintings, Chauvet Cave (Southeastern France).

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[17] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Monza, p. 84.
[18] Ivi. p. 86.
[19] Werner Herzog is a German film director, screenwriter, author, actor, and opera director. One of his documentaries made in 3D is entitled *Cave of Forgotten Dreams* (2010) and was shot in the Chauvet Cave.

In addition to the sound effects obtained through the echo of the cave and the percussion of its rocks, also the intervention of ritual dances that let dialogue the shadows of the Paleolithic performers and the pictorial figures animated by torches.

All of this created a peculiar imaginative reproduction of reality, corresponding to what André Bazin in one of his works defined as a «myth of total cinema»[20], recognizing in the cinematographic idea an anthropological need preceding the historical invention of the medium, «a total and integral representation of reality» that «looks at first glance at the return of a perfect illusion of the outside world with sound, color and relief»[21].

Herzog speaking of the cave emphasizes the concept of "fluidity" since every human being or animal can become something else by penetrating the world of spirits, starting from the human becoming animal or from the walls that can speak, and is also highlighted the aspect of "permeability" because there are no barriers to dividing cave dwellers from the spiritual universe[22].

It is certainly not a coincidence that a specific type of virtual immersive environments has been precisely called *Cave Automatic Virtual Environment* (CAVE), thus passing from prehistoric cave to digital CAVE.

VR projects respond to the desire to have a more intimate relationship with the work or even to enter into it and to live or visit the past. In both cases, technologies and immersive narratives are very useful tools in relation to their ability to be means of transport and time machines. They offer the illusion of being teleported elsewhere in space and even in the past. for this reason, they have also been used in the archaeological field[23].

Google has been a pioneer in digitizing numerous cultural assets over the years, encompassing museums, galleries, and historical landmarks for its Arts & Culture platform, accessible to all via web browsers and mobile apps. In 2020, the company and the "Syndicat mixte de l'Espace de restitution de la Grotte Chauvet" unveiled a new addition to its expansive collection, focusing on the Chauvet Cave in Ardèche (France), celebrated for its inspiring prehistoric art.

The precise age of these ancient paintings remains uncertain, radiometric dating places their origins around 36,000 years ago. The site, discovered in 1994, was promptly closed

[20] Bazin, A. (1999), *Che cos'è il cinema?*, Garzanti, Milano, pp. 11-15.
[21] Ibid.
[22] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Monza, p. 87.
[23] Modena, E. (2021), *Nelle storie. Arte, cinema e media immersivi*, Carrocci Editore, Roma, p. 95.

to the public to safeguard its preservation, but Google's latest exhibit offers the closest experience to physically entering the cave, surpassing even a full-size replica[24].

The educational project is called *Chauvet: Meet the Ancestors* and within a single, user-friendly website, it hosts an extensive collection featuring over 350 digital resources, 54 virtual exhibitions, 6 three-dimensional models, and an immersive virtual experience that can be accessed via a 360-degree YouTube video or a VR tour on the Steam platform. These resources encompass 3D renditions of the renowned *The Horses Fresco* and artifacts like a bear skull, remnants left behind by the cave's ancient inhabitants[25].

Furthermore, always in 2020, Google has created a 10-minute VR experience entitled *Chauvet: The Dawn of Art*, tailored for HTC Vive and Oculus Rift headsets. This free application provides 12 immersive "stations" that cover the surroundings of the cave and some of its most renowned artworks. The whole thing is narrated by actors Daisy Ridley (English version) and Cécile de France (French version), and this experience also incorporates expert insights from the cave's scientific team[26].

1.3.2. 2nd century BC

Ancient wall paintings dating back to the final period of the Roman Republic, executed in the artistic style typical of Pompeii's Second Style, have survived to the present day. the paintings include not only imitative but also illusionary elements. The *Great Frieze* in the Villa dei Misteri at Pompeii (fig. 3) created ca. 60 B.C., is one of the most famous frescoes of antiquity. The fresco adorns the entirety of the walls of Room no. 5 in the Villa known as the Villa dei Misteri.

Within this artwork, a remarkable example of an image strategy can be found, the wall surface extends beyond a single plane, creating an illusion of a larger room. As a result, the visitor's gaze is drawn into the painting, blurring boundaries between real space and image space[27].

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[24] Google Arts & Culture (2023), *Meet Our Ancestors*, in Google Arts & Culture, https://artsandculture.google.com/project/chauvet-cave, (last accessed 11-02-24).
[25] Summers, N. (2020), *Google's latest VR app lets you gaze at prehistoric paintings*, in Engadget, https://www.engadget.com/2020-02-27-google-chauvet-cave-paintings-vr-art-collection.html, (last accessed 11-02-24).
[26] Ibid.
[27] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts 2003, p. 25.

In the oecus, which measures 5 x 7 meters, are grouped twenty-nine highly realistic, life-size figures against a background of glowing red and marble incrustations and rhythmized by lisières. The spectacular painting almost entirely fills the observer's field of vision. The room can be accessed easily from the southwestern side of the building where it is linked (via a portico) to a terrace overlooking of the Gulf of Naples.

Except for this opening in the wall, the visitors find themselves surrounded by a 360 degrees vision with unity of time and place. Thanks to the use of illusionistic techniques in every direction, the final outcome is to dissolve the barriers separating the observer from the events portrayed on the wall[28].

The groups of figures can be distinguished and divided in three: the mortals making preparations for the initiation, the initiated mystes, and the group of guardians of the enigmatic Dionysian revelations, which includes the immortals. All three groups, each with a different form of existence, are depicted on the same level and, additionally, fuse spatially with the observer, this is a decisive factor for the function and effect of the fresco[29].

The combination of human cult followers and Dionysian divinities in the picture pursues the objective of intensifying the observer's identification with the events. The picture is a gateway, which allows the gods to enter the space of the real, and, in the other direction, transports their mortal assistants into the picture[30].

Moreover, the glowing red colour enhances the sensual and ecstatic atmosphere, until its climax, and ultimately succeeds in involving the observer as well. This pictorial form represents the maximum that the medium of image of the fresco could obtain with the means available at the time, thanks to its evocative exclusivity and the consequent psychological effect[31].

The primary interest focuses on the function of the image as an illusion. The fresco blends spatially the observer with the mythical scene and requires a pictorial form that envelops the observer hermetically, thus creating an illusion of being in the picture, inside an image space and its illusionary events[32].

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[28] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 25.
[29] Ivi. p. 29.
[30] Ibid.
[31] Ibid.
[32] Ibid.

The techniques of illusionistic painting, as in the *Great Frieze* of Villa dei Misteri, create an artificial space in which the observer is "integrated", completely filling the visual field, there is no possibility for the observer to compare extraneous objects with the scene. In addition, the observer faces a simultaneous image that envelops the panorama and transports it to another space[33].

To increase the effect of illusion and maintain continuity, the light falls into the room from an opening in the wall immediately below the ceiling, this construction is similar to the lighting method used later in the panoramas[34].

The frescoes of Villa dei Misteri are so extraordinary thanks to the highly realistic method of representation using great detail, the optical effect of a relief that can give depth, but above all the most important effect is the totality[35]. The image space appeals to the observer from all sides: «The visitor to the chamber falls under the spell of the gaze directed at him from all three areas, which rivets him for as long as he remain in the room»[36]. It is possible to feel the dialogic communication between figures, from wall to wall, as a persistent reality, almost physical reality[37].

For all these reasons, it is clearly a tangible testimony of a virtual reality, which not only sought to involve the observer through his subject but also, using panoramic images, specific colours, and dramatic gestures. All aimed at emotionally arousing the observer to ecstatic participation: the psychological fusion of observer and image in the cult[38].

Figure 3. *Great Frieze*, 2nd century BC, frescoes, Villa dei Misteri (Pompeii).

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[33] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, cit., pp. 29-31.
[34] Ivi. p. 31.
[35] Ibid.
[36] Simon, E. (1961), *Zum Fries der Mysterienvilla bei Pompeji*, Jahrbuch des Deutschen archaologischen Instituts, n. 76, p. 126.
[37] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, cit., p. 28.
[38] Ivi. p. 29.

Archaeological research has not succeeded in discovering what this room was actually used for, but with the help of the most advanced techniques of painting and representation, it is assumed that the intention was to create a virtual refuge in the form of a peaceful garden[39].

1.3.3. 16th century

In the 15th century Italian artists such as Brunelleschi, Masaccio and Ghiberti, have mastered the perspective, thus managing to open the depths of space. The immersion strategies received a huge boost, what previously could only be alluded to, now with the aid of the visual technique of perspective was portrayed convincingly. Alberti, and later Leonardo, translated the concept of perspective into the metaphor of the window: an image is a window that opens onto a different reality[40].

Perspective now provided the option of the objective representation, as it might appear to the naked eye, but many times it tended in the direction of deception or related to it, like virtual reality today.

Piero della Francesca paved the way for the perspective to become the Italian mode of visualization, for a period he worked in Urbino, which became in the 1470s the centre of the prospective revolution and provides a link with Baldassarre Peruzzi.

The *Sala delle Prospettive* (fig. 4) is the most remarkable example of a space of illusion of the High Renaissance, it was painted by Peruzzi in 1516-1518 on commission of the Sienese banker Agostino Chigi and is located in Villa Farnesina in Rome.

The perspective fresco was realized by Peruzzi and other artists from his studio, it depicted a hall with columns that surrounded visitors to the room. Between the pillars of the colonnaded portico, the observer could have a view of the building of Rome and a realistic portrait of the Roman countryside. The illusion of depth is created by use of mathematical perspective, and in this case is not compromised by any element of decoration of the Villa, the result obtained is the feeling of an irresistible relationship with the painted landscape: immersion[41].

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[39] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 31.

[40] Alberti, L. B. (1435), *De Pictura. Trattato sulla Pittura*.

[41] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, cit., pp. 38-39.

It has been said that Peruzzi was the first to succeed in «bringing together individual walls of the views to form a spatial unity»[42], this observation does call to mind obvious associations with the panorama. The sections of the view of Rome individually are insignificant and marginal, but combined acquire significance as they make the landscape continuous and also form an inner and mental picture of a panorama.

The coffered ceiling seems to be supported by the arrangement of the illusionistic columns, in this way the three-dimensional architectural features with a real function are combined with purely pictorial elements in a total effect in which nothing interferes with the illusion or interrupts its effect.

The monumentality of the architecture seems to increase the distance to the faraway hills of which the view is from an elevated position. This enigmatic picture of architecture is an isolated refuge, an illusionistic temple on an imaginary top of a mountain high above a virtual Rome. In this virtual space, the idea of the image and its method of realization visualize a dream of ancient greatness[43].

Another example of a space of illusion of Renaissance is *Camera dei Giganti* (fig.5). Giulio Romano used a strategy that was somewhat opposite to the linear perspective in configuring the architectural and pictorial layout of Palazzo Te in Mantua, the Villa of the pleasures of the Marquis Federico II Gonzaga and his lover Isabella Boschetti. The entire Palace was conceived as an illusionistic machine that invites reflection on the spectator's visual act as a participatory response to the iconic stimulus. This strategy, unfolded in increasing progression in the theory of the rooms that follow each other along the perimeter of the palace, culminates in the *Camera dei Giganti*, an environment created between 1532 and 1535 that houses an illustration of the Fall of the Giants, episode that Ovid exposes in Book I of the Metamorphoses.

Vasari after a visit to the palace conducted in 1541 describes the *Camera dei Giganti* as a «stanza tonda» in which the painting was «tanto simile al vivo, che gli uomini ingannasse, et a quegli nell'entrare facesse paura»[44]. The walls were perceived rounded for the illusionistic effect of the fresco, while in reality the angles between the walls and the angles between the walls and the vault were blunt. In this impression of the natural

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[42] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 39.
[43] Ivi. p. 40.
[44] Vasari, G., *Giulio Romano. Pittore et Architetto*, in ID., *Le vite de' più eccellenti pittori e scultori e architetti cit.*, v. V.

breakthrough of the artificial architectural space, the walls and the vault contribute to produce a perceptive bubble, in which the floor also participates, in fact Giulio Romano designs the floor with real stones whose blend seamlessly with the painted stones, thus creating a total image. A real experience of exit from the frame that today would be defined as «seamless»[45].

Today the effect is unfortunately dismissed, since the original floor was replaced during the second half of the 18th century, so it is only possible to image the kinematic effect produced on the gigantic figures, at the time the visitor could perceive a real immersive environment at 360 degrees, for this reason Forster and Tuttle have significantly described the *Camera dei Giganti* as a «totally enveloping visual panorama»[46].

Figure 4. Peruzzi, B., *Sala delle Prospettive*, 1516-1518, frescoes, Villa Farnesina (Rome).

Figure 5. Romano, G., *Camera dei Giganti*, 1532-1535, frescoes, Palazzo Te (Mantua).

[45] Pinotti, A. (2021), *Alla soglia dell'immagine. Da Narciso alla realtà virtuale*, Einaudi, Torino, p. 108.
[46] Forster, K.W. & Tuttle, R. J. (1971), *The Palazzo del Te*, Journal of the Society of Architectural Historians, n. 30/4.

Those who today experience virtual immersive environments that integrate additional sensory, tactile and olfactory channels to the audiovisual, find themselves in a direct line of continuity with the experiment of Giulio Romano[47].

It is therefore not necessary to wait for contemporaneity to witness the advent of an immersive and enveloping space. The transition from the visual pyramid of Alberti to the sphere of Giulio Romano signals an early sensitivity for that 360 degrees display mode that would become current currency from the late 18th century thanks to the invention of the panorama[48].

In order to dynamize the focal points of interest of the treasure of the Italian Renaissance, the heritage of Palazzo Te in Mantua was digitalized, both the documents and the internal and external environments. All of these materials served to build an Augmented Reality experience using a geolocated mobile app and to enhance the visitor's experience, was created a scenic design of Virtual Reality stations complete with animated renditions of the wall frescoes. Within this proposition, the inclusion of Virtual Reality stations was essential.

Thanks to the VR technology, OCULUS GO headsets, and 3D model maps and planimetries, the visitor was guided on a suggestive journey through the interior chambers of Palazzo Te[49].

The design of this virtual experience involves four Virtual Reality stations, each equipped with a corresponding number of headsets. The station and the equipment enabling users to immerse themselves in Giulio Romano's frescoes and view the animations of the characters (for example in the tragic and evocative scene in the *Camera dei Giganti*), and also observe how Palazzo Te appeared during those times. All of these elements always maintain the texture and original drawings of the master and remaining faithful to the historical and artistic documentation.

It is interesting to see how the human being reacts to images whenever a relationship is established that is not attributable to disinterested aesthetic contemplation, as in cases of religious and ritual function, or erotic function, etc.

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[47] Pinotti, A. (2021), *Alla soglia dell'immagine. Da Narciso alla realtà virtuale*, Einaudi, Torino, p. 109.
[48] Ibid.
[49] Visivalab (2020), *Virtual reality Experience and Mobile app*, in Visivalab, https://visivalab.com/en/portfolio-item/mobile-app-and-virtual-reality-mantua-palazzo-te/, (last accessed 11-02-24).

A notable example is offered by the pilgrimage to the "Sacri Monti"[50], distributed in the Piedmont and Lombardy territory since the eighties of the 15th century. This type of sanctuaries are integrated into the subalpine environment, whose chapels host life-size statues in terracotta, wood and wax, depicting in highly realistic style the scenes of the life of Christ, the Virgin and the saints. The maximum rendering in terms of realistic representation of the statues, offers the best possibility to confuse the limit that separates the representation from the reality.

In a letter to Lodovico il Moro, dated April 1495, the Franciscan friar Bernardino Caimi outlined his plans to erect a series of buildings associated with the life of Christ. The idea was to create a series of buildings that marked the steps of the life of Christ, the Places of the Passion, the places of Christ's suffering in Jerusalem, the crucifixion, the ascension, and so on. Pope Innocent VIII authorized the project in 1486 with the intention of creating «an institutionalized form of Sacred Representations at the complex of the Sacro Monte of Varallo», which had been founded by Caimi a few years earlier[51].

During the ascent to the Sacro Monte, the faithful can begin to feel that they are pilgrims, walking through the eleven stations they live in first person the life of Christ, from the Annunciation to the Last Supper, and seventeen other spaces of images present the final dramatic events that led to the Pietà. The pilgrims reaching the top, are able to enter a highly illusionistic virtual reality.

Gaudenzio Ferrari was one of the main representatives of the Piedmontese school and his contemporaries did not hesitate to put him on a par with Raphael, Michelangelo and Leonardo. He returned several times to work on the project of the Sacro Monte as a sculptor and fresco painter in the period between 1490 and 1528. His works are characterized by realism, natural colours, and some of its life-size figures in terracotta wear real clothes and have real hair and glass eyes. This technique of representation creates the illusion of merging a colourful three-dimensional closeup of figures, a variety of "faux terrain", with a two-dimensional fresco in the background[52]. The term "faux terrain" ground is used to describe three-dimensional objects that appear to grow from

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[50] The Sacred Mount is a devotional complex placed on the side of a mountain with a series of chapels or small temples, in which there are represented, with paintings and sculptures, scenes from the Life of Christ, Mary or Saints.

[51] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 41.

[52] Ivi. p. 44.

the surface of the image or remain free in the area between the observer and the image, this creates the illusion of adding a third dimension to the two-dimensional space. The union between wall and floor, the transition from horizontal to vertical, is interrupted and the boundaries of the picture are extended into the observer's space. This technique was perfected during the Baroque period and, after 1830, was regularly used in panoramas.

This immersive illusionism with such powerful images appeared to transport the observer to the historical place and occupied the observer's mental images, fixing them unforgettably in the memorial exposition of the faithful[53]. All distance disappears as the observer is involved physically and mentally in the depicted events.

This image complex with its immense suggestive power was so successful and convincing that in the following years a whole series of Sacri Monti were constructed, their patron and mentor was Carlo Borromeo. They were erected particularly after the Council of Trent, with the aim put inro action a strategic image program against the Reformation, the Catholic Church enclosed its own powerful images and welded them together in a common outlook: Orta 1576, Crea 1589, Varese 1589, Valperga Canavese 1602, Graglia 1616, Oropa 1620, and Domodossola 1656, the majority founded by the Franciscans[54].

The Sacri Monti movement is a good example of the fact that innovations in the history of visualization and illusion techniques are rarely the work of individuals; rather, spaces of immersion are the product of collective efforts, which combine art and technology in new ways and constellations.

1.3.4. 18th and 19th centuries

The "panorama" device (from pan "everything" and orama "view, show") was officially patented on 19 June 1787 by the Scottish painter Robert Barker, with the French term of *Nature à coup d'œil*, the device was renamed a few years after the first inauguration.

Two years later, on March 14, 1789, Barker had enchanted several spectators with his first exhibition, the view of Edinburgh on display in Haymarket, in West End of London. The patent of the invention describes all the elements that make up the device: the panorama is first of all a cylindrical building, inside which there is a circular canvas, with an elevated platform in the centre, where the spectators take place. From this position it

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[53] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 44.
[54] Ivi. p. 45.

is never possible for them to see the upper and lower edges of the canvas, nor to project their own shadow, thus discovering the real two-dimensional nature of the painted figures. A ditch, camouflaged with artificial vegetation or other objects, also makes the actual distance from the image equally inscrutable. The intervention of natural lighting, deliberately manipulated, then plays a central role: it radiates from a glass dome in the ceiling, so as to reflect on the walls leaving the rest of the space completely obscured. In this way, one gets the impression that the light is emanating from the canvas itself, inside a dark space[55].

An anecdote reveals how precisely the use of light sources is at the origin of the founding myth of the invention of the panorama: Robert Barker is in prison because of the many debts accumulated and is locked up in a cylindrical cell, illuminated by a single open window on the ceiling. One day he receives a letter and, to read it more easily, he decides to put it on the wall, discovering that this support works just as well as a lamp, by reflecting the rays coming from above as if they were emanating from his own surface. Barker plans to exploit this discovery for the exhibition of his paintings and, once released from prison, he has the opportunity to repay all his debts[56].

The fact that the genealogy of the panorama is to be found in the experience of imprisonment, and more particularly in the architectural device of the prison cell, finds a full correspondence in the inability to escape from the image.

The transformation of the cell into a landscape and the contextual ability of the latter to trap the viewers in an image, are in turn significant aspects of the psychological and collective dimension that the device takes on in Paris. In fact, the influence of the *panorama* comes even to give its name to one of the "passages", the commercial galleries built in iron and glass that spread in the Ville Lumière since 1822[57]. The viewer who penetrates their meanders no longer knows the ontological detachment between his own body and the images, confusing them into a single plane of reality[58]. This panoramatic configuration of space (for which one penetrates into a room where the world opens up) extends to the architecture of Paris and assumes a dreamlike dimension, since it abolishes

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[55] Wilkie, G., Wilkie, T., Robinson, J. (1796), *Repertory of Arts and Manufactures*, London, pp. 165-167.
[56] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Monza, pp. 21-22.
[57] Ivi. p. 22.
[58] Schwartz, V. R. (1998), *Spectacular Realities. Early Mass Culture in Fin-de-Siecle Paris*, University of California Press, Berkley.

any distinction between inside and outside, house and landscape, private property and public life[59].

The world's first purpose-built rotunda (fig. 6), made by Barker, opened in Leicester Square on May 14, 1793. Regarding the design and function, the visitors entered the viewing platform via staircase and at this spot, they were completely surrounded by the illusionistic painting that hung on the circular walls of the building. The picture was smaller than later panoramas, covering an area of "only" 930 m².

The platform was surrounded by a balustrade, which had the double function of preventing visitors from getting too close to the picture and keeping them in a position where the upper and lower limits of the picture could not be seen. In this way, no extraneous object was in space of the picture and therefore did not risk diminishing or compromising the illusion[60].

Also in this case, the illumination from above, which was invisible to the visitor, illuminated the painting so that it appeared as the source of the light itself. For the observer who was in the dark, this made it even more difficult to distinguish between imitative nature and real nature. This effect will then be perfected in cinema, television and computer-generated images.

The two-dimensional painting then approached the observer with a three-dimensional effect.
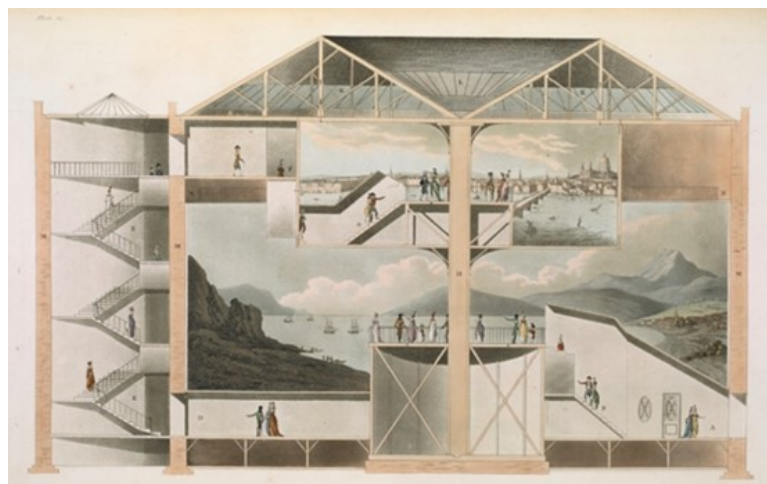
Figure 6. Mitchell, R., *Section of the Rotunda in Leicester Square*, 1801, drawing.

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[59] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Monza, p. 23.
[60] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 59.

The picture changed into an image space where the observer was physically present, in the contemporary literature on VR and in the reports on the immersive experiences, to characterize the sense of user presence within a virtual environment is often and willingly used the expression «being there»[61].

Apart from the faux terrain, Barker's patent covered practically all the innovations that still determine panorama construction until the present day. Building on the traditions and mechanisms of illusionistic landscape spaces, the panorama developed into a device that completely shut out the outside world and made the image absolute and total. Therefore, the panorama allowed a sort of «teleportation» of the observers in the middle of natural and urban landscapes or of salient historical episodes. This teletransportation today would be call embodied, triggered by a total vision that also implied the rotational bodily movement of the viewer to be able to appreciate the image in all its circular amplitude. This transfer, which can certainly be described as virtual, has produced an illusionistic somatic effect[62].

The first name chosen by Barker was therefore not the right one: no glance that would allow the observer to perceive the scene in a single moment, but rather a motor progression of the act of vision, that would be maintained also with the mobilization of the device and the transformation of the panorama in a moving panorama[63].

These devices were able to turn the visitor into a traveller, in fact each Panorama, whose subjects varied regularly to attract new audiences, had as its first objective to immerse the observer in an environment built mainly (but not only) from an image to 360 degrees. Moreover, the panorama is an element of a new entertainment industry that develops rapidly and which also includes the same idea of tourism, nestled in the panoramic vision there is also the idea of travel and movement[64].

There is also a direct relationship between motion and emotion: «movement really produces an emotion and that, by correlation, emotion contains a movement»[65] which is

[61] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 59.
[62] Pinotti, A. (2021), *Alla soglia dell'immagine. Da Narciso alla realtà virtuale*, Einaudi, Torino, p. 110.
[63] Ivi. p. 111.
[64] Modena, E. (2021), *Nelle storie. Arte, cinema e media immersivi*, Carrocci Editore, Roma, p. 21.
[65] Bruno, G. (2015), *Atlante delle Emozioni. In viaggio tra arte, architettura e cinema*, Milano, p. 17.

one of the basic issues of cinema as a means of transport and the proto-filmic construction of visual space (including that of the exhibition)[66].

Summing up, the (proto) immersive panoramic environment is a combination of three elements: travel, imagination and storytelling.

It was born a real «ramamania»[67] that had taken possession of the common discourse in the France of the 19th century, a bit like today with the almost obligatory recourse to the immersive experience. There were: panorama, diorama, cosmorama, pleorama, georama, smell-o-rama, aromarama, fantascope, cinerama, etc.

In a period between 1820 and 1830, it is possible to observe a fundamental breaking point regarding the model of the Renaissance observer, comparable to the advent of computer-graphics and animation. At the beginning of the 19th century, in fact, it is possible to trace a theory of vision that recognizes the physical character of the observer, inscribed within a renewed system of social, institutional and technological relations typical of capitalism, at the heart of modernity. According to this thought, consequently, the overcoming of the internal/external polarity would have occurred in these years and not later[68].

On December 28, 1895, in a basement of the Grand Café on the Boulevard des Capucines in Paris, the brothers Louis and Auguste Lumière show the *Cinematographe* to the public for the first time. The immersive archaeology animates the first film projection, with the audience fleeing the hall for fear of being hit by the train arriving at La Ciotat station.

In cinema, the role played by the screen becomes central. The original immersive vocation of the screen (dark room where the screen acts as the only source of images) is lost in a series of new provisions: the front position of the viewer; the framing of the image and its evident two-dimensionality; the absolute prevalence of sight to the detriment of the other senses and last but not least, he determination of two separate spaces, one bright where moving images live and a second dark, where the bodies are sitting[69].

The short film by Lumière Brothers celebrated the perfect marriage between the moving image and the modern means of transport that embodied the driving force itself and that during the 19th century had profoundly changed the perception of space-time[70]. But the

[66] Modena, E. (2021), *Nelle storie. Arte, cinema e media immersivi*, Carrocci Editore, Roma, pp. 22-23.

[67] Pinotti, A. (2021), *Alla soglia dell'immagine. Da Narciso alla realtà virtuale*, Einaudi, Torino, p. 111.

[68] Modena, E. (2021), *Nelle storie. Arte, cinema e media immersivi*, cit., p. 22.

[69] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Monza, p. 23.

[70] Schivelbusch, W. (1978), *Railroad space and railroad time*, New German Critique, n. 14, pp. 31-40.

peculiarity of the myth that characterized the first projection of *The Arrival of a Train at La Ciotat Station* on January 6, 1896, consists in the fact that it revolves around the train and the psychomotor response of the spectators, presenting itself as a tear on the spectatorship of the origins of cinema.

The imposition of cinema on immersive media is underlined by the Universal Exposition held in Paris in 1900. The fair represents in fact the triumph of the Lumière cinema, whose short films are projected on a giant screen (25 x 16 meters), as large as the descending panoramas.

Also in 1900, the *cinematographe* had been circulating for five years and spectators no longer run away from the room when the train rushed in their direction. A further dream was therefore needed, capable of overcoming the *cinematographe* itself in its now domesticated perceptive deceptions and of giving the image, now photographic and in motion, the power to absorb its user and trap him[71].

The synthesis between cinematic and immersive images has been realized thanks to a device, which aims to overcome as much as to guarantee a future for both: the *Cinéorama*. It was a was a process of cinematographic projection, on a circular screen, realized through the use of synchronized projectors. It had the shape of a balloon, inside which the spectators were orderly disposed to undertake a virtual journey. The travellers found themselves in the centre of the immense spacecraft of a balloon, even equipped with anchor, balustrade and ladder, and at the base were positioned the projection devices. From them arised the image of "a wonderful ascension" that, at least in the initial project, from Paris would lead the spectators to Brussels, London and Barcelona, seen from above[72].

The *cinéorama* was designed by the Frenchman Raoul Grimoin-Sanson, patented in 1897 and presented at the 1900 World Fair in Paris. Contrary to a firmly established legend that the show attracted such a crowd that it had to be interrupted for safety reasons, after only three days of operation; probably there was never a public showing, but only imaginary descriptions on the press of the time and publications on brochures. *Cinéorama*, whether successful or unsuccessful, was the first attempt to screen 360 degrees films.

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[71] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Monza, p. 63.
[72] Ivi. pp. 63-64.

To the simulation of a visual space perfectly disguised as air transport, was added the new power that innervates the cinema of its origins: the attraction for the unusual and the wonderful, generated by the mediatization of unreachable and extraordinary points of view. The world seen from the sky, ascension and flight were all part of these daydreams. The *cinéorama*, illusory aircraft and immersive device, aspires to live on the same union of science and dream and illusion and reality of the *cinematographe*. The fire-retardant character of the immersive image (regardless of whether it is a mythology of impossibility or failure) decrees the triumph of the screen, whose distant, framed, frontal images, seem to keep the spectators in a space protected from the incendiary incursions of the imagination[73].

Although the *cinéorama* was probably only a dreamed medium, it is certainly in the visual culture of the early twentieth century that he clings to the dream that the traces of his experience are found[74].

1.3.5. 20th century

Modern abstraction painters have tried to create image spaces that surround the observer to reduce the distance between the image and the observer. Claude Monet, for example, has spent decades searching for ways to merge the observer and the image. The *Nymphéas (Water Lilies)* cycle occupied the painter from the late 1890s until his death in 1926.

This series was inspired by the water garden that he created at his Giverny estate in Normandy. The famous water lily pond inspired Monet to create a colossal work composed of almost 300 paintings, over 40 of which were large format.

The Musée de l'Orangerie houses 8 of the great *Nymphéas (Water Lilies)* compositions created from various panels assembled side by side (fig. 7). These compositions are all the same height (6.5 ft x 1.97 m) but differ in length. These are paintings are still important today because they created the illusion of a single continuous canvas in a complete panoramic view of Monet's water lily lake[75].

Monet planned *Nymphéas* as a proper panorama for a garden rotunda lit only by daylight from the glass roof. Although this mode of display aroused associations in contemporary

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[73] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Monza, p. 65.
[74] Ibid.
[75] Musée de l'Orangerie *(2023), History of the Water Lilies cycle*, https://www.musee-orangerie.fr/en/node/33#anchor-navigation-3, (last accessed 11-02-24).

visitors of being "submerged" in a lake. The artist's intention was instead to locate observers within the watery scene, not submerging them in water, but immersing them in an image space with an indeterminate perspective: floating above the water's surface, without distance, confronted on all sides by the 360 degrees images[76] [77].

Already from the paintings made in 1904 Monet had removed the banks of the lake, the viewpoint was no longer that of external observers on the mainland but had reached the surface of the pond. The painter sat only 15-20 cm away from the canvas when he was painting, in this way, he was able to transfer his vision to the observers. Monet was able to push observers out of a secure inner distance, blur the perspective, shapes and colours of the homogeneous images and encourage them to glide into the exclusiveness of an aquatic landscape.

The synthesis of the natural environment and the mental impression puts the observer in a bird's eye view position that overcomes the laws of gravity in the space of the image. The panorama's image apparatus perfectly suited the artist's intentions[78].

The artist left nothing to chance with this set of paintings that were displayed according to his wishes, on the curved walls of two egg-shaped rooms in Musée de l'Orangerie, thanks to the collaboration with the architect Camille Lefèvre and with the help of George Clemenceau.
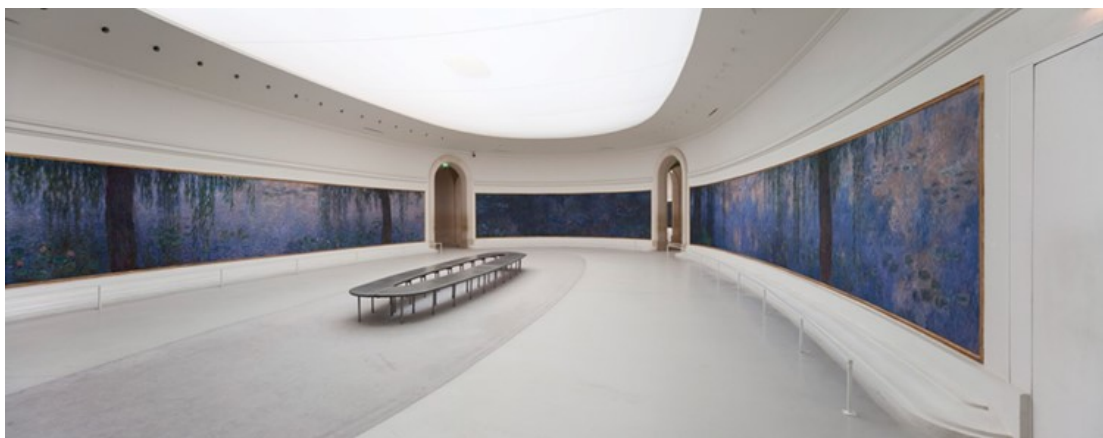
Figure 7. Musée de l'Orangerie, *Panoramic perspective of the Water Lilies*, photo, Musée de l'Orangerie (Paris).

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[76] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 141-142.
[77] Elder, M. (1924), *A Giverny chez Claude Monet*, Paris, p. 79.
[78] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, cit., p. 143.

The latter designed the shapes, volumes, positioning, rhythm and spaces between the various panels, thus creating a guided visitor experience through different entrances to the room. Daylight coming from above floods space when the sun is out or that is more discreet when the sun is masked by clouds, thus making the paintings different depending on weather conditions[79].

The complete stands as one of the most extensive and remarkable artistic creations from the first half of the 20th century, covering an area of 200 m². The size and area covered by the painting envelop the viewer in over 100 linear meters where a landscape of water dotted with water lilies, willow branches, reflections of trees and clouds unfolds, creating «the illusion of an infinite whole, of a wave without horizon and shore»[80] as Monet said. The paintings and their layout subtly resonate with the building's orientation, where scenes capturing the nuances of sunrise are positioned to the east, and those portraying sunset are found to the west. Consequently, a representation of continuity across both time and space becomes tangible. Equally striking is the elliptical configuration of the rooms, evoking the mathematical symbol of infinity[81].

Virtual reality has arrived at the Musée de l'Orangerie, which in recent years has collaborated with Google Arts & Culture to create a virtual tour of the rooms of the *Water Lilies*, accessible to all visitors comfortably and directly from home[82].

The museum, together with the Musée d'Orsay, also collaborated with the artist Nicolas Thépot for the creation of the VR work called *Claude Monet, The Water Lily Obsession*. It consists in an immersive experience, where visitors can explore the paintings in an unprecedent way: the spectators move through the heart of Monet's property in Giverny thanks to the headset that offers a 360 degrees view. The result is a walk through an impressionistic natural environment, where the colours con may depending on the lighting. The project was produced by Lucid Realities and made available to the public

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[79] Musée de l'Orangerie (2023), *History of the Water Lilies cycle*, in Musée de l'Orangerie, https://www.musee-orangerie.fr/en/node/33#anchor-navigation-3, (last accessed 11-02-24).
[80] Ibid.
[81] Ibid.
[82] Google Arts & Culture (2023), *Musée de l'Orangerie*, in Google Arts & Culture, https://artsandculture.google.com/partner/musee-de-lorangerie, (last accessed 11-02-24).

in 2018 and 2019. It marks the 100 years anniversary of the installation of the original *Water Lilies* series at the museum[83].

Monet's artworks and obsession became more accessible, thanks to the VR work of Nicolas Thépot. The project received numerous awards: Best Interactive Work at the Montreal International Festival of Films on Art in 2019, VivePort Developer Awards' Best Art & Culture VR experience in 2019, Silver Muse Award at the Annual Meeting of American Alliance of Museum in 2019, etc[84].

The juxtaposition of avant-garde artworks-environments with contemporary digital immersive environments is not unusual, in fact futurist artists tried to immerse themselves in space to make it material, pulsating and vital.

The call to arms for Futurist artists had been pronounced by Umberto Boccioni since 1910 and later in 1912 with the *Technical Manifesto of Futurist Sculpture* together with Carrà, Balla and Severini, who together enunciated the will to realize these practices of exit from the frame of the painting and the pedestal or niche of the statue. The observer was no longer placed in front of the painting but was placed inside the painting, thus establishing a continuity between it and the space, making the viewer an «inhabitant» of the environment[85]. If the traditional statuary is cropped by delineating and closing against a space that contains it, the futurist sculpture will have to do exactly the opposite, so proclaim the absolute and complete abolition of the finished line and the closed statue[86]. All this was accompanied by an effort to integrate the aesthetic experience of art (not optically contemplative, but participatory and motor) the collaboration of all the human sensory. Among the various projects stood out the painting of sounds, noises, smells. Carlo Carrà in 1913 in his Manifesto on Futurist Painting, aimed at the creation of a «total painting, which required the cooperation of all the senses»[87].

Enrico Prampolini (1894-1956), probably the most prominent member of the second generation of Futurists, was fascinated by the idea of using all available technical means to remove the boundary between observer and image space.

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[83] Thépot, N. (2023), *Claude Monet. The water lily obsession,* in Institut Francais, https://www.institutfrancais.com/en/magazine/work/claude-monet-the-water-lily-obsession-by-nicolas-thepot, (last accessed 11-02-24).
[84] Ibid.
[85] Boccioni, U. (1912), *Manifesto tecnico della scultura futurista*.
[86] Ibid.
[87] Carrà, C. (1913), *La pittura dei suoni, rumori, odori*.

The young Prampolini, in his Manifesto on Futurist Scenography[88] of 1915, called for the immediate and radical removal of all static and painted scenarios and its replacement with a dynamic electromechanical stage architecture of moving plastic and luminous elements. He was not interested in replicating natural elements of the world, but he wished to energize the dramatic action on stage, convinced that this would lead to corresponding effects on the minds of the audience. Prampolini wanted to apply the fantasies of fusing different elements in one to the theatre stage, typical of the Futurists.

At the same time, Filippo Tommaso Marinetti extended his theory to cinema with his *Manifesto on Futurist Cinematography* of 1916, through which he declared cinema as the most dynamic of all human media of expression, because of its ability to combine traditional forms of art and media[89]. Futurist cinema had set itself the objective of the demolition of the limits and the structures of literature, through a realm of images augmented by appeals to other senses deriving from other forms of art[90].

Marinetti, in his writing called *Tattilismo* of 1921, provides for an «educational scale of touch», through the use of «tactile tables» tactile tables that map the fundamental tactile values[91]. From tables like these, Marinetti imagines a development that expands in the direction of rooms, streets and theatres just as tactile. This type of experimentations and experiences are part of a tradition of synesthetic and multimodal environments, which will then extend into the contemporary through the experimentation of the «total cinema» and also the third dimension, to finally arrive at immersive environments in VR[92].

Prampolini continued to work on his new concept for theatre, and in 1924 he proclaimed the «polydimensional» Futurist stage, which was based on «spherical expansion» and «new vertical, oblique, and polydimensional elements» that were electromechanically set in motion. These would enlarge the perspective view of the horizon, which, together with the elements of light, would move «in the simultaneous penetration towards a centrifugal irradiation of the infinite visual and emotional angles of the scenic action»[93].

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[88] Prampolini, E. (1915), *Scenografia e coreografia Futurista*.
[89] Marinetti, F. T. (1916), *Manifesto della Cinematografia futurista*.
[90] Ibid.
[91] Id. (1921), *Tattilismo*.
[92] Pinotti, A. (2021), *Alla soglia dell'immagine. Da Narciso alla realtà virtuale*, Einaudi, Torino, p. 104.
[93] Prampolini, E. (1925), *Magnetic Theatre*, Paris, p. 7.

Prampolini was not the only one thinking in this direction. Although following different artistic and political goals, a short time later Bauhaus artists were also directing considerable efforts toward the union of stage and audience.

The futurist conception of a polydimensional spaciousness focused on the fusion between observer and space of the mechanized image would have opened «new worlds to theatrical magic and technique»[94]. The more powerful the suggestive potential of the apparently living theatrical images became, the more logical it seemed to the Futurists that the actor was a useless element in the action, because represents a relative point of view and this endangers the immediacy of the new images and their effectiveness.

Prampolini saw the theatre as «a panoramic synthesis of the action and a perfectly mystical ritual of spiritual dynamism»[95], thus translating the well-known visions of Futurism to merge human beings with machines in a state of permanent dynamism on stage. He wanted to amalgamate this image, now mechanized and «totalized», with the spectator. Without actors, it would be possible to revolutionize spectators' perception and direct their thoughts towards a spiritual state. For this purpose, the futurist scenospace theatre creates a virtual and dynamic sphere in which the spectator is totally immersed and from which he cannot escape[96].

At the beginning of the 20th century the avant-garde artists questioned the relationship - already cracked - between an object and its representation. A fracture took place and also involved the mode of communication between the work of art and the viewer.

The progressive insertion of fragments of reality in the work of art has also eroded the threshold between reality and image, the work of art is no longer limited to representing something but intends to present it directly. It is therefore free from all those constraints that defined its role and its space in the world[97].

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[94] Prampolini, E. (1925), *Magnetic Theatre*, Paris, p. 7.
[95] Ibid.
[96] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 146
[97] Modena, E. (2021), *Nelle storie. Arte, cinema e media immersivi*, Carrocci Editore, Roma, p. 108.

Chapter 2. Virtual reality devices, applications and interaction formulas

2.1. History of virtual reality devices

After analysing the phenomenon of virtual reality with a historical approach, it is now necessary to adopt a technological approach. For this research, is realized in the following pages an overview of the image industry and its devices in the last 60 years.

The evolution of virtual reality devices reflects a remarkable journey at the intersection of technological innovation and human imagination. Over the decades, advancements in computing power, graphics processing, and sensory technologies have paved the way for a transformative exploration of simulated environments.

This paragraph investigates the fascinating history of virtual reality devices, tracing their roots, highlighting key milestones, and examining the key role they play in reshaping digital experiences. From early prototypes to the state-of-art devices of today, this narrative unfolds the dynamic narrative of virtual reality's development over time.

2.1.1. 1960s

The sense of immersion encountered by early cinemagoers is eloquently depicted by Siegfried Zielinsk:

> as darkened room, where the spectators, like Plato's cave dwellers, are virtually held captive between the screen and the projection room, chained to their cinema seats, positioned between the large-size rectangle on which the fleeting illusions of motion appear and the devices chat produce the images of darkness and light. Cinema as an environment for the enjoyment of art, for immersion in traumatic experiences, for hallucination, for irritation of real experience; and, what is more with films constructed in deliberate opposition to the experiences of those who pay to enter the dark womb and be at the mercy of the play of light and sounds[98].

The audience's initial responses to silent black-and-white films are a mix of curiosity, fear and amazement, explained only by the innovative nature of the medium of illusion and its unexplored potential for transient suggestive effects. Films had a profound impact

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[98] Zielinski, S. (1999), *Audiovisions: Cinema and Television as Entr'actes in History*, Amsterdam Univ. Press, Amsterdam, p. 92.

on an audience that was not used to processing moving and simulated images. However, this impact must be analysed by considering the equally intense reactions of the public to the first panoramas and to the historical chain of innovations in the creation of illusory images. At first, viewers were overwhelmed by the novelty of meeting with unknown visual devices that led them to temporarily abandon their inner psychological ability to maintain distance[99].

The validation and approval of this concept takes place through comparative research on immersion, an area still in its infancy. The correlation between technological innovations in the production of illusion and the stress applied to the ability to maintain detachment could momentarily (the duration of the period of time depends on the illusion potential of the new medium given) transform the conscious illusion into unconscious reality, thus giving the mere appearance a sense of authenticity[100].

It is possible to say that the introduction of a new illusory medium creates a gap between the power of the impact of the image and the ability of viewers to consciously distance themselves from it. It is achievable to gradually reduce this gap, only with increased exposure, able to bring the viewer to a return to conscious evaluation. The spell of illusion decreases thanks to addiction, in fact, the illusion if it no longer possesses the ability to fascinate becomes a commonplace and consequently the public becomes insensitive to his attempts at deception[101].

At this stage and thanks to the habit, observers become more responsive to the proposed contents and to the medium itself, until a new medium emerges, thus throwing again a spell of illusion on the audience with its greater sensory appeal and suggestive power. In the history of European art since the end of the Middle Ages, this process in which the illusory media and the ability to maintain detachment compete, has taken place repeatedly[102].

Film, or cinema, is an intricate medium that rejects a standard categorization. In this contex, according to the perspective of Russian director Andrey Tarkovsky, the film is described as an «emotional reality» that enables viewers to engage with a «second

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[99] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 152.
[100] Ibid.
[101] Ibid.
[102] Ibid.

reality»[103]. Cinema is designed to elicit direct sensory and emotional responses, and this inherently «empowers» the director to influence the audience's emotions[104].

Cinerama was a revolutionary film format that introduced a new dimension to the film experience. It held a pivotal position in the successful era of 3-D entertainment cinema during the 1950s and 1960s[105].

Cinerama was created by Fred Waller, an American inventor and engineer. Waller had previously worked on projects for the US Air Force during World War II, involving the projection of films on curved screens for training purposes. His desire to bring a new depth and involvement to the cinematic experience comes from this particular experience[106].

The first prototype of *Cinerama* was the result of Waller's experiments in the late 1930s. Like several other large-scale image projection systems, it was presented to the public in an official presentation featured at the 1939 World Exhibition, under the name of *Vitarama*. However, the system underwent further improvements and changed its name to *Cinerama* in 1953[107].

Cinerama used a process of projection on a large and curved screen (usually with a curvature of 146 degrees), the immersive visual experience was created by the screen because of its characteristic of wrapping the viewer with the image. The system used three separate cameras and three projectors, each with a wide range of special lenses to cover the entire screen. During the projection, the three separate images were synchronized to create a single panoramic image and were accompanied by stereophonic sound. The first film to use the *Cinerama* format was *This is Cinerama* produced by Merian C. Cooper and directed by Mike Todd, Michael Todd Jr., Walter A. Thompson and Fred Rickey. The American documentary film debuted in 1952. *Cinerama* films were exclusively shown in specially designed theatres, numbering approximately one hundred worldwide[108].

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[103] Tarkovsky, A. (1986), *Sculpting in Time: Reflexions on Cinema*, University of Texas Press, Austin, p. 176.
[104] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 153.
[105] Hayes, R. M. (1989), *3-D Movies: A History and Filmography of Stereoscopic Cinema*, Jefferson, New York.
[106] Huhtamo, E. (2013), *Illusions in Motion*, The MIT Press, Cambridge, pp. 81-91.
[107] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, cit., p. 157.
[108] The Editors of Encyclopedia Britannica (2023), *Cinerama*, in Encyclopedia Britannica, https://www.britannica.com/topic/Cinerama, (last accessed 11-02-24).

Despite the extraordinary visual quality of *Cinerama*, it presented some technical and practical challenges: the need for three projectors and the curve of the screen made the projection process complex and not all cinemas could afford to adopt this expensive system. Regardless of these problems, *Cinerama* represents a fundamental model in the history of cinema and also for many of the technical and visual innovations that have been developed over the decades, that are still used in some modern film productions. Its pioneering research into projection modes that offered an exceptional viewing experience to the public paved the way for the development of advanced film formats[109].

During the same period, Morton L. Heilig conceived a significantly more radical concept for immersive experiences: the Cinema of the Future. This innovative concept aimed to provide illusionary encounters that engaged all human sense: sight, taste, smell, and touch[110]. It was a simple but at the same time revolutionary concept for his time. Heilig's ambitious vision was to completely wrap entirely the senses of the viewer, extending both beyond the ears and beyond the visual field. According to him, thanks to this broadening of the senses that would allow a greater understanding of the complexity of the sensory apparatus and of human perception, artists would have the opportunity to improve their ability to express themselves[111].

The Cinema of the Future, along with other projects, was destined to remain a futuristic vision. However, its idea and direction continued to inspire the efforts of the successors in the field of technological progress[112].

Morton L. Heilig then devoted his time and energy exclusively to the research and development of an immersive image device, designed for the medium that was rapidly expanding at the time, namely television. In the year 1960, he secured a patent for his creation called the *Stereoscopic television apparatus for individual use* (fig. 8). This invention featured a pair of stereo glasses equipped with two miniature television screens, capable of generating 3-D images. He ingeniously combined the principles of the traditional stereoscope with the innovative television technology and the result was this revolutionary invention[113].

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[109] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 157.
[110] Heilig, L. M. (1992), *El Cine del futuro: The Cinema of the future*, Presence 1, n. 3, pp. 297-294.
[111] Ibid.
[112] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, cit., p. 157.
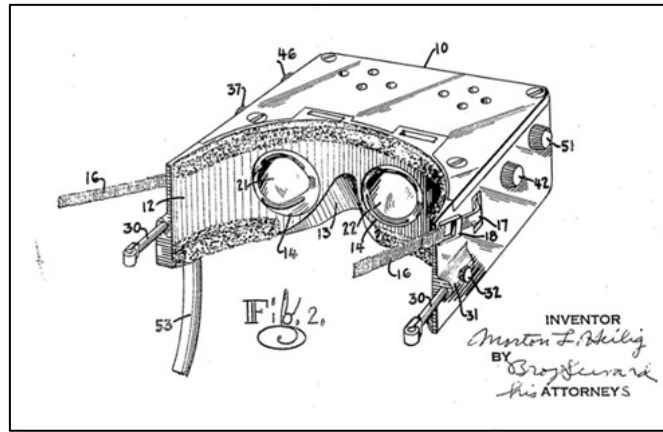[113] Ibid.

Figure 8. Heilig, L. M., *Stereoscopic television for individual use*, 1960, drawing.

Merely two years later, Heilig introduced the *Sensorama Simulator,* a groundbreaking device that quickly gained a place within the realm of entertainment. This apparatus not only presented viewers with 3-D CinemaScope visual cinematic and stereophonic audio, but also created vibrations and scents artificially generated through the use of specially formulated chemicals. The *Sensorama* did not offer the user particular interactive abilities, but successfully interacted with four of the human senses.[114] The goal was undeniably clear and was to provide a polysensory experiences of images. During the 1960s, the *Sensorama* was primarily found in amusement parks situated in California but had limited presence in other regions[115].

Since the dawn of the computer during World War II, numerous attempts have been made to connect and synchronize this universal machine with humans. Ivan E. Sutherland probably made the most significant contribution to the interactions between humans and machines with his doctoral thesis *Sketchpad* (1963), which was supervised by Claude Shannon at the Massachusetts Institute of Technology (MIT). *Sketchpad* represented the pioneering graphical user interface and brought about significant changes in the field of computer graphics.

In 1965, Sutherland's visionary concepts for the «ultimate computer display»[116] represented a revolutionary advancement in the world of technology. This innovative display had the potential to dynamically manipulate physical laws using optical means in

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[114] Fischer, S. C. (1991), *Virtual environments: Personal simulation and telepresence*, Meckler, London, p. 103.
[115] Krueger, M. (1991), *Artificial Reality: Past and future*, Meckler, London, p. 66.
[116] Sutherland, I. E. (1965), *The ultimate display* in *Proceedings of International Federation of Information Processing (IFIP)*, Macmillan, London, v. 2, p. 508.

"exotic concepts" and furthermore, it could visualize these concepts through computed matter[117].

One remarkable passage written by Sutherland's recalls Alberti's use of the window metaphor: «One muse look at a display screen as a window through which one beholds a virtual world. The challenge to computer graphics is to make the picture in the window look real, sound real, and the objects act real»[118].

Starting in 1966, Sutherland in collaboration with his student Bob Sproull, worked on the development of a head-mounted display (HMD) for the Bell Helicopter Company. This was a crucial moment in the history of virtual reality devices. The HMD marked the initial step toward a media utopia: a helmet incorporating binocular displays, where images from two monitors positioned directly in front of the eyes provided a three-dimensional perspective.[119] The immersive psychological potential of this technology has been demonstrated with flight simulations, when connected with an infrared camera, this device allowed military pilots to execute landings at night on difficult terrain. The idea behind the design of this device is a person could immerse himself in an unknown environment and be «telepresent», solely through the use of «camera-eyes»[120].

In the same year, Sutherland replaced photographic film images with computer-generated graphics, continually updated in real-time by the system, this marked the inception of the concept of virtual reality with interactive experience.

Two years later, in 1968, Sutherland developed the inaugural computer-assisted *Head-Mounted Display* (HMD) (fig. 9). He was supported by ARPA funds from the U.S. defense budget. The innovative device showcased 3-D computer-generated images and it featured internal sensors that tracked the user's head movements, a process now known as "headtracking". The fundamental idea behind this three-dimensional display was to provide the user with a perspective image that would fit dynamically adjusted as the user moved[121]. It's important to note that the primary objective of this HMD, in contrast with today's headsets, was not the total simulation of artificial environments. For this reason,

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[117] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 162.
[118] Sutherland, I. E. (1965), *The ultimate display* in *Proceedings of International Federation of Information Processing (IFIP)*, Macmillan, London, v. 2, p. 508.
[119] Grau, O, (2003), *Virtual Art. From Illusion to Immersion*, cit., p. 163.
[120] Ibid.
[121] Sutherland, I. E. (1968), *A head-mounted three dimensional display* in *Proceedings of the Fall joint Computer Conference (AFIPS)*, Thompson book Company, Washington DC, v. 33, p. 757.

it maintained uninterrupted visual access to the real world, utilizing two miniature cathode ray tubes, in this way the computer-generated images were superimposed over the actual environmental images. This approach allowed the user to simultaneously perceive both real and computer-generated images[122].

This stereoscopic system was also nicknamed the *Sword of Damocles* since it attached to a mechanical arm suspended from the ceiling of the laboratory. Its appearance inspired the name linked to classical mythology. The motivation for this design was partly due to its weight and mainly due to its use to track head movements via links. During the experiments carried out with the HDM the user had to have the head securely fastened in the device.[123].

Sutherland's early virtual environments were relatively basic, typically consisting of approximately 200-400 polygons. Through the integration of headtracking and biomechanical feedback, he managed to achieve an engaging experience. Thanks to regular updates to computer-generated images, a dynamic and responsive experience was born, limited only by the program's capabilities and rooted in the principle of interaction[124]. For the first time, the observer played an active role in generating the resulting 3-D images. This new level of involvement by the observer surpassed the (passive) experiences of traditional panoramas or Cinerama.

Figure 9. Sutherland, I. E., *Prototype of HDM*, 1968, photo, ARPA.

[122] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 163.
[123] Rheingold, H. (1992), *Virtual Reality*, Simon & Schuster, New York, pp. 105-113.
[124] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, cit., pp. 163-164.

2.1.2. 1970s and 1980s

In 1970, Germany hosted the exhibitions *Computerkunst - On the Eye of Tomorrow* (Hannover, 1969) and *Impulse: Computer-kunst* (Munich, 1971). This was also the year to attribute the beginning of the integration of computer art into the Venice Biennale, thus elevating the international recognition and status of this genre[125].

During the early 1970s, the computer scientist Myron Krueger began a journey to explore and develop new ways of combining the human mind with interactive computer-generated images.

Krueger conducted experiments with interactive installations that paved the way for responsive and psychologically communicative environments. His work represents a quest for a system in which observers, or users, perceive themselves as integral components of a community, composed of programmed entities, while the artist assumes the role of a composer of computer-generated spaces conveyed in real time. Krueger defined this concept as a «responsive environment»[126]. *Videoplace* is his principal and most important creation and embodies this idea, the initial version dates back to 1970 and in the following years he continued to refine it.

Videoplace is a two-dimensional graphic computer environment, a classic closed-circuit system. It captures the observer on video and projects their silhouette, which is digitally altered, onto a screen of huge proportions. The program offers numerous layers of interaction, engaging the viewer in a dialogic structure[127].

During the 1980s, in the metaphor governing interactions between humans and computers, a notable transition occurred. Advanced graphical interfaces started to replace commands based on text, this introduced the concept of "desktop", thus generating the perception of a flexible symbolic space on the computer display. Essentially, the evolution of virtual environments can be seen as an expansion of this metaphor into a third dimension, observable and manipulable both externally and internally[128].

The key figures in the advancement of virtual reality systems (in addition to Sutherland) include Tom Furness and Scott Fisher.

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[125] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 166.
[126] Ibid.
[127] Krueger, M. (1983), *Artificial Reality*, Addison-Wesley, Boston, p. 375.
[128] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, cit., pp. 166-167.

Starting from the mid-1970s, Furness focused on developing targeting devices for the U.S. Air Force and founded the Human Interface Technology Lab (HIT) at the University of Washington in 1989. Instead, Fisher initiated his work at MIT on stereo optical apparatus and, together with numerous researchers, moved to Atari's R&D department in Silicon Valley in 1982[129].

Thomas Zimmerman was the computer scientist who invented the prototype of the *Data Glove* in 1982. The latter were created as an input device, tracking position and orientation, through a connection between the computer and a fiber optic cable, the user was able to move virtual objects. The researcher had been thinking for years about creating an interface device for musicians based on the common practice of playing "air guitar", in particular, a glove capable of tracking the movements of hands and fingers hand and offering control over instruments such as electronic synthesizers[130].

At the time, Zimmerman was working at the Atari Research Centre in Sunnyvale (California) along with Fisher, Laurel, and other VR researchers who would be active during the 1980s and later. Jaron Lanier was another researcher at Atari and shared Zimmerman's interest in electronic music, this common interest brings the two to the beginning of a collaboration in 1983, in fact they worked together to improve the design of the *data glove*. Two years later, Zimmerman and Lanier left Atari at the same time to work independently and found their start-up, which was named VPL Research (Virtual Programming Languages)[131].

The new company began a collaboration with NASA aimed at improving the functionality of the *data glove*. Thanks to the upgrades, the glove now functions as a specialized sensor, skilled in detecting and transmitting finger positions, also facilitating seamless movement and navigation within a virtual environment.

Typically, the glove employs optical fibers tracing the fingers' path from the wrist. the bending of the fingers modulates the light transmitted through these fibers and the resulting data is communicated to a computer by diodes. Through the use of this innovative glove and the sensors positioned on the body of the users, they acquire the ability to have spatial coordination and the capacity to interact and manipulate computer-

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[129] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p 167.
[130] Lowood, H. E. (2023), V*irtual reality*, in Encyclopedia Britannica, https://www.britannica.com/technology/virtual-reality, (last accessed 11-02-24).
[131] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, cit., pp. 166-167.

generated objects[132]. However, simulating feedback effects or tactile impediments remains a challenging task for this particular device.

Lanier, together with his company VPL Research, was the pioneer that made possible the introduction of commercial applications for the data glove and virtual reality (fig. 10). The Data Gloves were released in 1985 and earned the title of the first commercial VR device. A few years later, the company also released a full-body, motion-tracking system called "*DataSuit*", the first consumer head-mounted display called "*EyePhone*" and a shared VR system for two people called RB2 (Reality Built for Two)[133].

The Atari Lab, previously appointed, finished its research and closed in the mid-1980s, consequently Fisher decided to move to the NASA Ames Research Center (California). There, he was working as founding director of the Virtual Environment Workstation (VIEW) project. This project put together a set of goals that summarized previous work on artificial environments, from the creation of multisensory and immersive «virtual environment workstations» to telepresence applications[134].

Fisher had put together a research group to build low-cost personal simulation environments. While NASA had an extended goal, the development of telerobotics for automated space stations in future planetary exploration, and also workstations for entertainment, scientific, and educational purposes.

Figure 10. Zimmerman, T., *Prototype of the Data Glove*, 1985, photo, VPL Research.

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[132] The data glove is basically the further development of the mouse. The input medium could be, for example, a video camera.
[133] Lowood, H. E. (2023), V*irtual reality*, in Encyclopedia Britannica, https://www.britannica.com/technology/virtual-reality, (last accessed 11-02-24).
[134] Ibid.

By 1990, the VIEW workstation, called the *Virtual Visual Environment Display* was completed. It established a standard set of VR technology that included a stereoscopic head-coupled display, head tracker, speech recognition, computer-generated imagery, data glove, and 3-D audio technology. Fisher and his team designed and later built also their own stereoscopic *Head-Mounted Display* (HMD), the system of this device featured a liquid crystal display (LCD)[135]. These virtual image spaces allowed the interaction of up to six users (simultaneously) with virtual objects. The VIEW could transmit artificial images with 3D computer graphics and were used in astronaut training. In addition, the device was used in partnership with VPL Research and its products: the user at the same time worn the *DataGlove* and the *DataSuit*, both equipped with sensors to measure the motions, gestures and spatial orientation of the trunk and limbs[136].

It is important to emphasize that also NASA played a significant role in the advancement of the telepresence technology. Telepresence enables users to control the movements of a distant robot through a remote control, the navigation is carried out within a computer-generated simulation that represents the actual physical location of the robot. The sensation of being physically present in a different location is created through the synchronized actions of the user and the robot, coupled with the visual depiction of the robot's position[137].

Subsequently, the connection between the body and the machine possible through telepresence is taken to a new level. It is fundamental to emphasize that this concept does not aim to eliminate the physical body of the user, the goal of the research on telepresence is to involve the senses of the human being, creating a complete and deceptive illusion. The body is not eliminated but instead exploited in favour of the objective[138].

In 1988, Scott Fisher and Elisabeth Wenzel introduced the first «spatiovirtual» sound. With this innovation the sound kept its position in the simulated space, also whit the change of the user's coordinates, thus reaching another step towards the improvement of the overall illusion[139].

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[135] Lowood, H. E. (2023), V*irtual reality*, in Encyclopedia Britannica, https://www.britannica.com/technology/virtual-reality, (last accessed 11-02-24).
[136] Ellis, S. R. (1991), *Nature and Origins of virtual environments: A bibliographical essay* in *Computing Systems in Engineering*, n. 4, pp. 321-347.
[137] Minsky M. (1980), *Telepresence*, Omni, June, pp. 44-50.
[138] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, pp. 167-168.
[139] Ivi. p. 168.

In 1989, Fake Space Labs released the device called *BOOM*. The new invention consisted of a small box containing two CRT monitors that were displayed through holes made for eye placement. The user could then safely grab the box, lay it on his eyes and move through the virtual world. A mechanical arm measured the position and orientation of the box[140].

During this period in the late 1980s and early 1990s, the cost of high-performance computers declined significantly, leading to the emergence of numerous new companies and the initial commercial applications of virtual reality. Small-scale startups characterized by few employees, such as Autodesk, Sense8, and W. Industries, proliferated[141].

The general atmosphere was predominantly euphoric and accompanied by considerable hype. A collective imaginary that Lanier defines as «New Californian Dream» was founded, on the widespread utopian visions, that were born as a result of the imminent development of a means capable of generating unprecedented image illusions[142].

The concept of a global network facilitating the immersion in 3-D space, quickly moved from the subculture to tabloid publications, and even serious business journals were not immune to these technological speculations. Last but not least, billions of dollars via the stock exchange were invested in the field of virtual reality ad technology.[143].

As already written above, Jaron Lanier coined the term *Virtual Reality* in 1987. His attempt (which was successful) sought to consolidate diverse areas of research regarding the human-computer interface and the utopian aspirations. The result was a paradoxical word but appealing to the public imagination[144]. The deliberate vagueness in the terminology used around virtual reality broadens the horizons of the public imagination and feeds the dynamics of the market. The aspirations are placed in a technological future, yet to be realized, and have nothing to with something human or divine, but rather on an artificially constructed apparatus: an artifact[145].

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[140] Mazuryk, T. & Gervautz, M. (1999), *Virtual Reality History. Applications, Technology and Future*, Institute of Computer Graphics, Vienna University of Technology, Vienna, p. 3.
[141] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 168.
[142] Lanier, J. (1992), *Virtual Reality: A status report* in *Cyberarts: Exploring Art and Technology*, Miller freeman, San Francisco, pp. 272-279.
[143] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, cit., p. 169.
[144] Ibid.
[145] Bredekamp, H. (1992), *Der Mensch als "Zweiter Gott"* in *Elektronische Medien und künstlerische Kreativität*, Hans-Bredow-Institut für Rundfunk un Fernsehen, Hamburg, pp. 134-147.

2.1.3. 1990s

At regular intervals and with the aim of enriching the immersive experiences in virtual reality and cinema, new ideas were presented and in some cases even realized. Among these ideas, the spherical projection of *Omnimax* cinema stands out. With this invention, James Gibson concretely realized his intention to widen the field of view by eliminating all forms of framing from the line of sight. He stated: «With a Cinema screen, the virtual window may sample as much as 160° of the ambient array, instead of the mere 20° or 30° of the usual movie theatre, and the illusion of locomotion may then be compelling»[146].

The Image Maximization (IMAX), introduced in the 1990s, represented the state-of-the-art of the cinematic illusion of the time. This U.S. company has distributed more than 150 of its breathtaking cinemas in over 20 countries in the world. This type of cinema featured a curved screens that cover up to 1000 m² and the audience was literally immersed in the images[147].

When watching IMAX 3-D films, spectators must wear special glasses with lenses that are opened and closed in rapid succession and that emit high frequency infrared light. In this way, each eye perceives the images of the two film projectors separately but then the brain combines the images (which are slightly different) in one image, the result perceived by the viewers is that of an impressive spatial depth. From the commercial point of view, IMAX cinemas are very successful among the public and there are no wonder about this result, in fact the films tend to follow a pattern reminiscent of the panoramas and their themes: the IMAX, just like panoramas in the past, transports the spectators to inaccessible and foreign places. Millions of visitors are attracted to the modified sequences of images that capture angles that are inaccessible to most people[148].

In the early 1990s and in the Silicon Valley area, a large number of virtual reality companies sprouted up, although the overall momentum had already waned in the middle of the decade. As has already been brought to light, talking about the evolution of virtual reality, this had taken shape in recent decades through a series of projects and especially thanks to numerous pioneers who will remain in history. This field, however, failed to capture such widespread and rapid interest as had been expected. Contrary to the market

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[146] Gibson, J. (1986), *The Ecological Approach to Visual Perception*, Hillsdale, NJ: Erlbaum, p. 184.
[147] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 160.
[148] Ibid.

predictions that favoured the personal VR setups, the most eye-catching and successfully promoted products were the "location-based entertainment" systems. These VR game rooms and simulators were realized by teams from the fields of gaming, film, simulation, and theme park sectors. Their strength point was the combination of the characteristics of video games, amusement park rides, and highly immersive storytelling[149].

In the field of location-based entertainment, stood out the project created by Disney in its amusement parks around 1990s and called "Disneyland's Star Tours". Although it is noteworthy that the company already, for several decades, built attractions that featured an advanced technology for Disneyland parks. Star Tours was basically an immersive flight simulator whose theme was centred around the Star Wars film series. This attraction was developed in collaboration with the esteemed producer George Lucas and his company Industrial Light & Magic. The carousel had simulated and specialized technological effects, and its peculiarity was the use of methodologies derived from Hollywood films and military flight simulators, intertwined with a narrative emphasis and architectural elements have shaped and made unique the experiential journey of spectators[150]. During the 1990s, given the success of Star Tours, the Walt Disney Imagineering decided to undertake a series of projects aimed at integrating interactive technology and immersive environments in their attractions, including for example 3D cinematic photography and multiplayer virtual worlds[151].

Since 1991 has begun the proliferation of the first gaming establishments dedicated to VR video games, facilitated by a specialized apparatus called Virtuality Group Arcade Machines and the VR arcades of Visions of Reality. In addition to Disney novelties, there were also other projects always related to the concept of VR entertainment based on location, for example, the 1991 Sega Arcade R360 gyro flight simulator, Iwerks Entertainment's Turbo Tour and the 1992 Turboride 3-D Theater Motion Simulator. Film producer Steven Spielbergle had created a chain of arcades called Gameworks in collaboration with Universal Studios, Sega Corporation and Dreamworks SKG[152].

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[149] Lowood, H. E. (2023), *Virtual reality*, in Encyclopedia Britannica, https://www.britannica.com/technology/virtual-reality.
[150] Ibid.
[151] Ibid.
[152] Ibid.

During this decade, it can be asserted that companies engaged in the domain of virtual reality have shifted their focus toward the gaming sector, thanks to the rapid advancements of technology, computer graphics, and motion sensors.

In 1992, there was another milestone in the history of virtual reality devices, the researchers from the University of Illinois at Chicago introduced an innovative virtual reality system different from the traditional *Head-Mounted Display* (HMD) setups, it was called *Cave Automatic Virtual Environment* (CAVE) (fig. 11). The CAVE constituted a cube with walls measuring 10 feet on each side, on which images were projected to captured users in both sights and sounds, effectively it functioning as a VR theatre. Individuals, wearing lightweight stereoscopic glasses (LCD), were allowed to move freely within the room. Their head and eye movements were meticulously tracked to adapt the images and the result is a stereoscopic perspective and a perception of depth in the virtual environment[153].The user's interaction with 3-D virtual objects was facilitated through the creation of a wand-like device equipped with three buttons. The CAVE not only filled the natural field of vision of its occupants, enhancing the sense of immersion, but also provided more freedom of movement compared to conventional VR workstations. Moreover, making a comparison with traditional devices, the space housed multiple individuals who could share the experience and engage in discussions about their observations[154].
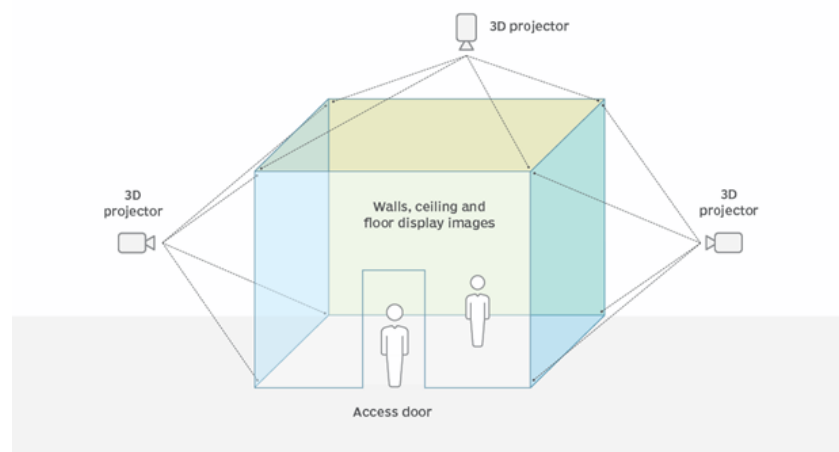

Figure 11. Techtarget, *Prototype of the CAVE VR*, 2022, digital drawing.

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[153] Creagh, H. (2003), *Cave automatic virtual environment* in *Proceedings of Electrical Insulation Conference and Electrical Manufacturing and Coil Winding Technology Conference,* Indiana Institute of Technology, Indianapolis, pp. 499-504.
[154] Ibid.

Thanks to virtual reality environments projected within artistic and scientific settings, a transition from the bulky VR helmets prevalent in the previous years was achieved. In this new era, there was a shift to lightweight eyeglasses, wearable sensors, which allowed an augmented degree of mobility of the users. Another difference from the past was the use of virtual reality for social interaction within virtual worlds[155].

In 1993, SEGA, the prominent Japanese company, publicized its intention to develop a new VR headset, incorporating LCD screens, stereo sound, and head tracking functionalities, specifically realised for select games on the Mega Drive console[156]. However, this apparatus failed to reach a standard considered acceptable for commercialization and due to developmental problems never saw public release[157].

Introduced in July 1995, the *Nintendo Virtual Boy* is the first and only video game console explicitly designed for stereoscopic gaming and after marketed to the public. However, it encountered limited success attributable to various factors, the device faced challenges in classification by being halfway between a stationary console and a portable unit, as a result, it proved inconvenient for both types of uses and make it difficult to promote. Additionally, the lack of backward compatibility with other consoles from the same company has been a major disadvantage[158].

As if these reasons were not enough, to mitigate price problems, a display with colour limitations and lower quality than alternative market offers have been adopted for the device. Further aggravating these issues were ergonomic problems resulting from the necessity to assume a bent position during gameplay, leading to physical discomfort, and the absence of multiplayer capabilities. In summary, all these factors contributed to the modest success of the *Nintendo Virtual Boy*[159].

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[155] Lowood, H. E. (2023), *Virtual reality*, in Encyclopedia Britannica, https://www.britannica.com/technology/virtual-reality, (last accessed 11-02-24).
[156] Whitehouse, R. (2020), *Sega VR revived: emulating an unreleased genesis accessory,* in Video Game History Foundation, https://gamehistory.org/segavr/, (last accessed 11-02-24).
[157] D'Anastasio, C. (2020), *How Video Game Historians Resurrected Sega's Lost VR Headset*, in Wired, https://www.wired.com/story/sega-vr-headset-video-game-preservation/, (last accessed 11-02-24).
[158] Zachara, M. & Zagal, J. P. (2009), *Challenges for success in stereo gaming: a virtual boy case study in Proceedings of the international conference on Advances in Computer Enterntainment Technology*, Athens, pp. 99-106.
[159] Ibid.

In 1995, the artist Charlotte Davies realized the virtual environment called *Osmose* (fig. 12), the installation was presented on a limited scale, merely six instances in North America and Europe, and it has been encountered by only a select few thousand visitors. Her creation is mentioned in the most important manuals on virtual reality and its history thanks to the attention that this project has received in the global discourse on media art, thanks to the profound novelties regarding the aesthetics and the reception of virtual art has received more attention than any other contemporary work[160].

Osmose reaches a level that remains unprecedented, as it carefully takes care of the user interface that is a central aspect of interaction and virtual reality applied to art. It works as a technically sophisticated simulation that visually surprises those who have the opportunity to enter in it. The theme of the installation is a series of natural spaces and branched expansive materials that were portrayed in an intricate way: «an intangible sphere characterized by its mineral and vegetative attributes»[161]. Notably, in this work, there is a conspicuous departure from the grainy and polygonal imagery reminiscent of the formative years of virtual art.

Osmose constitutes an immersive and interactive environment, encompassing a head mounted display (HMD), 3-D computer graphics, and interactive auditory elements. The users are afforded the opportunity to explore this environment «synaesthetically»[162].
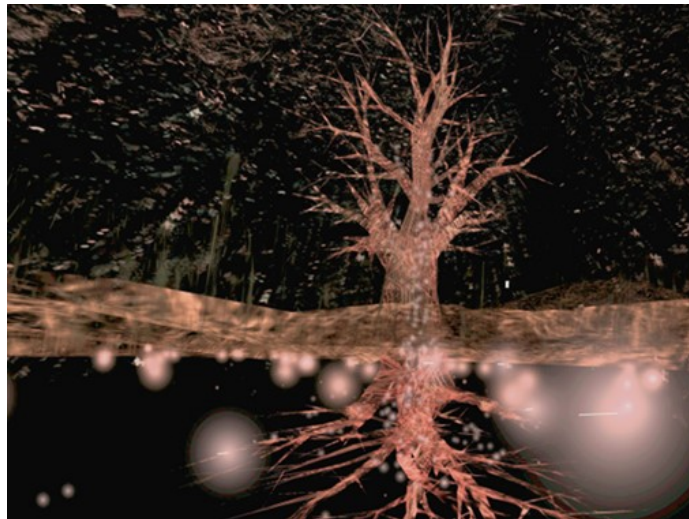

Figure 12. Davies, C., *Osmose*, 1995, real time frame captured, ISEA (Montreal).

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[160] Davies, C. (1998), *Osmose. Notes on being in immersive virtual space*, Digital Creativity, n. 2, pp. 65-74.
[161] Ibid.
[162] Davies, C. & Harrison, J. (1996), *Osmose: Towards broadening the aesthetic of virtual reality*, Computer graphics: Annual Conference Series 30, n. 4.

In second place, visitors have the opportunity to trace the individual and interactive visual path made of images, through this installation that is considered a «simulacrum of nature». Facilitated by polarized glasses, the observers are witnesses of the «changing prospectives of the three-dimensional image worlds on a large-scale projections screen»[163]. The images are exclusively generated by the user, whose moving silhouette is weakly perceptible within the installation on a frosted glass panel. As previously pointed out, the visitor lives a personal journey within the virtual space, so the sense of loneliness is intentional and aimed at intensifying this type of experience. The fusion of an autonomous system and an obscured auditorium with a screen constitute the configuration of the installation, aimed at evoking associations with a theatre or film studio[164].

The meaning of this artistic creation has developed over time, also thanks to the appreciation it has obtained from the passions of technology and art. It effectively serves as a milestone in the annals of media history, comparable to the cinematographic works of the Lumière brothers or the first panoramas, despite occasional controversial allusions to kitsch and esotericism. The aesthetic exploitation of emerging technologies related to immersion and illusion are among the motivations of its still current recognition[165].

VPL had ceased operations in 1993 and rumours began to spread about a potential demise of virtual reality, fuelled also by the collapse of the commercialization of VR workstations. Despite these assumptions, throughout the 1990s and into the 21st century, technologies such as virtual worlds, augmented reality, and telepresence persisted and experienced successful implementation in different fields. These technologies served as pivotal platforms for creative work, research initiatives, gaming, training environments, and social space of interactions. Furthermore, military and medical imperatives continued to propel advancements in these technologies, often in collaboration with academic institutions or entertainment enterprises. In addition, the rise of the Internet has pushed to focus on integrating network technology into these projects, giving a crucial social dimension to virtual worlds. As a result, individuals were learning to live in virtual spaces[166].

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[163] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 193.
[164] Ibid.
[165] Ibid.
[166] Lowood, H. E. (2023), *Virtual reality*, in Encyclopedia Britannica, https://www.britannica.com/technology/virtual-reality, (last accessed 11-02-24).

2.1.4. 21st century

From the turn of the century and then for at least a decade, the virtual reality scenario has remained stagnant, in fact, after the initial wave of enthusiasm for virtual reality tools, these have been temporarily set aside. This is primarily attributable to the technical limitations of computer systems, wherein the necessity for processors capable of maintaining consistent graphic representation of the 3D virtual world, while simultaneously tracking the movements of the head and body at an appropriate rate is indispensable to prevent the escalation of sensations of nausea and vertigo[167].

However, as pointed out by Jaron Lanier and as will be treated later, in the last two decades, virtual reality has become a standard in both testing and application. It is used daily as a simulator in engineering, automotive, maritime, mechanical, and aeronautics contexts. These different applications of virtual reality serve as fundamental elements for media the integration in the realms of entertainment and audiovisual storytelling[168].

To reach a real turning point, it is necessary to wait for the advancements and the market penetration of new digital media, exemplified by smartphones, along with greater and persistent accessibility to internet. At the same time, the increase of computational capabilities, characterized by more robust processors and RAM cards with expanded memory storage, as well as improvements in graphics rendering and 3D model capabilities, are essential elements for the functioning of virtual reality devices[169].

Starting from the year 2010, a multitude of startup enterprises proliferated in the United States, among them the Oculus brand. All these new models introduced on the market were characterized by flat screens, motion tracking capabilities and accelerated graphics, but they were offered at a more accessible price. This marked a pivotal moment when virtual reality finally transitioned from the laboratories to the commercial sphere of entertainment. This change has irreversibly paved the way for subsequent advancements and diverse modalities for experiencing virtual reality content, not indispensably linked to the utilization of viewing devices[170].

Since 2010, there has been a substantial advancement in various ergonomic aspects incorporated by head mounted displays. Significantly, these devices have witnessed a

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[167] Faisal, A. (2017), *A Computer science: Visionary of virtual reality*, Nature, v. 551, p. 298.
[168] Lanier, J. (2017), *Dawn of the New Everything: Encounters with Reality and Virtual Reality*, New York, Henry Holt and Company, p. 2.
[169] Faisal, A. (2017), *A Computer science: Visionary of virtual reality*, cit., pp. 298-299.
[170] Ibid.

reduction in weight that has made them more comfortable and also more convenient for wear. Simultaneously, there has been a reduction in their cost, and they have embraced wireless configurations, thus offering to user greater freedom of movement[171].

Oculus is the most important company in the creation of life reality devices. Palmer Luckey worked for Oculus in 2010 and designed the first prototype of the *Oculus Rift*. The device was only able to perform rotational monitoring due to its construction on an existing virtual reality headset. It was an unprecedented innovation for the market, the consumers had never seen a headset with a 90-degree field of view. Luckey has created a software that previously distorted the image rendered in real time, this to solve the problems of distortion caused by the type of lens used to obtain such a wide field of view. The initial project of the Oculus Rift would serve as a starting point for all the subsequent designs[172].

In 2012, the debut showcase of the *Oculus Rift* took place at the E3 video game trade exhibition under the presentation of John Carmack. The new VR headset produced by the nascent company Oculus has an immense success, raising $2.5 million and revitalizing the global interest in virtual reality[173].

Subsequently, in 2014, Facebook acquired Oculus VR for a sum initially reported as $2 billion but later disclosed to be a more accurate valuation of $3 billion. This acquisition transpired subsequent to the shipment of the initial development kits, originally ordered through Oculus Kickstarter initiative in 2012, which were dispatched in 2013. Following its acquisition by Facebook, Oculus has emerged as one of the most famous brands in the realm of virtual reality headset production and design[174].

Valve, another manufacturer of headsets, has identified and openly shared the breakthrough in low-persistence displays that enable lag-free and artifact-free VR content visualization. This innovation has been adopted by Oculus and implemented across their subsequent headset releases[175]. In early 2014, Valve introduced its prototype named

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[171] Morandini, S. (2019/2020), *Master's Degree: Immersive Storytelling in cinematic, artistic and theatrical virtual reality works*, Relatrice Prof.ssa S. Bassi, Università Ca' Foscari Venezia, p. 48.
[172] Rubin, P. (2014), *Oculus Rift*, Wired, v. 22, n. 6, p. 78.
[173] Ibid.
[174] Metz, C. (2014), *Facebook Buys VR Startup Oculus for $2 Billion*, in Wired, https://www.wired.com/2014/03/facebook-acquires-oculus/, (last accessed 11-02-24).
[175] Wasson, S. (2013), *Not-quite-live blog: panel discussion with John Carmack, Tim Sweeney, Johan Andersson*, in The Tech Report, https://techreport.com/review/not-quite-live-blog-panel-discussion-with-john-carmack-tim-sweeney-johan-andersson/, (last accessed 11-02-24).

SteamSight, featuring key attributes such as consumer-grade headphones, individual 1K displays for each eye, low-persistence technology, expansive positional tracking, and Fresnel lenses. This prototype laid the groundwork for the consumer headsets subsequently launched in 2016[176].

In the year 2014, Sony unveiled *Project Morpheus*, denoting the codename for the PlayStation VR, a virtual reality headset designed for implementation with the PlayStation 4 video game console[177].

Subsequently, in 2015, Google introduced *Cardboard* (fig. 13), a low-cost stereoscopic viewer designed for user-assembled use with smartphones. In this configuration, the user positions their smartphone within the Cardboard apparatus, which is worn on the head. The headset has only the function of a container for the smartphone, as the latter incorporates all primary components requisite for a comprehensive VR system, encompassing tracking functionality (confined to rotational tracking facilitated by the gyroscope), dedicated hardware for processing, and display capabilities[178].

In 2016, the inaugural consumer version of the Rift was launched and denoted as *Consumer Version 1* (CV1) (fig. 14)[179]. As previously remarked, this apparatus remains emblematic in the realm of virtual reality and serves as a prototype for subsequent innovations, including the inception of the *Oculus Quest*.

Figure 13. Google, *Google Cardboard viewer*, 2014, photo, Google Annual Developer Conference (California).

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[176] Paul, J. (2013), *Valve to Demonstrate Prototype VR HMD and Talk Changes to Steam to "Support and Promote VR Games"*, in Road to VR, https://www.roadtovr.com/vr-headset-valve-virtual-reality-steam/, (last accessed 11-02-24).

[177] Their, D. (2014), *Sony Announces 'Project Morpheus': Virtual Reality Headset For PS4*, in Forbes, https://www.forbes.com/sites/davidthier/2014/03/18/sony-announces-virtual-reality-headset-for-ps4/, (last accessed 11-02-24).

[178] Pierce, D. (2015), *Google Cardboard is VR's Gateway Drug*, in Wired, 2015, https://www.wired.com/2015/05/try-google-cardboard/, (last accessed 11-02-24).

[179] Rubin, P. (2014), *The Inside Story of Oculus Rift and How Virtual Reality Became Reality*, in Wired, https://www.wired.com/2014/05/oculus-rift-4/, (last accessed 11-02-24).

Figure 14. Oculus VR, Commercial poster of the *Oculus Rift*, 2016, photo.

Following the advent of the *Oculus Rift*, a multitude of additional VR products has emerged and proliferated. In the same year, Valve Corporation in collaboration with HTC, conceived another prominent VR device: the *HTC Vive*. The device incorporates latest generation motion controllers that use headlight tracking technology. This technological advance marks the significant iteration of sensor-based detection, which is able to offer users unlimited mobility within a delimited spatial environment[180].

In 2017, a patent application submitted by Sony indicates their research for localization technology, similar to that employed by Vive for the PlayStation VR, potentially opening doors for the creation of a wireless headset[181].

By the end of 2016, more than 230 enterprises were actively engaged in the development of products associated with virtual reality. These included major players in the industry: Amazon, Apple, Facebook, Google, Microsoft, Sony, and Samsung, all had established specialized VR and AR divisions.

In this period, the majority of the released headset featured the widespread integration of dynamic binaural audio. However, regarding the other features, the touch interfaces were in a nascent phase of development, and the prevailing hardware configurations featured push-button phones for touch-based interactivity. The displays still presented modest

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[180] Prasuethsut, L. (2016), *HTC Vive: Everything you need to know about the SteamVR headset*, in Wareable, https://www.wareable.com/vr/htc-vive-review, (last accessed 11-02-24).
[181] Martindale, J. (2017), *Vive-like sensor spotted in new Sony patent could make its way to PlayStation VR*, in Digital Trends, https://www.digitaltrends.com/computing/sony-psvr-patent-sensor/, (last accessed 11-02-24).

resolutions and frame rates, the visual fidelity was not at its highest level, in fact virtual images still remained perceptibly distinguishable from reality[182].

In 2019, Oculus introduced the *Oculus Rift S* alongside an autonomous headset, namely the *Oculus Quest*. Unlike previous generations of headsets that used external tracking methodologies, these new devices used inside-out tracking[183].

In the same year, Valve introduced the *Valve Index*. An wide 130° field of view, immersive off-ear headphones designed for enhanced comfort, open-handed controllers that allow individual finger tracking, front cameras and a front expansion slot designed to facilitate extensibility, were all characteristics of this device[184].

Merely a year later, Oculus launched the *Oculus Quest 2*, introducing several noteworthy improvements such as an enhanced display resolution, increased performance features but a reduced price. By the year 2021, the *Oculus Quest 2* constituted a predominant share for the company, comprising 80% of all virtual reality headsets sold[185].

In the year 2023, the *PlayStation VR2* was introduced by Sony as a successor to the PlayStation VR made in 2014, the new headset is equipped with inside-out monitoring, advanced resolution display, controller with adaptive trigger and tactile feedback, and an enlarged field of view[186]. Subsequently, Apple marked the company's inaugural adventure in the VR headset market with the launch of *Apple Vision Pro*. This device seamlessly integrates virtual reality and augmented reality to generate immersive images. In particular, the *Apple Vision Pro* stands out as one of the few mainstream headsets that relies solely on manual monitoring without additional controllers[187].

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[182] Kelly, K. (2016), *The Untold Story of Magic Leap, the World's Most Secretive Startup*, in Wired, https://www.wired.com/2016/04/magic-leap-vr/, (last accessed 11-02-24).

[183] Meta (2019), *From the lab to the living room: The story behind Facebook's Oculus Insight technology and a new era of consumer VR*, in Meta, https://tech.facebook.com/reality-labs/2019/8/the-story-behind-oculus-insight-technology/, (last accessed 11-02-24).

[184] Valve Software (2023), *Headset - Valve Index® - Upgrade your experience - Valve Corporation*, in Valve Software, https://www.valvesoftware.com/en/index/headset/, (last accessed 11-02-24).

[185] Robertson, A. (2020), *Oculus Quest 2 Review: Better, Cheaper VR*, in The Verge, https://www.theverge.com/21437674/oculus-quest-2-review-features-photos, (last accessed 11-02-24).

[186] Playstation (2023), *PS VR2 Tech Specs | PlayStation VR2 display, setup and compatibility*, in PlayStation, https://www.playstation.com/en-se/ps-vr2/ps-vr2-tech-specs/, (last accessed 11-02-24).

[187] Patil, R. R. (2023), *Integration of Natural Language Processing and Augmented Reality: ChatGPT Meets Apple Vision Pro*, in International Research Journal of Modernization in Engineering Technology and Science, https://www.irjmets.com/uploadedfiles/paper//issue_8_august_2023/43783/final/fin_irjmets1691084450.pdf, (last accessed 11-02-24).

2.2. Applications

The rapid evolution of virtual reality technologies in contemporary times is intricately associated with their pervasive relevance in different fields of application. In some case, dedicated devices are tailored and customize for specific purposes, while in many others, a uniform technology is proposed for various objectives. The following paragraphs briefly outline the most noteworthy realms of application.

2.2.1. Education

The young generations, growing up in an environment infused with different technological apparatuses since early childhood and living within a technologically driven society, have become familiar with various technological modalities. In contrast to adults, who may be concerned and reluctant about technology, younger individuals show significantly less hesitation in embracing contemporary developments, promptly exploring new advancements spread especially through advertising[188].

The field of education is one of those that in the coming years could further expand the use of virtual reality. In recent years, educational institutions of all levels, spanning from kindergarten to university, have begun to integrate virtual reality in pedagogical processes to improve their educational offer[189].

Educational applications encompass virtual laboratories, in which students engage not only with the virtual matter but also with their peers, thus promoting new and stimulating interactions. For example, within a chemistry laboratory, students can observe three-dimensionally reconstructed molecules and atomic bonding configurations, offering an intuitive perspective that facilitates a deeper comprehension of the subject under examination. Another illustrative example of virtual reality integration in education concerns the immersive observation of celestial bodies such as the sun, planets, and galaxies in three-dimensional space, which clarifies complex concepts such as planetary revolutions and rotations. Still speaking of the experiential learning, virtual reality allows individuals to reenact historical narratives, improving students diminished perceptual distance and consequently their involvement[190].

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[188] Boyles, B. (2017), *Virtual Reality and Augmented Reality in Education*, Centre for Teaching Excellence, United States Military Academy, New York, pp. 1-8.
[189] Ibid.
[190] Baker, S. C., Wentz, R. K., Woods, M. M. (2009), *Using virtual worlds in education: Second Life® as an educational tool*, Second Life, Teaching of Psychology, pp. 59-64.

Furthermore, the realm of language acquisition particularly in conjunction with artificial intelligence, is particularly promising for virtual reality and offers a potentially effective method for language learning[191].

In the following years, an extensive integration of virtual reality within the educational sector is planned. This prediction is underpinned by the potential ability of virtual technology to clarify intricate abstract concepts, giving students of all ages a tangible opportunity to immerse themselves directly in the topics of study, thus fostering greater understanding. Despite these transformational possibilities, the widespread adoption of VR technologies in education remains constrained by high financial costs[192].

2.2.2. Architecture and engineering

Within the field of architecture, a clear trend is emerging in which clients are increasingly have the opportunity to predict the final outcome of a project, before the start of construction activities. The plan is meticulously reconstructed in three dimensions or, sometimes, even in immersive form. This practice, commonly referred to as "architectural visualization", serves not only to allow customers to evaluate the results in advance, but also empowers architects to verify the validity of the project. Additionally, given that virtual reconstruction entails significantly lower costs and requires much less time, it becomes feasible to make changes to the initial models, including those of a recurring nature[193]. Through the comprehensive assessments of various factors and aspects preceding actual construction, the incidence of design errors is significantly diminished. Whether insiders such as architects and real estate agencies, or outsiders like clients, acquire the ability to preview the visual representation and internal components of a property prior to acquisition, and even before its construction. Conducting a virtual first-person visit of the intended environment, including its furnishings, facilitates a more

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[191] Blasing, M. T. (2010), *Second language in second life: Exploring interaction, identity and pedagogical practice in a virtual world*, Slavic and East European Journal, v. 54, pp. 96-117.
[192] Hussein, M. & Nätterdal, C. (2015), *The Benefits of Virtual Reality in Education - A comparison Study*, Chalmers University of Technology & University of Gothenburg, Department of Computer Science and Engineering, pp. 3-13.
[193] Sala, N. (2023), *Applications of Virtual Reality Technologies in Architecture and in Engineering*, International Journal of Space Technology Management and Innovation, pp. 78-88.

refined and accurate evaluation of dimensions and spatial configurations that might pose challenges for a non-professional individual[194].

In the field of building and skyscrapers construction, the capacity to preview the ultimate product before its physical realization is extremely beneficial. Conducting a construction simulation, for instance, becomes critical to simplifying the building procedures and proactively preventing potential critical issues. This preventive approach not only optimizes the creation process, but also mitigates the time required for the building's actual realization[195].

Automotive corporations use this kind of virtual reality application for the realization of prototypes and for carrying out test and evaluations. The adoption of virtual technologies facilitates the rapid and economical realization of such prototypes.

2.2.3. Medicine

In the medical domain, virtual reality is evolving beyond its role of simple training mode and is increasingly recognized as a therapeutic and operative tool, finding application in diagnostic procedures and even in surgical interventions. Both in physical and cognitive rehabilitation, virtual reality exploits its substantial capacity to simulate daily activities with escalating levels of complexity, thus facilitating personalized training within a secure and controlled framework[196].

Within surgical contexts, the integration of VR technologies allows interventions in highly challenging and dangerous scenarios. Leveraging the third dimension, these technologies offer the ability to scrutinize details imperceptible to the naked eye and enable surgeons to operate remotely exclusively through the use of robotic devices. The first robotic intervention in history took place in Paris in 1998[197].

Moreover, in the medical field, virtual reality provides a wide range of tools for advanced diagnostic procedures, particularly in the early detection of neurodegenerative diseases

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[194] Sala, N. (2023), *Applications of Virtual Reality Technologies in Architecture and in Engineering*, cit., pp. 78-88.
[195] Ibid.
[196] Falah, J. (2014), *Virtual Reality medical training system for anatomy education*, Science and Information Conference (SAI), IEEE, pp. 752-758.
[197] Pottle, J. (2019), *Virtual reality and the transformation of medical education*, Future healthcare journal, vol. 6, n. 3, p. 181.

such as Alzheimer's or Parkinson's. This diagnostic approach involves neurosensory reactivation grounded in memories of experienced past events[198].

Ultimately, virtual reality technologies are employed in psychological therapy. Patients are immersed in a virtual environment wherein they are exposed to stimuli that may induce discomfort, even under conditions that are highly controlled compared to real-world scenarios. The adoption of these therapeutic modalities is beneficial, as patients are more prone to exploration, being aware of the simulated nature of the environment[199].

2.2.4. Army

The army has always played a supportive role, including the support of the financial aspect, in the advancement and application of virtual reality technologies. The VR training methodologies are not only safer, but in particular have demonstrated comparable effectiveness to traditional training approaches. This cost-effective paradigm minimizes expenses associated with physical transportation for soldiers during exercises and avoids the need for costly materials to replicate specific scenarios or for testing purpose. Also, ensures the safeguarding of soldiers' well-being by mitigating the inherent risks associated with physical harm or fatality. In addition, virtual reality allows the creation of a wide range of possible scenarios[200].

Head-mounted displays and data-gloves, both equipped with tracking functionalities to enable interactive engagement with virtual elements, are the devices that are commonly used in soldiers' training regimes. This technology finds application in both team combat and vehicle simulations, providing advanced feedback mechanisms, noteworthy training activities in several areas: armed conflict simulation, flight simulation for pilots, driving simulation and training of medical personnel training. The immersive experience generates an increased sense of danger among soldiers, thus obtaining optimal performance[201].

Ultimately, virtual reality is also used as a therapeutic means to address the symptoms of post-traumatic stress disorder (PTSD), an affliction prevalent among veterans exposed to

[198] Satava, R. M. (1995), *Medical applications of virtual reality*, Journal of Medical Systems, pp. 275-280.
[199] Ibid.
[200] Harris, D. J., Arthur, T., Kearse, J. (2023), *Exploring the role of virtual reality in military decision training*, Frontiers in virtual reality, pp. 1-10.
[201] Ibid.

traumatic or psychologically challenging experiences on the battlefield. The treatment methodology consists in gradually exposing patients to triggering situations associated with PTSD, enabling them to develop coping mechanisms within a safe and controlled environment[202].

2.2.5. Production and marketing

During the production phase of a commodity, conventional methodologies perceived as cost-prohibitive, insecure, and ineffective are supplanted by procedures that employ emerging technologies, in particular virtual reality. Before reaching its ultimate form, a product undergoes a succession of modifications, starting from its nascent conception, to the actual production, reaching its presence on retail shelves or online, ready to be purchased by clients. This transformative trajectory can involve considerable costs and prolonged time periods, but it is necessary to reach the quality parameters required by the consumer. Virtual reality emerges as an economically viable and time-efficient alternative, progressively shifting traditional prototyping methodologies wherever possible[203].

In alternative scenarios, the selection of a production process is influenced not only by the financial and temporal considerations, but also by the safety considerations relating to engineers, workers, and personnel affiliated with the corporate or institutional entity. Virtual reality, constituting a simulated environment, mitigates numerous risks associated with the fabrication of potentially dangerous machinery. In particular, staff can undergo training within a virtual environment before engaging with the actual and tangible machinery. Furthermore, some operating procedures can be executed within a virtual domain during the production phase, avoiding unforeseen complications[204].

Actions that are carried out daily as browsing the catalogue of an online store, often involves the observation of goods from different perspectives, this is facilitated by the sequential control of photographs, but there is an alternative modality, for the aesthetic evaluation of a retail product that involves the use of VR. When the user selects an item,

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[202] Vianez, A., Marques, A., Simões de Almeida, R. (2022), *Virtual Reality Exposure Therapy for Armed Forces Veterans with Post-Traumatic Stress Disorder: A Systematic Review and Focus Group*, Int. J. Environ. Res. Public Health, pp. 1-16.
[203] Harz, N., Hohenberg, S., Homburg, C. (2021), *Virtual Reality in New Product Development: Insights from Prelaunch Sales Forecasting for Durables*, Journal of Marketing, v. 86, pp. 1-23.
[204] Ibid.

a three-dimensional model of that item is autonomously retrieved from the network, giving the user the capacity to scrutinize it spatially through a VR headset, simulating an encounter as if the product were (almost) physically present[205].

In the sphere of fashion and the broader apparel industry, the visualization capabilities afforded by virtual reality and mixed reality technologies are highly advantageous, not only in the moment of the sales, but also throughout the long and insidious production phase. For example, new technologies offer the designer the prospect of evaluating nascent concept directly on a virtual model[206].

2.3. Virtual reality in entertainment and culture

The integration of virtual reality (VR) into the fields of entertainment, video games, and culture has initiated a new era of immersive experiences. It has not only revolutionized the way we experience digital content, but has also become a testimony to the boundless possibilities that this technology offers.

This paragraph, divided into two parts, explores the multiple applications of virtual reality, investigating its transformative impact on entertainment, gaming, and the broader cultural and artistic spheres. From captivating virtual game landscapes to the avant-garde expressions in contemporary art, in fact the utilization of VR technologies has become a powerful tool that redefines storytelling, interactions, and expands the frontiers of artistic expression.

In recent years, there has been a resurgence of interest in virtual reality, this is mainly due to the continuous release of innovative commercial headsets, each time more advanced, exemplified by the Oculus Rift. The strategic objective of the manufacturing companies was to engage young people, typically more receptive to emerging technologies. As a result, a proliferation of virtual videogames, virtual museums, themed amusement parks, interactive theatrical productions, and similar performances has materialised.

The emphasis on immersive engagement and active participation of the audience is a fundamental similarity that characterizes all these new experiences. The transition from a passive spectator role to one that potentially assumes an active role, represents a transformative change for the public. Moreover, the inherent ability of a direct interaction

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[205] Bialkova, S. & Bigne, E. (2017), *Shaping the future of virtual reality marketing: perspectives and challenges*, European Marketing Academy Conference, pp. 1-15.
[206] Ibid.

offered by these cutting-edge VR technologies assumes the role of a channel for the transmission of information in new and captivating ways.

This narrative aims to present the intricate interaction between technology and culture, demonstrating how virtual reality has become a driving force in shaping the future of digital experiences.

2.3.1. Entertainment and videogames

The video game serves as an essential reference to outline the attributes of immersive storytelling: the participants enter an alternate environment, interacting within it to dynamically modify predetermined scenarios, orchestrated by a designer, living and telling a firsthand experience. Video games orbit and evolve around the figure of "avatar", which is a virtual entity that includes both avatar and the player. The term "avatars" initially means graphical representations, which can potentially turn into authentic narrative entities, thus facilitating mobility and user interaction within a digital environment[207].

The etymology of this term has its roots in the ancient Hindu tradition, where "avatara" in Sanskrit denotes the descent to Earth and the perceptible manifestation of a deity, in particular Vishnu. This divine intervention has the explicit purpose of rectifying terrestrial affairs and restoring cosmic order. The deity assumes various forms depending on the circumstances, with each avatara representing a fractional manifestation of the corresponding divinity, making it visible. Upon the completion of the assigned task, the avatara reverts to its original divine state. The Hindu notion, encapsulated in the avatara, has found resonance in analogous representations of divine manifestations, exemplified by the Christian concept of incarnation[208].

The religious connotation of the avatar is closely linked to its manifestation in the realm of cyberspace, facilitating a process of setting between two heterogeneous spheres: firstly, between the divine and the terrestrial, and secondly, between the digital and the tangible[209].

Via an avatar, the user crosses and inhabits the digital cyberspace and engages with other users, a possible scenario in multiplayer video games and social communities. In the

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[207] Pinotti, A. (2021), *Alla soglia dell'immagine. Da Narciso alla realtà virtuale*, Einaudi, Torino, p. 136.
[208] Ibid.
[209] Ibid.

context of digital-virtual gaming, the avatar serves as crucial medium for immersive and interactive participation, this aspect acquires meaning as it clarifies that the primary purpose of the avatar is to allow the user to interact with the virtual environment[210].

The construction of the dynamics between player, avatar, and navigable space has gone distinct phases throughout history, related mainly to the technological evolution of the medium. The transition from 2D to 3D, which took place in the early nineties, transformed what was a background or a scenography into an authentic world that could be explored by the user. Later, further changes influenced the ways in which players interfaced with virtual space, increasingly perceived as immersive. The ability to navigate a 3D space in all directions through an avatar, along with the assumption of a first-person perspective similar to the subjective cinema, represented a remarkable evolution. Today, finally, the immersive experience in relation to the avatar evolves into real embodiment: the user perceives the actions of the avatar within the virtual environment as extensions of his own. Avatars serve as bidirectional mediators, allowing interventions to cross from the virtual world to the real one[211].

Regarding gaming, the integration of VR technology has opened door for new genres and forms of interaction (fig. 15). In these new interactive game formulas, the player transcends the traditional seated position, characteristic of conventional controllers, to assume a more dynamic position within the playing area. Such a mental commitment also requires a physical commitment that turns into motion, the game actions instigate the player so that he moves in a natural and intuitive way. A primary advantage intrinsic in this innovative approach lies in its implications for physical health, the imperative for the movement of the player serves to encourage and promote physical activity, thus generating positive results for health[212].

Conventional "flat screen" games played on computer monitors or televisions cannot increase immersion and reproduce the sensation of being really present in the virtual world, beyond physical confines, these concepts are not only achievable with VR games. Virtual reality has the natural characteristic to significantly improve genres in which players assume an immersive role within a vehicle (as evident in driving games), an

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[210] Pinotti, A. (2021), *Alla soglia dell'immagine. Da Narciso alla realtà virtuale*, cit., pp. 136-137.
[211] Ibid.
[212] Cruz-Neira, C., Fernandez, M., Portalés, C. (2018), *Virtual reality and games*, Multimodal Technologies and Interaction, pp. 1-5.

aircraft (as observed in flight simulators), or even within fantastical constructs. The heightened sense of presence is particularly pronounced when tangible references (e.g. a car dashboard) remain within the user's field of vision, this increase not only enhances the gaming experience, but also mitigates the occurrence of adverse symptoms such as nausea or vertigo[213].

Other genres particularly suitable for VR are those in which the player assumes a first-person perspective, allowing, as already highlighted, the natural movement. Taking into account the fact that traditional video games typically feature extensive travel capabilities for the player's avatar, the seamless integration of virtual reality is not immediate. In many cases, the incorporation of a virtual reality device is impractical, unless the game mechanics (especially those associated with locomotion) are subject to complete redesign for VR compatibility[214].

Figure 15. Kozlowski, D., *Example of virtual reality in video games*, photo.

2.3.2. Art and culture

The museum carries an immersive element in its DNA. Retracing briefly its history it is possible to identify some immersive elements, the Renaissance studiolo, which is one of its most distinguished ancestors, served as a place for contemplation, reading, and reflection, inside it were also exhibited commissioned works of art. Subsequently in the 16th and 17th century, the Wunderkammer was designed to create a space that generated amazement through its eclectic collection of wonders adorning its walls. This ancient

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[213] Cruz-Neira, C., Fernandez, M., Portalés, C. (2018), *Virtual reality and games*, cit., pp. 1-5.
[214] Ibid.

arrangement foreshadowed what could be described today as a 360-degree environment[215].

The one who is called by different names such as observer, receiver, viewer, user, etc. in the case of the museum becomes a visitor and represented a key figure in the relationship between museum and immersivity. As Janet Murray noted, the concept of visiting museums can be used as a metaphor for how to access a virtual environment, since it provides a specific structure and limits in terms of time and space[216].

In the museum the visit can be free or guided. In both cases, it consists in a form of immersive narration in the presence of a unique narrator, in the case of a guided tour, or spread in the elements useful to increase the experience of the works of art (such as captions, panels, audio guides, etc.), in the case of a free visit. Within the museum environment, the guide becomes a narrator and will articulate a story that aims to make visitors interact with the objects inside, which in turn will communicate with those present[217].

In recent years, more and more virtual visits have been proposed, as a possibility of remote access, these represent a confirmation of the fact that the museum is still an immersive experience and not just a container of valuable objects. The museum space is not structured as a gallery of digitalized works but is presented through 360-degree images and environments explored from the screen or with a viewer. In this space the visitor can engage in addition to sight and hearing other senses such as proprioception (ability to recognize the position of your body in space) and the balance (sense of balance and direction)[218].

The contemporary museum aims to involve the audience and bring physically bring the viewer closer to the work of art through an immersive and interactive experience, in some cases even ludic (fig. 16)[219]. From this point of view, immersive technologies are a valuable tool able to enhance a more direct contact (apparently non mediated), between

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[215] Modena, E. (2021), *Nelle storie. Arte, cinema e media immersivi*, Carrocci Editore, Roma, p. 89.
[216] Murray, J. H. (2017), *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*, The MIT Press, Cambridge, pp. 105-107.
[217] Modena, E. (2021), *Nelle storie. Arte, cinema e media immersivi*, cit., p. 90.
[218] Ibid.
[219] Sbrilli, A. (2020), *Giocabilità e cultura artistica*, a cura di S. Pescarin, Videogames, Ricerca, Patrimonio Culturale, FrancoAngeli, Milano, pp. 189-196.

the public and the work of art that the museum has made untouchable in the name of a (necessary) protection of the original[220].

The immersive potentials of technologies can be exploited with their inclusion in a more articulated educational experience, such as an exhibition or a physical visit to the museum, which does not exclude the original, but rather aims to enhance it. Instead, most of the so-called immersive exhibitions, also named experience exhibitions because they are often dedicated to the idea of living an artist and his works, aim to produce a stupor effect in visitors due to their both physical and emotional involvement. In most cases, these are multimedia installations consisting of projections on all the walls of a room of works by famous artists, that are offered both by museums and other exhibition spaces, as temporary occasions or projects part of the permanent installations (and that occasionally also include some content available in VR)[221].

The notion and concept of a "work of art" has evolved continuously throughout history. A particular form can be favoured, for a period, thus reaching the status of a paradigm, later il will give this state to a subsequent form and so on. Any object designated as a work of art, and consequently recognized as worthy of remembrance, is susceptible to the interpretations of social collectives. An artwork serves as a symbol and embodiment of a specific artistic perspective on the world. Beyond gender distinctions, it solidifies concepts, ideologies, hypotheses, aesthetic preferences, and norms, whether consciously or unconsciously, it adheres to social configurations[222].

The avant-garde artists began, in the early 20th century, to examine the connection between an object and its portrayal. The consequence is a rupture, which is not limited to the work, but is also extended to the ways in which it engages with the observer. The border between reality and image is consumed by the gradual integration of fragments of reality in the work. The latter transcends its conventional role of representation, aspiring to present the subject directly. The artwork emancipates itself from the limitations that previously delineated its role and spatial context within the world[223].

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[220] Modena, E. (2019), *Musei nei videogiochi|Videogiochi nei musei*, Piano B. Arti e culture visive, v. 4, n. 1, pp. 83-105.

[221] Id. (2021), *Nelle storie. Arte, cinema e media immersivi*, Carrocci Editore, Roma, p. 94.

[222] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 204.

[223] Modena, E. (2021), *Nelle storie. Arte, cinema e media immersivi*, cit., p. 108.

Figure 16. Isidro, *Example of virtual reality in museums,* generated with AI.

Recent advancements made by technology include laser scanners that can of directly project virtual reality images onto the retina, in this specific scenario, the categorical classification of an "image" does not completely fade (if the retina is considered a sufficient medium). It represents the most private manifestation of an image conceivable to this day, since this image is perceptible only to the observer, who instigates or recovers it through deliberate actions or movements. Furthermore, these directly projected virtual images are r intended for individual viewing before vanishing forever into oblivion, a phenomenon unprecedented in the annals of image history[224].

As already pointed out, in the field of production of sequential image, imperceptible to the naked eye, the images manifest themselves continuously and vanish in just fractions of seconds. Despite the tangible nature of the equipment involved in creating a virtual work of art, the use of photons results in the "de facto" dematerialization of the work. This dematerialization serves as a prerequisite necessary for achieving the maximum degree of variability and forms the basis for interactive possibilities. Within the aesthetics of computer-assisted virtual reality, the ontological essence traditionally attributed to a work of art is no longer applied. Such virtual works because of their unfinished or open character are increasingly characterized by their procedural nature, thus positioning art in the context of communicative social relations[225].

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[224] Grau, O. (2003), *Virtual Art. From Illusion to Immersion*, The MIT Press, Cambridge, Massachusetts, p. 206.
[225] Ivi pp. 206-207.

In the field of visual arts, the term "installation" indicates a category of artworks that include the space they occupy, transcending historical boundaries that traditionally separated representation and reality.

In 1976, Germano Celant curated an exhibition and published a volume titled *Ambiente/Arte: From Futurism to Body Art*. It was set up in the central pavilion of the Giardini di Castello for the Venice Biennale from 14 July to 10 October. The exhibition meticulously reconstructs entire environmental installations, also presenting design documents and photographs of others that have been lost, destroyed, or irretrievable.

The design of an environment adheres to the logic of the theatrical stage or of the film set, that is by definition, the delimitation of a portion of space capable of giving meaning to what is placed inside. The term "environment" is defined by Celant as a «magical fence» extended to all dimensions of the space. According to this interpretation, this term is more rigid than "installation", which more generally refers to artworks that use space as their primary medium. In this context, he has coined the term «spherical art» to describe installation works[226].

This type of environments, as they are conceived, are part of the genealogy of virtual reality. Entering the confined space of an environmental installation created by an artist mirrors the feeling of physical immersion experienced wearing a virtual reality headset, transcending in a spatial and temporal dimension distinct from the one occupied before the entrance. According to Celant, while the boundaries between inside and outside may seem wider, they are still delineated and constructed as «an architectural or environmental shell»[227].

Artists have the opportunity to create, within these space, abstract immersion experiences aimed at provoking physical, perceptual, and emotional responses, alternatively, they can choose to narrate a story. Moreover, the environmental installation can be interpreted as an expansive image in both space and time, to the point of unfolding a narrative that is not represented but directly presented[228].

The virtual reality art installation operates on multiple levels: the physical realm of the exhibition space, the virtual realm in which the user is immersed, and the hybrid realm

[226] Celant, G. (2009), *Un'arte sferica*, in B. Ferriani, M. Pugliese, *Monumenti effimeri. Storia e conservazione delle installazioni*, Electa, Milano, pp. 14-21.

[227] Id. (2021), *Un viaggio virtuale nella realtà*, in *Alejandro J. Iñárritu. Carne y Arena. Quaderno Fondazione Prada #12*, Fondazione Prada Publisher, Milano, p. 24.

[228] Groys, B. (2012), *Autorialità multipla*, in *Art Power*, Postmedia Books, Milano, pp. 105-113.

formed by the resulting mixed reality. Individuals engaging with the image-world through a headset are isolated from the external environment but remain physically connected to it, being in that mixed reality that combines the two[229].

It is important to note that artworks created with this technology are generally not freely accessible online or downloadable from virtual stores. The choice to showcase such installations in an exhibition space or museum, with one or more headsets available to visitors, brings numerous advantages. First, it confers an aura to the artwork, establishing its recognition as unique, its presence in a site-specific condition and its availability for a limited time safeguard the intrinsic reproducibility of the work. Secondly, it allows the artist control over the viewer's experience, an element often missing when the content is consumed in a domestic or private setting, as in most VR films, documentaries, or video games. The organization of the presentation within the ideological boundaries of the so-called "white cube" enables especially the artist to stage and show the characteristic qualities of media and the transformative potential of virtual reality[230].

Different forms of representation, presentation and production of reality coexist in the hybrid space of the installation, the visitor assumes a key role in at least two distinct ways. First, the physical body of the users occupies the tangible space by incorporating one or more devices (headsets, gloves, and other body sensors), after equipping for immersion, it crosses the border of tangible reality. Secondly, despite their limited perception, in virtual space there are only glimpses of their avatar, which are typically manifested through the vision of their hands. The visitor therefore encounters a kind of blindness towards the physical environment that remains external, combined with an increased vision of objects and reality perceptible only from within[231].

Observed from the outside, a participant in a VR experience appears to interact with phantasmagorical and ethereal entities, in a manner that may seem absurd and meaningless (fig. 17). To the extent that Jaron Lanier has characterized virtual reality as «that big viewer that makes those who wear it look ridiculous from an external perspective»[232].

[229] Modena, E. (2021), *Nelle storie. Arte, cinema e media immersivi*, Carrocci Editore, Roma, p. 121.
[230] Ivi. pp. 121-122.
[231] Ivi. p. 122.
[232] Lanier, J. (2019), *L'alba del nuovo tutto. Il futuro della realtà virtuale*, il Saggiatore, Milano, p. 13.

Figure 17. Pailey, B., *Exhibition New Museum Triennial 2015: Surround Audience*, 2015, photo, New Museum (New York).

The potential meaning of the artwork is not only conveyed through the experiential content, but also through the way this content is presented. In this case the emphasis is placed on the spectator/actor, often referred to as the "spect-actor" who becomes a medium that unites two worlds, both materially and conceptually[233].

In the context of virtual reality, a game of looks is created: the spectator's gaze is totally or partially limited, for those who are outside it is not possible to see what the spectator sees, and the latter does not see that there is someone watching him. Despite their visual limitations present in the physical reality, the viewer acquires the ability to observe but also to perceive an alternative reality and assume a role[234]. The user is transformed into an actor (whose role changes depending on the case) thanks to the headset that functions as a mask and also as a medium that forces the observer to engage in interpretation and imagination. According to these assumptions, the viewer being in effect a material entity could (and perhaps should) be recognized together with the list of physical components that define these types of installations[235].

During his monologue at the TedTalk in Vancouver in 2016, Chris Milk discusses how his artistic exploration deepens the emotional sphere through the use of technology. The artist recognizes the limits of his field and that the space between image and individual, in any case, removes a part of the emotionality and identification, starting from this assumption, he has directed his research towards the use of new technologies in order to

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[233] Modena, E. (2021), *Nelle storie. Arte, cinema e media immersivi*, cit., pp. 122-123.
[234] Ibid.
[235] Ivi. p. 126.

eliminate the spatial gap: «We were pushing beyond the screen, trying to connect more deeply to people's hearts and imaginations. But it wasn't quite enough»[236].

Through the continuous experimentation of new digital and interactive media, the director claims to have discovered the definitive solution in virtual reality, considering it as the most significant milestone in the history of recent media and defining it «the ultimate medium». He states: «[...] is the first means that actually makes the leap from our internalization of the expression of an experience of an author, to our experience in the first person. [...] In VR, consciousness is the means»[237].

In virtual reality environments, the content of the message is conveyed to the viewer in such a way that the space that exists between representation and reality is minimized, the gap is filled by the personal and direct experiences of each individual. Even in the field of art, exists this division between the message conveyed by the artist, the way in which he conveys it and the direct experience of the user. This gap is more perceived in contemporary art, focusing more on the artist's expression then on the audience's interpretation. The contextualization of the message is more difficult for the public and the only solution is to fully identify with the artist's point of view[238].

Virtual reality and mixed realities, more generally, possess powerful communication skills within the emotional sphere. They have the potential to emerge as a new form of language and narrative for artistic content, especially within genres such as performance and video art. In addition, they can be used as valuable tools for digitization, valorization and preservation of cultural artistic heritage[239].

In the subsequent chapters, a series of examples featuring artworks, films, artists, and directors who have chosen to express themselves through these digital media will be introduced.

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[236] Milk, C. (2016), *The birth of virtual reality as an art form*, in TED2016, Vancouver, https://www.ted.com/talks/chris_milk_the_birth_of_virtual_reality_as_an_art_form, (last accessed 11-02-24).
[237] Ibid.
[238] Ibid.
[239] Ibid.

Chapter 3. Virtual Reality at the Biennale

3.1. Venice Biennale

The Venice Biennale boasts an impressive 128 years of history. Since its foundation, it has been considered among the most famous and prestigious cultural institutions in the world. It has been at the forefront of researching and promoting new artistic trends and organizing events in contemporary arts according to a unique multidisciplinary model[240]. The history of the Biennale has deep roots; it began as a cultural society in 1895 with the organization of the world's first Biennial International Art Exhibition, the "great mother" of all the Biennale activities, aiming to stimulate artistic activity and the art market in the city of Venice and in the unified Italian state. Spanning the entire 20th century and reaching its 59th edition in 2022, the Biennale still aims to promote new artistic trends and organize international events in contemporary arts[241].

In 1932, the Biennale gave life to the Film Art Exhibition, the world's first film festival, which, along with Music (since 1930), Theatre (since 1934), Architecture (since 1980), and Dance (since 1999), constitutes the diverse and distinctive cultural offering of the Biennale. Its history is documented at the Historical Archives of Contemporary Arts (ASAC)[242].

The name "Biennale" derives from the biennial rhythm of its events, with the exception of the Film Exhibition, which became an annual event from 1935. Until 2019, the Art Biennale occurred in odd years, and the Architecture Biennale in even years. However, due to the COVID-19 pandemic's impact, the Art Biennale now takes place in even years and the Architecture Biennale in odd years[243].

The exhibition space covers an area of over 7,000 square meters, featuring artists from more than 86 countries in both collective exhibition spaces and national pavilions. The primary exhibition, located in Castello within the halls of the Arsenale and Biennale Gardens, alternates between showcasing art and architecture[244].

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[240] La Biennale di Venezia (2023), *Storia 1895-2022*, in La Biennale di Venezia, https://www.labiennale.org/it/storia, (last accessed 11-02-24).
[241] Ibid.
[242] Ibid.
[243] La Biennale di Venezia (2023), *L'Istituzione*, in La Biennale di Venezia, https://www.labiennale.org/it/la-biennale-di-venezia, (last accessed 11-02-24).
[244] La Biennale di Venezia (2023), *Luoghi*, in La Biennale di Venezia, https://www.labiennale.org/it/luoghi, (last accessed 11-02-24).

The Gardens were built by Napoleon, at the beginning of the 19th century, and are the traditional seat of the Biennale Art Exhibitions since the first edition. In 1907 began the construction of foreign pavilions, which were added to the already built Central Pavilion[245]. The exhibition has been based on separate pavilions scattered in the gardens, belonging to the participating nations that autonomously select the artists to be presented at every Biennale. Since its first edition, it has hosted a growing number of participant nations and each time new pavilions have had to be added, each in its own architectural style, thus giving the visitor the feeling of an international meeting-point. The pavilions due to their legal status, are considered equivalent to delegations of foreign representation, enjoying extraterritorial privileges[246].

In front of the main entrance to the Giardini stands the building that was once the Italian pavilion. Renamed International Pavilion, an appointed general curator proposes a theme due to represent the identity of each edition, an ideal guideline to follow in the galaxy of contemporary art. The Gardens now house 29 pavilions from foreign countries, some of which were designed and built by famous architects[247].

The other, separate area hosting the Biennale is the Arsenale. Here was the heart of the Serenissima republic of Venice where the ships were built and strictly guarded, where the secrets of the craftsmen were kept hidden. The traditional buildings around the pools and the harbour facing the lagoon now offer wide spaces where the exhibition can expand[248]. The historical background enhances Venice's status as an ideal setting for iconological discourse. In this unique space, nations worldwide are invited to present their artists' works autonomously, creating a miniature global village for the arts, here, they encounter distant imaginaries and engage in dialogue[249].

The Biennale Foundation also hosts other events encompassing theatre, music, and dance, occurring annually in different parts of Venice. Additionally, the Venice Film Festival is held at the Lido[250].

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[245] La Biennale di Venezia (2023), *Giardini della Biennale*, in La Biennale di Venezia, https://www.labiennale.org/it/luoghi/giardini-della-biennale, (last accessed 11-02-24).
[246] Marazzi, A. (2014), *An Encyclopedic Art Biennale in Venice*, Visual Anthropology, p. 278.
[247] Ivi. p. 279.
[248] Ivi p. 282.
[249] Ivi. p. 278.
[250] La Biennale di Venezia (2023), *Luoghi*, in La Biennale di Venezia, https://www.labiennale.org/it/luoghi, (last accessed 11-02-24).

The prestige of the Biennale is maintained, even today, thanks to its ability to anticipate new trends in art and, at the same time, to present under renewed perspectives works and artists of every period. Countless Masters have been invited to present their works in Venice and important critics and art historians curated the main exhibitions and the National Pavilions. A long list of central figures in the history of art in the 20th century contributed to generate and develop the "pluralism of voice" which has always characterized La Biennale di Venezia[251].

Since 1998 the Art Biennale and the Architecture Biennale are no longer simply exhibitions organized with the contribution of National Pavilions, but rest instead on three pillars:

1. The exhibitions by National Pavilions, each with its own curator and project.
2. The International Exhibition by the Biennale curator, chosen specifically for this task.
3. Collateral Events, approved by the Biennale curator[252].

3.2. Case Studies

The preeminent segment of the chapter will illustrate the case studies pertaining to artworks presented in diverse formats during the 58th Venice International Art Exhibition. The selection of the case studies ensued following a thorough investigative process, undertaken with meticulous scrutiny, and was predicated upon their pertinence to the overarching theme of virtual reality, which constitutes the focal subject matter of the present thesis.

Virtual reality is not a new entry to the Venice Biennale. Since 1970, the year that marked the beginning of the integration of computer art at in the exhibition, the primitive forms of virtual reality have been exhibited in Venice. Despite the virtual reality boasting half a century of presence within the field of technology and art, only through the exhibitions of recent years there has been a recognition and a consecration of this medium, which has finally been placed on the same level as the others. All the case studies are part of the Art Biennale of 2019, the choice fell on this edition not solely due to the significant

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[251] La Biennale di Venezia (2023), *Storia della Biennale Arte*, in La Biennale di Venezia, https://www.labiennale.org/it/storia-della-biennale-arte, (last accessed 11-02-24).
[252] La Biennale di Venezia (2023), *L'Istituzione*, in La Biennale di Venezia, https://www.labiennale.org/it/la-biennale-di-venezia, (last accessed 11-02-24).

prevalence of projects pertaining to sphere of virtual reality, but also owing to its congruence with the theme of the dissertation. Quoting the words of Ralph Rugoff, the curator of this edition:

> The 58th International Art Exhibition will not have a theme per se, but will highlight a general approach to making art and a view of art's social function as embracing both pleasure and critical thinking. The Exhibition will focus on the work of artists who challenge existing habits of thought and open up our readings of objects and images, gestures and situations. Art of this kind grows out of a practice of entertaining multiple perspectives: of holding in mind seemingly contradictory and incompatible notions, and juggling diverse ways of making sense of the world. [...] "Order" has become the simultaneous presence of diverse orders[253].

The selected case studies have in common the use of virtual reality but are very different from each other for the modalities of exposure. The project *Virtual Reality* was presented by the Azerbaijan Pavilion within the national participation, *3x3x6* by Shu Lea Cheang and *Living Rocks: A Fragment of the Universe* by James Darling and Lesley Forwood are two collateral events, and other works are exhibited by Dominique Gonzalez-Foerster and Ed Atkins, artists specifically invited by the curator. The approach adopted in the selection of the case studies, aims to showcase diversity and variety, always remaining within the framework of the Biennale. For this reason, multiple projects were chosen from every section of the exhibition. Each individual project strives to improve virtual reality and its valuable features. In some cases, taking inspiration from the past and its historical background, in others looking to the future.

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[253] Rugoff, R. (2023), *Biennale Arte 2019. May You Live in Interesting Times*, in La Biennale di Venezia, https://www.labiennale.org/en/art/2019/58th-exhibition, (last accessed 11-02-24).

3.2.1. Azerbaijan Pavilion at the 58th Venice International Art Exhibition

Figure 18. Azerbaijan Pavilion, *Virtual Reality*, 2019, real time frame captured, 58th Venice International Art Exhibition (Venice).

Commissioner: Mammad Ahmadzada, Ambassador of the Republic of Azerbaijan.

Curators: Gianni Mercurio and Emin Mammadov.

Exhibitiors: Zaigam Azizov, Orkhan Mammadov, Zarnishan Yusifova, Kanan Aliyev, Ulviyya Aliyeva.

Responding to the theme *May You Live in Interesting Times*, curated by Ralph Rugoff for the 58th International Art Exhibition of Venice, Azerbaijan presented the exhibition called *Virtual Reality* (fig. 18) within its national pavilion. The year 2019 marked Azerbaijan's fourth participation in the Biennale, realised by the Heydar Aliyev Foundation[254].

Virtual reality that draws on the phenomenon of fake news as one of the greatest threats to democracy, free debate, and progress. The display builds on themes and techniques explored by the exhibitors in their previous works, the results was an interactive multimedia projects, installations, and sculptures[255].

In a time of international instability, where the world is facing more significant change than ever before, this exposition could not be more affecting. *Virtual Reality* addresses an issue that is at the heart of today's politics and questions our everyday reality: it examines

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[254] La Biennale di Venezia (2019), *May You Live In Interesting Times: Biennale arte 2019*, 58th International Art Exhibition, Venezia, pp. 20-21.
[255] Ibid.

the ideas and dangers of living in a post-truth era[256]. As stated in the Catalogue of the 58th International Art Exhibition:

> There is a significant change in the manner in which we receive data and news today. Fake news stories are more often shared via web-based networking media than official news stories, and a significant part of the contention around false news is about something other than whether its content is valid or not. We all need to escape the confines of confirmation bias and shine a light on our unconscious leanings. We should embrace the views of others and acknowledge the other side in our communications. We should stimulate and participate in debate and remember that social media platforms only give us more of the same. It is up to us as individuals to change that pattern[257].

The exhibition conceptualizes the issue of receiving, perceiving, and processing information flows by individuals and society as a whole. Current installations by Azerbaijani artists reflect the state of the modern world's informational landscape, which is filled with diverse and sometimes conflicting information. The artists explore the challenges and implications of living in an era where social media can prove to be a double-edged sword, as stated in the official press release of the Pavilion[258].

Over the past twenty years, as a result of the telematics revolution and the evolution of technology regarding the transmission of information and the transformation of images and simulation, the way of relating to the world has changed. At the beginning of the last century, with the advent of psychoanalysis came the discovery that the perception of reality in individuals was heavily conditioned by the system of internal impulses known as the unconscious. After a few decades the unconscious would become the object of profound manipulation by the mass media and advertising, giving rise to the progressive alteration of the mechanisms of our perception of reality. The result of this process is marked by the pervasiveness of virtual reality in our lives today. In fact, in contemporary society individual consciousness is formed based on an uninterrupted flux of uncontrolled and uncontrollable external impulses, which are amplified, repeated and overlapped, and which tend to be nullified in the collective consciousness. Our life experiences are increasingly guided by virtual experiences, or at least they are generated through them:

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[256] La Biennale di Venezia (2019), *May You Live In Interesting Times: Biennale arte 2019*, cit., pp. 20-21.
[257] Mammadov, E. (2019), *Catalogue of the Azerbaijan Pavilion*, Fondazione Heydar Aliyev & La Biennale di Venezia, pp. 8-9.
[258] Ivi. pp. 16-17.

before embarking on a real relationship we enter a virtual relationship, including our selection of trips, restaurants, and even a partner[259].

The problem is the reception and reliability of the impulses, but also how individuals defend themselves when the impulses manipulate reality. This is not a new thing, since the tendency of society to sensationalize has evolved into an attitude to integral fiction, which has compromised the distinction between reality and fiction. As a result, society has become abstract: many images and data that are real appear false, while others that are fabricated appear true. Furthermore, the intensification of the possibilities of information within the realm of reality makes the very idea of a single reality more and more inconceivable[260].

Assuming that human memory is limited, then cramming our heads with false information significantly restricts our potential and takes up useful space. Given the harm incurred from receiving hollow or misleading information, *Virtual Reality* is both timely and valuable. Through contemporary interactive multimedia projects, installations, and sculptures Azerbaijani artists convey and query the predicament of overloading the web with unconfirmed news. In this challenging situation we cannot be indifferent and we should not become brainwashed or unquestioningly accept the increasing flow of unreliable news that is removed from reality. With our ultra-modern means of virtual communication and social networks, people should not become unwitting tools of delivering irresponsible news. We must use our intelligence to identify and separate facts from empty fiction, sincerity from pretence, and the original from the fake[261].

The artists take on these themes through their respective styles and personal languages, but with one unifying message that is profoundly relevant to the present day: the risks of the virtual reality that pervades our lives are manifold. These include de-socialized humanity that exchanges emotions solely through technology, which has become the principal instrument for all forms of communication and avoids direct physical contact. Or the possibility that information and interpretations of history and current events will become distorted or manipulated, like the liquidness of opinions that travel through social networks, where everything is relative, contaminated and uncertain. With their works, these artists affirm the need to stop the process of the dissolution of reality as a prototype.

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[259] Mercurio, G. (2019) *Catalogue of the Azerbaijan Pavilion*, cit., pp. 24-25.
[260] Ibid.
[261] Mammadov, E. (2019), *Catalogue of the Azerbaijan Pavilion*, cit., pp. 16-17.

In the end, despite the virtual manipulations to which it is subject, an authentic reality does exist, and the greatest risk we face is that Nietzsche's prediction that in the world of mass media the real world will ultimately become a fairy tale, will be realized[262].

The showcase was curated by Gianni Mercurio and Emin Mammadov, and organized by the Heydar Aliyev Foundation. Gianni Mercurio is an Italian independent curator and has been involved with modern and contemporary art for nearly thirty years as curator and writer. Specialist in American art, he has already collaborated with the Heydar Aliyev Center in Baku in 2013, when he curated the exhibition *Andy Warhol, Life, Death and Beauty*. He has been guest curator at the Ludwig Museum Cologne, MOCA Lyon, MACRO Rome, MAXXI Museum Rome, Tretyakov State Gallery in Moscow, Heydar Aliyev Center in Baku, Trienale Museum in Milano and museums in Italy, Austria, Spain, Belgium, Finland among others[263].

Emin Mammadov is the Artistic Advisor of the Heydar Aliyev Foundation and in 2012 he was appointed Honoured Worker of Art of the Azerbaijan Republic. Mammadov has gained international recognition quickly and has curated numerous exhibitions in Azerbaijan and Europe. Mammadov curated *Under One Sun. The Art of Living Together* Azerbaijan Pavilion at the Biennale Arte 2017, and also curated the exhibitions *Beyond the Line* and *Vita Vitale* that were shown at the Azerbaijani Pavilion at the Biennale Arte 2015[264].

Kanan Aliyev and Ulviyya Aliyeva present two works. *Globe* seems motionless, but the slightest interference changes its direction. Through the sculpture's sensitivity to movement, the artists share their belief that even a pawn on the international chessboard can propel Globe, and, thus, the world in new or desired directions. In their second project *The Slinky Effect*, a Slinky jumps over people's heads. The Slinky represents the flow of news that we receive from social networks every second of the day. People communicate almost only through these flows, without gazing each other's even if they are close; they became beings without empathy and have therefore a gray and uniform appearance[265].

Orkhan Mammadov presents two installations, consisting of immersive audiovisual experiences blurring boundaries between physical and digital spaces. The installation

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[262] Mercurio, G. (2019), *Catalogue of the Azerbaijan Pavilion*, cit., pp. 24-25.
[263] Heydar Aliyev Foundation (2019)*, Catalogue of the Azerbaijan Pavilion*, cit., p. 28.
[264] Ivi. p. 20.
[265] Ivi. pp. 32-35.

Circular Repetition employs data consisting of elements of traditional ornaments. Using the latest state-of-the-art machine learning algorithms, Orkhan and his team designed a unique Artificial Intelligence approach to traditional patterns. The artist designed a neural network computing system that processes 15,000 archived ornamental images from museums and libraries and creates new, unlimited combinations based on their similarities. The installation creates imaginary patterns that did not exist previously[266].

In the second installation *Muraqqa*, the artist has reproduced original miniature paintings and represented them as a digital linear story. The authentic traditional *Muraqqa* becomes a source for the construction of an alternative virtual replica. The artist has added his own stories to the original content and created a video installation. He sets the characters of the miniature in motion to play with plot development, while animated effects demonstrate its artificiality[267].

Zarnishan Yusifova questions the connection between social media and human relationships. Her *Bubble Reflection* conveys connection with the social networks and human relations, as well as the impact of the media devices on the human beings, on their mind. The anthropomorphic figures are perfectly aligned, in military order, while telematic circuits at this point have integrated in their organisms and are masters of their unconscious and their intimacy. They represent a hypnotized humanity, inhabitants of a planetary Metropolis whose empty heads passively welcome a virtual reality[268].

Zeigam Azizov in his installation *Headlines* considers media domination by focusing on the sway that headlines command. Made in the form of essay (textual and visual), Headlines partly a response to the media domination and a complex relation between images and time. As a poetic-philosophical perception of the contemporary world through the stream of images it will demonstrate how headlines became a language of addressing multicultural global movements of people and the transportation of ideas, which creates a new image of the world altogether[269].

[266] Heydar Aliyev Foundation (2019)*, Catalogue of the Azerbaijan Pavilion*, cit., pp. 40-41.
[267] Ivi. pp. 42-43.
[268] Ivi. pp. 48-49.
[269] Ivi. pp. 54-55.

3.2.2. *3x3x6* by Shu Lea Cheang

Figure 19. Cheang, S. L., *3x3x6*, 2019, photo of the exhibition space, 58th Venice International Art Exhibition (Venice).

Promoter: Tapei Fine Arts, Museum of Taiwan

Curator: Paul B. Preciado

Participant: Shu Lea Cheang

With the support of: Ministry of Culture of Taiwan, Ministry of Foreign Affairs of Taiwan, Tapei City Governament, Department of Cultural Affairs, Tapei City Governament.

The venue of Palazzo delle Prigioni, the central prison of Venice from the Renaissance until 1922, is the site of the exhibition for the Taiwan representation at the 58th Venice Biennale in 2019. The collateral event is located inside the Doge Palace, the city's cells were expanded on and moved to a building across from the Palace in 1614, and yet remained connected by the Bridge of Sighs. The Piombi (the name the Venetians gave to the old prison due to its roof made of "lead") is most renowned today for being the site of incarceration of Italian writer and mythical lover Giacomo Casanova, he was detained for several months in 1755 before finding a way to escape[270].

The series of works that constitute the exhibition *3x3x6* is based on artist Shu Lea Cheang's decision to respond to the architectural and political history of the building,

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[270] Preciado, P. B. (2019), *May You Live In Interesting Times: Biennale arte 2019*, 58th International Art Exhibition, Venezia, pp. 198-199.

both as a material and as a conceptual element of the project. Reflecting upon the transformation of surveillance techniques since the panopticon to include contemporary 3D facial recognition, Al, and the Internet, Shu Lea Cheang's *3x3x6* restages the rooms of the Palazzo delle Prigioni as a high-tech surveillance space (fig. 19)[271].

Shu Lea Cheang is a Taiwanese-American artist and filmmaker. She lived and worked in New York City during the 1980s and 90s before relocating to Europe in 2000. She has been a multimedia and new-media artist since the 1980s and has engaged with themes such as ethnic stereotyping, sexual politics, and institutional oppression through radical experiments in digital realms[272].

Cheang crafts sci-fi narratives in her film scenarios and artistic imagination, establishing her unique "science" fiction genre within the new queer cinema. Her journey from homesteading cyberspace in the 1990s to her current exploration of the post net-crash BioNet zone reflects her focus on viral love and bio-hacking in her recent works[273].

Over the past decade, Cheang has become a prominent figure in new media art, addressing multidisciplinary topics. Recognized as a pioneer in internet-based art, she employs a multimedia approach that integrates film, video, internet-based installation, software interaction, and durational performance. Her interactive work is noteworthy, blending social issues with artistic methods. Cheang's use of these media and interfaces explores themes such as ethnic stereotypes, the nature and excesses of popular media, institutional power (particularly governmental), racial relations, and sexual politics[274].

Cheang has conducted in-depth studies on ten historical and contemporary cases of subjects incarcerated because of gender or sexual dissent, taking as its starting point the story of libertine writer Giacomo Casanova (imprisoned in the Prigioni in 1755) and including the Marquis de Sade and Michel Foucault, as well as contemporary cases from Taiwan and South Africa. Their fictionalized portraits become part of the exhibition's system. The title of the installation is symbolic and refers to today's standardized architecture of industrial imprisonment: a cell of 3x3 square metres constantly monitored by 6 cameras[275].

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[271] Preciado, P. B. (2019), *May You Live In Interesting Times: Biennale arte 2019*, cit., pp. 198-199.
[272] The Influencers (2019), *Shu Lea Cheang*, in The Influencers, https://theinfluencers.org/en/shu-lea-cheang, (last accessed 11-02-24).
[273] Ibid.
[274] Ibid.
[275] Preciado, P. B. (2019), *May You Live In Interesting Times: Biennale arte 2019,* cit., pp. 198-199.

Investing the building in the crossings of histories and fictions, memory and imagination. Cheang has created an immersive installation with multiple interfaces to reflect on the construction of sexual subjectivity by technologies of confinement and control, from physical incarceration to the omnipresent surveillance systems of contemporary society.

In the development of the project, Cheang has collaborated with international academics, activists, and researchers (including Dean Spade, Josephine Ho, Jackie Wang, and Hans Huang) to study different historical and contemporary cases of imprisonment due to gender, sexual, and racial nonconformity. For this project, the artist has examined numerous prison architectures and visited several prisoners in different parts of the world. Her research process has led to the selection of ten cases that have become the critical material for a series of ten 4K films, each reflecting on how legal and visual regimes shape sexual, gender, and race norms over time[276].

The idea was to start from the architecture of the panopticon to construct the central space of the exhibition: on one hand, the surveillance tower has been inverted to project the portraits of ten prisoners; on the other, the tower is connected to a newly developed 3D camera surveillance system, which installed at the entrance of the exhibition scans the visitor's face as they enter, these by electing to enter the exhibition are accepting to be part of the system and to having their faces modified. Here, gender and racial morphing are queer digital strategies to disrupt the tradition of colonial and anthropometric identification techniques, which extend from criminological photography of the 19th century to today's facial recognition technologies[277].

Connected to the Internet, *3x3x6* allows visitors, both physical and virtual, to send selfies and images to the exhibition system. The visitors are therefore totally inside the surveillance apparatus. Moving on to the second and third rooms of the Prigioni, they enter into a maze of monitors that unfold the stories of the ten prisoners across different historical moments and cultures. Finally, visitors are invited to discover the control room and the very operating system of the surveillance apparatus in function[278].

Below are briefly told the ten stories that are reproduced by the ten monitors inside the installation. The characters really existed and with them also their different accusations and crimes, but they have fictional names. The first story is about Casanova X, arrested

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[276] Preciado, P. B. (2019), *May You Live In Interesting Times: Biennale arte 2019,* cit., pp. 198-199.
[277] Ibid.
[278] Ibid.

in Venice in 1755 and jailed at the Piombi. He was accused with an undetermined charge, likely a combination of corruption, indecency, and public outrage, but he managed to escape in 1756. The second story is about Sade X, who is charged with numerous allegations of sexual abuse, deviance, sodomy, and blasphemy. She was incarcerated in French prisons for more than thirty-two years of his life. The third story is about Foucault X, investigated for homosexual conduct by the Polish police in 1959 while serving as director of the Centre Français at the University of Warsaw. He was incarcerated for an unknown period of time. The fourth story is about B X, in 2013 the woman was sentenced to life imprisonment for cutting off her husband's penis and throwing it into a garbage disposal unit. She was granted parole only after seven years in prison. The fifth story is about MW X, a man who agreed by contract to eat another man after having sex. They had met in an Internet cannibal café and then one had slaughtered the other. He was convicted of murder and sentenced to life imprisonment in Germany in 2006. The sixth story is about 00 X, a men arrested for soliciting gay men to have chemsex via social networks. He was sentenced to twelve years in prison for knowingly spreading the HIV virus and endangering others. The seventh story is about D X, a transgender person accused in the 2010s of having sex with a woman without revealing his gender status. He was sentenced to six years of prison for sexual assault, this legal charge is known as "rape by deception". The eighth story is about R X, a Muslim scholar arrested for alleged sexual assault and rape in 2018. He was detained for ten months in solitary confinement in a prison near Paris. The ninth story is about L X, a woman from China's post-1995 generation, sentenced to four years in prison. She was charged with manufacturing and disseminating obscene articles on social media for profit in 2016. The tenth story is about FSB X, a group of three women from Gweru held at Harare's Chikurubi Maximum Security Prison. In December 2011 they were arrested and incarcerated for alleged raping, harvesting, and selling men's semen. More recently, further cases of female sperm bandits have been reported in Zimbabwe and South Africa[279].

Hacking digital surveillance technologies and social media, Cheang uses the historical site of the Venetian Renaissance prison to create a glitch in its histories and to reform, a real-time interface, that the visitor is invited to join. But this "entering" is no longer just

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[279] Preciado, P. B. (2019), *3x3x6 She Lea Cheang,* Catalogue of the Exhibition, La Biennale di Venezia, pp. 110-142.

a physical act, the visitor's facial image is tracked and transformed into data, manipulated to modify parameters associated with cultural codes of gender, sexuality, and race; and reloaded into the biopolitical bank of historical and fictional faces of "sexual offenders" and gender revolters. The exhibition includes legal documents, fake news, historical reports, myths, and fantasies, as well as the data retrieved from 3D surveillance cameras and the images uploaded by visitors. It constructs a dissident collective history of sexuality, where trans punk fiction, queer, and anti-colonial imaginations provide visual and critical frameworks to think through the histories of subjection and resistance and to activate a critical proliferation of poetic and political actions for digital times. A contribution to the digital avant-garde, *3x3x6* equally challenges the aesthetics of Internet global capitalism and the genies, sexual, and race norms that hold up its hidden infrastructure[280].

Today we are seeing the emergence of a new digital avant-garde working to transform the frameworks of vision, sound, and meaning production to reflect on the change from an analogical society to a digital totality. Whereas modernism negotiated the tension between craft and the emergent technologies of its era, the digital avant-garde develops out of the reassessment, critique, and collapse of modern aesthetics by post-Internet technologies, including data mining, mass surveillance, virtual reality and AI[281].

This digital avant-garde movement undertakes two oppositional moves, as seen in *3x3x6*. First, instead of using Internet as simple content provider, Cheang uses and misuses the possibilities of producing and distributing Internet-specific art. Second, the artist practices what we could call fictional disobedience: her ways of coding and narrating oppose the hegemonic narrative that criminalizes sexual, gender, and racial minorities; she questions the norms that have established the difference between the normal and the pathological, the real and the virtual, the socially recognized and the invisible. Cheang turns a medium against itself only to reconnect it with political history and social agency. In doing so, the post-Internet digital avant-garde, to which the artist belongs, challenges the aesthetics of global Internet capitalism and the politics of identity construction fuelled by social media and exploited by marketing and political control[282].

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[280] Preciado, P. B. (2019), *3x3x6 She Lea Cheang*, cit., pp 88-89.
[281] Ibid.
[282] Ibid.

3.2.3. *Living Rocks: A Fragment of the Universe* by James Darling and Lesley Forwood

Figure 20. Darling, J. and Forwood, L., *Living Rocks: A Fragment of the Universe*, 2019, photo of the exhibition space, 58th Venice International Art Exhibition (Venice).

Promoter: Art Gallery of South Australia

Curator: Lisa Slade

Participants: James Darling and Lesley Forwood

«What was our planet three billion years ago?»[283] this is the question asked by James Darling and Lesley Forwood in the installation *Living Rocks: A Fragment of the Universe*. It is a South Australian collaboration and a Collateral Event at the 58th International Art Exhibition in 2019[284].

Microbes were the only living organisms on Earth for three billion years. Thrombolites and stromatolites are rock-like microbial structures that grew in shallow pools which, when they emerged from underwater, photosynthesised, releasing oxygen and creating the beginnings of the atmosphere of our planet. The work is inspired by a lake containing thrombolites not far from the artists' farm (fig. 20)[285].

Darling and Forwood are radical farmers and environmentalists from south-eastern Australia, they are also radical thinkers. When government policy demanded clearance of native vegetation for agricultural land, they responded by conserving the roots of the

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[283] Darling, J. & Slade, L. (2019), *May You Live In Interesting Times: Biennale arte 2019*, 58th International Art Exhibition, Venezia, p. 220.
[284] Ivi pp. 220-221.
[285] Ibid.

mallee gum to make art. Since the 90s they have been making large installations that dramatically celebrate the whorl and the helix of the roots and the arid land eucalypt.

The art of Darling and Forwood incorporates art and science in a daring multidisciplinary project that puts thrombolites at the centre of attention. The installation celebrates the cosmic imperative of microbes in action in the universe. It highlights their survival through the great extinction events of our planet, those that have happened and those that are still to come[286].

In Living Rocks, water floods the Magazzini del Sale, the historic stone salt storehouses of Venice that have stood the test of many an inundation. From an extensive pool emerge thrombolites that have been crafted, not by unimaginable time and the force of nature, but by the artists themselves, who employ the distinctive roots of an arid land eucalypt sourced from their farm to create living rocks. The mallee roots from the Eucalyptus plant are intricately arranged into imposing geometric structures that reflect upon ideas of form, nature and evolution[287].

Jumpagate VR, Adelaide-based VR production business, collaborated with artists James Darling and Lesley Forwood to bring their immersive work to life for the prestigious event. Jumpgate VR Managing Director Anton Andreacchio said the art project provides a platform for the company to further develop their technology for a range of applications in the creative industry[288].

The shallow 30-metre-long pool (engineered by South Australian engineer Rob Cooper), containing thousands of litres of water, comes within 5 centimetres of the 37 m x 3 m digital screen projecting 20 minutes moving image displaying a span of 3 billion years. Andreacchio said the 3D VR projections are designed to complement the sculptures to deliver an immersive experience for audiences, "We went out to Lake Hawdon and used photogrammetry to reconstruct the thrombolites that were out there, taking photos from multiple directions then reconstruct the 3D geometry as well as work closely with the

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[286] Darling, J. & Slade, L. (2019), *May You Live In Interesting Times: Biennale arte 2019*, cit., pp. 220-221.
[287] Ibid.
[288] Solstice Media (2019), *Virtual reality to become a reality at Venice Biennale*, in Medium, https://newsleads.medium.com/virtual-reality-to-become-a-reality-at-venice-biennale-16b8d61640b3, (last accessed 11-02-24).

scientists that James and Lesley were consulting with to get their feedback on the work as well"[289].

Ten 4K projectors provide this moving image, rendered in 26K (films are typically rendered in 2K or 4K). The ten 4K projectors were required for the projection to be experienced in 3D, and so the VR projections do not require headset to be experienced. Anton Andreacchio said:

> Creating a scene in 26K has immense challenges, the software can't deal with it. So, we've had to innovate on the back-end to make sure we can live up to the expectations of the artists. This includes the rendering and the 3D program where we're creating these digital worlds. We used an artificial intelligence up-scaler to take it from 13K to 26K, but it was going too slow so we re-wrote a new AI up-scaler so we were able to deal with this[290].

Jumpgate used modelling software Blender to create the 3D images and simulations that include volcanoes, flying flocks of birds, water that laps against the bases of the thrombolites, smoke emanating off the ocean and day-to-night transitions. The company helped the artists to build a smaller-scale display of the current installation which was first shown at the Hugo Michell Gallery in Adelaide in 2018, before it was granted entry to the Magazzini del Sale gallery and expanded for the Venice Biennale[291].

As well as spurring on this VR technology innovation, Living Rocks has also brought together leading scientists in the creation of this significant work. Leading scientists Dr. Robert Burne, Professor of Earth & Environmental Science at the Australian National University, and Malcolm Walter, Professor of Astrobiology School of Biological, Earth and Environmental Sciences, University NSW have been advisors to the artists throughout this project[292].

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[289] Darling, J. & Forwood, L. (2019), *Living Rocks: A Fragment of the Universe*, in James Darling & Lesley Forwood, https://www.darlingandforwood.com/2019-living-rocks-a-fragment-of-the-universe, (last accessed 11-02-24).
[290] Solstice Media (2019), *Virtual reality to become a reality at Venice Biennale*, in Medium, https://newsleads.medium.com/virtual-reality-to-become-a-reality-at-venice-biennale-16b8d61640b3, (last accessed 11-02-24).
[291] Ibid.
[292] Darling, J. & Forwood, L. (2019), *Living Rocks: A Fragment of the Universe*, cit., https://www.darlingandforwood.com/2019-living-rocks-a-fragment-of-the-universe, (last accessed 11-02-24).

The images, constantly in motion, occupy the space where the boundaries of science and the imagination cohabit and are accompanied by String Quartet No. 2 composed by Paul Stanhope and performed by the internationally acclaimed Australian String Quartet[293].

Living Rocks: A Fragment of the Universe is both an artistic testimony and the union of world-class organizations operating in South Australia, in fact the exceptional results have been generated by the interdisciplinary collaboration between more organizational organisms. Three tonnes of arid eucalypt stumps have been shipped to Venice and positioned in a huge pool of water to re-create the geological marvels (thrombolites) in the Venice's old salt emporium[294].

It is the first ever solo Australian project to be selected as an Official Collateral Event in La Biennale Arte and one of only 21 such events selected. *Living Rocks* has attracted an average of 500 visitors a day and is an exemplar work from two of the greatest land artists alive today[295].

Within curator Ralph Rugoff's theme May We Live in Interesting Times, the installation links the present to the beginning of life and brings to the fore the fragility of our planet. In a statement by James Darling, the artist said:

> This exhibition is about conception, where fragments and the imagination reside. *Living Rocks* celebrates the presence of thrombolites. It celebrates microbial life. Looking back and looking forward, the concept of microbialites as the "disaster-recovery" or default ecosystem of our planet, and perhaps of many others, speaks of genesis and genius. At its core, the installation connects the present day to the beginning of life. It is a memory of our origin and a prophecy of our future[296].

[293] Darling, J. & Slade, L. (2019), *May You Live In Interesting Times: Biennale arte 2019*, 58th International Art Exhibition, Venezia, pp. 220-221.

[294] Darling, J. & Forwood, L. (2019), *Living Rocks: A Fragment of the Universe*, in James Darling & Lesley Forwood, https://www.darlingandforwood.com/2019-living-rocks-a-fragment-of-the-universe, (last accessed 11-02-24).

[295] Ibid.

[296] Id. (2019), *Living Rocks: A Fragment of the Universe*, in Venice Art Factory, https://www.veniceartfactory.org/living-rocks-darling-forwood, (last accessed 11-02-24).

3.2.4. *Cosmorama* & *Endodrome* by Dominique Gonzalez-Foerster

Figure 21. Gonzalez-Foerster, D., *Cosmorama*, 2019, photo of the exhibition space, 58th Venice International Art Exhibition (Venice).

International Art Exhibition. She presents two works: *Cosmorama* (fig. 21), a diorama of a Mars landscape, and *Endodrome* (fig. 22), a virtual reality environment.

Over many years, Dominique Gonzalez-Foerster has taken inspiration from the world of speculative fiction as a tool for imagining different futures, pasts and presents, and is particularly drawn to the notion of escape. Another important notion is "environment", in fact she often creates immersive simulated worlds in galleries, museums and public spaces[297].

At a time when a looming global climate crisis threatens life on Earth, her attention has turned to Mars. So too have eyes of scientists, with satellites and rovers transmitting increasingly detailed images of the red planet. Our perception of the Martian environment, the setting for any number of science-fiction stories, is shifting from quintessentially hostile to potentially habitable; in the collective imagination, humans have substituted Martians as its dwellers. After all, the irruption of Martians in popular culture was a byproduct of scientific observations: in 1877, the Italian astronomer Giovanni Schiaparelli detected the presence of artificial "canali" on the planet's surface, erroneously translated into English as "canals"[298].

The first images of Mars arrived on the Earth in 1976, when the Viking probe landed on its ground. But already in the 1950s, Martian narratives haunted the science-fiction

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[297] Casavecchia, B. (2019), *May You Live In Interesting Times: Biennale arte 2019*, 58th International Art Exhibition, Venezia, pp. 250-251.
[298] Ibid.

imagination in worried tones. In his novel *The Martian Chronicles* (1950), Ray Bradbury describes these canals as fabricated waterways filled with "green liquors" and "lavender wine". Bradbury and Leigh Brackett's Martian fiction inspired Gonzalez-Foerster's *Cosmorama* (2018). It is a diorama realized in the space of Central Pavilion located in the Giardini. Historically, the cosmorama is an evolution of the panorama, which was used in the 19th century as a medium for the exhibition of perspective images of different places in the world. The realism of the images was achieved through the careful use of lighting and lenses[299].

This project is a collaboration with the artist Joi Bittle, who is a diorama designer, is modelled on dioramas found within natural history museums. This collaboration was first shown in the exhibition *Martian Dreams Ensemble* in Leipzig in 2018 (graphic artist Marie Proyart, musician Julien Perez and architect Martial Galfione also collaborated)[300]. The 19th century diorama, based on mimetic and optical illusion, finds a 21st century update in the simulated visionary worlds of virtual reality. The work combines a painted background with sculpted elements of the Martian landscape such as rocks and sand, all carefully tinted. With the diorama enclosed in glass, viewers are invited to imagine themselves inside this setting, in the way that footage from the Martian surface might inspire us to picture ourselves there. *Cosmorama* locates the viewer within a vision of the fourth planet from the sun, its surface rendered in shades of red with embedded black volcanic stones[301].

As mentioned above, the diorama elucidating a portrayal of the Martian topography and a myriad of discrete indications strategically positions the observer within a dystopian temporal analysis framework. The landscape, emblematic of the prospective technophile era, assumes the semblance of a panorama foretelling the Earth's pre-existing desolation, encapsulating a forthcoming era that retrospects upon its antecedents. From the confines of a dark room, the observer's attention is directed towards this space of curved representation (arena), wherein the artistic canvas seamlessly integrates with the rocky embellishments[302].

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[299] Oettermann, S. (1997), *The Panorama: History of a Mass Medium*, Zone Books, New York, p. 41.
[300] Ibid.
[301] Ibid.
[302] Pluot, S. (2019), *Cosmorama*, L'art même. Focus Biennale de Venise 2019, Bruxelles, pp. 14-15.

The so-called *Martian Dreams Ensemble* is the artist's latest attempt to meld art with science fiction, she treats the red planet as an object of thought, while once again underscoring her desire to create immersive experiences. But the *Cosmorama* given the very real threat of climate change, potentially depicting our future home[303].

Born in 1965 in Strasbourg, Dominique Gonzalez-Foerster is renowned for her interdisciplinary practice, with influences spanning cinematography, music, architecture, and literature. Her work has garnered recognition and has been showcased in prominent museums worldwide, including the Tate Modern in London and the Pompidou Centre in Paris. Rather than focusing on creating traditional art objects, the French artist is more inclined towards exploration, venturing into new territories, atmospheres, and spaces. Throughout her career, Gonzalez-Foerster has exhibited in diverse formats, such as shared spaces (Expodrome, 2007), futuristic installations (TH.2058, 2009), and a time machine (Temporama, 2015). Notably, she recently delved into virtual reality with her creation presented at the 58th Venice Biennale[304].

Gonzalez-Foerster is celebrated for her experimental approaches to art, particularly through conceptual installations and video projections that draw inspiration from film, literature, architecture, and art history. Her interdisciplinary practice extends beyond traditional boundaries, encompassing photography, design, and live performances. An early adopter of multimedia and experimental technologies, her venture into virtual reality with *Endodrome* seamlessly aligns with her artistic evolution[305]. The artist opens up new temporal, spatial, and mental dimensions within the space of Arsenale. *Endodrome* is a project that uses virtual reality to involve viewers in trance-like encounters where they can alter themselves and their surrounds. It is the first VR artwork realized by the pioneering artist and entirely supported by HTC VIVE Arts, the production team includes line producer Lucid Realities and VR studio Novelab. In 2019, Venice Biennale features

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[303] Maier, T. (2019), *Dominique Gonzelez-Foerster*, in Artforum, https://www.artforum.com/events/dominique-gonzalez-foerster-7-243180/, (last accessed 11-02-24).
[304] Institut Francais (2019), *Endodrome by Dominique Gonzalez-Foerster*, in Institut Francais, https://www.institutfrancais.com/en/magazine/work/endodrome-by-dominique-gonzalez-foerster, (last accessed 11-02-24).
[305] Vive Arts (2019), *Endodrome*, in Vive Arts, https://www.vivearts.com/projects/endodrome, (last accessed 11-02-24).

numerous artworks made using digital technologies, demonstrating growing recognition of works made using VR, AR, AI and other digital mediums[306].

Endodrome, conceived as a diptych, offers a unique immersive experience by seamlessly combining interactive virtual reality with a theatre ambience, incorporating sound, light, and projections reminiscent of a séance. The staged environment, featuring a round table and purpose-built room, sets the scene for viewers who initially observe the work from the outside, similar to a theatrical performance[307].

The artwork is designed for groups of five people to enter at a time, creating a shared and immersive encounter with the mesmerizing visions crafted by Dominique Gonzalez-Foerster. Once inside, each participant wear a VR headset to embark on an eight-minute journey. The VR experience unfolds in response to the users' movements, eyes, and breath, creating a dynamic bath of colours that transform as participants engage with the artwork. Immersed in a fluid, hypnotic monochrome environment, viewers traverse abstract visual space, interacting with shifting layers of vibrant colour fields. This interactive aspect allows participants to influence the unfolding visions, providing a unique opportunity to participate in the meditative exploration created by the artist[308].

Figure 22. Gonzalez-Foerster, D., *Endodrome*, 2019, photo of the exhibition space, 58th Venice International Art Exhibition (Venice).

[306] La Biennale di Venezia (2019), *Dominique Gonzalez-Foerster*, in La Biennale di Venezia, https://www.labiennale.org/en/art/2019/partecipants/dominique-gonzalez-foerster, (last accessed 11-02-24).

[307] Institut Francais (2019), *Endodrome by Dominique Gonzalez-Foerster*, in Institut Francais, https://www.institutfrancais.com/en/magazine/work/endodrome-by-dominique-gonzalez-foerster, (last accessed 11-02-24).

[308] Vive Arts (2019), *Dominique Gonzalez-Foerster: Exploring Consciousness through VR*, in Vive Arts, https://www.vivearts.com/features/venice-biennale-2019-ralph-rugoff-and-dominique-gonzalez-foerster., (last accessed 11-02-24).

Drawing on the artist's collaboration with musician and author Corine Sombrun, the VR artwork is accompanied by a specially crafted soundscape. This eight-minute experience is a captivating fusion of technology, art, and theatricality, inviting viewers to become active participants in Gonzalez-Foerster's evocative artistic realm. The artist said: «I wanted to showcase the experience. I like the idea of observing someone, themselves observing something»[309].

The title *Endodrome* is designed by the artist, it combines two Greek terms "endon" meaning "internal" and "dromos" meaning "path". The installation has been realized with the aim of being an "interior journey" for the participants. With this work the artist has created a VR artwork which allows viewers to journey inwards to access alternative states of consciousness[310].

Endodrome continues Gonzalez-Foerster's exploration of notions of space and interiority. As already mentioned, attracted by the notion of escapism and speculative fiction, the artist has designed her three-dimensional images as sounds that evoke new life forms or extraterrestrial environments. Virtual reality is used as a medium that allows not only an out-of-body experience but is also a means of broadcasting the interior world. The visual artist said «*Endodrome* thus gives participants a space to enter a meditative realm and access a space of conscience inspired by trance»[311].

During an interview for Vive Arts Magazine, Ralph Rugoff, Artistic Director of the 58th Venice Biennale, speaks to artist Dominique Gonzalez-Foerster about her works *Cosmorama* and *Endodrome*. The artist stated that in the 19th century there was an incredibly fertile moment when people, driven by the desire to explore, had created new ways of representing images and living experiences. At this very moment, dioramas were born, but they were soon replaced by cinema. She said that sometimes saw a similarity between the contemporary era and that historical moment. The director observed that throughout history, humans have always developed different technologies with the aim of satisfying the desire for exploration and immersion. Even before dioramas, there was the panoramic painting, and even before that, late medieval painters used perspective to create immersive environments. She added that inside the Giotto's Chapel or in front of

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[309] Institut Francais (2019), *Endodrome by Dominique Gonzalez-Foerster*, in Institut Francais, https://www.institutfrancais.com/en/magazine/work/endodrome-by-dominique-gonzalez-foerster, (last accessed 11-02-24).
[310] Ibid.
[311] Ibid.

a work by Monet like the *Water Lilies*, it is evident that the artist's aim is to invite the observer into the work. The interior is represented by a space, transforming simple observation into an almost tactile experience. She explained that the space of the artwork had always fascinated her and that she is equally interested in real and virtual spaces. She declared that she is constantly evolving and that always wants to invent new ways to be inside the space. Ralph Rugoff remarked that in the last 100 years there has been a real revolution of the image, due to the introduction of the screen and the transition from art-work to art-installation. Thanks to these changes, now viewers are able to enter a total space, abandoning the controlled experience of watching something within a frame. He pointed out that the main feature of virtual reality is to immerse the observer in an experience and make him able to explore the surrounding space through the body, thus having a physical relationship with space never had before. Dominique Gonzalez-Foerster expressed agreement with the points outlined above. She added that one of the simplest and most unusual things that is possible to do with VR is "lose" the body in an infinite space but perceiving a link between the real position of the body and the virtual one. She claimed that virtual reality is just the beginning of this spatial exploration. She stated that her intent is not to use VR to imitate an architectural space or to recreate an existing space, but that her purpose is to explore an inner space, connected to the body. In conclusion, she said that in addition to the moment of immersion in virtual reality, it is also important the moment of "exit" from the experience and that she wanted to focus and work on this transition[312].

[312] Vive Arts (2019), *Dominique Gonzalez-Foerster: Exploring Consciousness through VR*, in Vive Arts, https://www.vivearts.com/features/venice-biennale-2019-ralph-rugoff-and-dominique-gonzalez-foerster, (last accessed 11-02-24).

3.2.5. *Old Food* by Ed Atkins

Figure 23. Atkins, E., *Old Food*, 2019, photo of the exhibition space, 58th Venice International Art Exhibition (Venice).

Ed Atkins makes all kinds of convolutions of self-portraiture. He writes uncomfortably intimate, elliptical prophesies, draws horrible caricatures; and makes realistic computer-generated videos that often feature male figures in the throes of unaccountable psychical crises. These CGI figures are self-proclaimed surrogates for the artist, possessed and animated by his voice and by his motion-captured body; they are "emotional crash-test dummies", thrust into whatever torturous scenario of digital sentimentality in order seemingly to stress test limits of empathy. Snatches of musical cues, vivid foley and visual effects are employed with hysterical abandon, in pursuit of some sort of terrible sufficiency of representation[313].

Across his chosen media, Atkins wants our nerves frayed and our responses manic, as desperate as his attempts to communicate are. Atkins's artificial realism, whether written or animated, pastiches romanticism to get rendered down to a sentimental blubber, all the better to model those bleak feelings often seemingly inexpressible in real life. The installation *Old Food*, on view in the Arsenale (fig. 23), is wadded with historicity, melancholy and stupidity. Here, Atkins has expanded his emo terrain, tempering affecting autobiographical figuration with broader issues and citations[314].

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[313] Rycroft, V. (2019), *May You Live In Interesting Times: Biennale arte 2019*, 58th International Art Exhibition, Venezia, pp. 208-209.
[314] Ibid.

Where previously death was the precondition of love and the logical end point to the wants of representation, *Old Food* presents a system that's less morbid and far, far less romantic. The world of *Old Food* is always-already lost, gone but persisting regardless, never knowing why. The videos depict some pseudo-historic world of peasantry, bucolic landscapes, and eternal ruin[315].

Characters weep continuously, their lives devoid of dramatic redemption; a looping piano piece by Jürg Frey is the haunting leitmotif; crowds of people plummet while credits roll; inedible, impossible sandwiches assemble and collapse in lurid advertisements; and corporate sponsorship appears sporadically, and apparently unbidden. Countless opera costumes throng the space, displayed in the manner of their storage, hemming in the audience and baffling the air, underscoring the absence of life in the videos and the ways in which history is dramatically pardoned, through romanticism, nostalgia, and ignorance. Information panels written by the anonymous critics at Contemporary Art Writing Daily inform us of so much (too much) saturating the work hyper-textually, parodying institutional authority with a tone that lurches between overly familiar vernacular and revelatory oversight[316].

Old Food is a multimedia installation presented for the first time at the Berliner Festspiele in 2017 and then in 2019 at the Venice Biennale, in an updated version. The work consists of multiple elements including digital screens, sound boxes, explanatory panels, and physical objects such as hangers, stage costumes and seats for the public. However, the starting point of the installation is not rooted in the field of visual arts but originates in the homonymous literary work written by Atkins himself. The book *Old Food* represents the value attributed by Atkins to the title, already of central nature since the beginning of its production[317]. In fact, it immediately to that dimension of decay, rotting and disease, like a still life that withers and is contaminated with mold and crumbles.

The element of the word also enters the installation through texts, written by the anonymous collective Contemporary Art Writing Daily that, through sharp and critical texts, comment on the work, making it part at the same time[318].

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[315] Rycroft, V. (2019), *May You Live In Interesting Times: Biennale arte 2019*, cit., pp. 208-209.
[316] Ibid.
[317] Atkins, E. (2017), *Old Food*, Fitcarraldo Edition, London.
[318] Contemporary Art Writing Daily, explanatory text included in the installation: «Old Food is of course a misnomer. There is no Old in the digital. No refrigerator negligence. It is decided to appear as such. Food is newly moody, already digitally embalmed. And CGI characters of course have no body thus no

The installation should therefore be understood as an almost curatorial undertaking created by the artist himself with the aim of giving unity to individual works different from each other and other objects that, placed in front of the digital art videos, can acquire new and unprecedented meanings. *Old Food* is one of the best examples, both in reference to the work of Atkins and compared to the most recent works of Installation Art, able to achieve something immersive, engaging and captivating, while maintaining a great reflective depth[319].

The physical elements, such as clothes and hanging structures, also broaden the horizon of Atkins' research, usually focused on audiovisual works proposed with projections on white surfaces, with special features only related to the arrangement of screens in space. In particular, there are some clothes hangers with stage costumes hanging to attract the viewer, questioning him on the reason for their presence. Being recognizably used for performance, they refer to a type of recreation linked to the past, contrasting with television screens that embody a current idea of entertainment, a conceptual passage from performance to digital content. As the artist states, the archival clothes have the aim of reflecting on the idea of body, in fact, point towards a body that has worn them, and their inactivity places further emphasis on the potential they offer to the bodies that pass next to the installation[320].

The individual videos that make up the archipelago of works *Old Food*, despite they are all united by this cyclical and repetitive temporality and although in dialogue with each other, deal with very different issues, dividing into two distinct groups. The first is composed of two screens showing three different characters: a toddler, a boy and a hooded adult man. From the clothing worn it is possible to identify its temporal origin in an indistinct past with medieval or Renaissance elements, called to interact with more modern objects. The second, instead, consists of two screens with slow-moving video

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use for food. If they eat it is because, as stated by recent Weyland androids, it is for our own comfort, seeing them forced to do so. The camera shaking as if hands hold it; the hands have been removed. Opera costumes, the surface effects of a literary character. A pregnant woman described how the little frock hanging in readiness for her as yet unborn child seemed like 'a ghost in reverse'. Your favourite virtue? Proust: "The need to be loved: more precisely the need to be caressed and spoiled much more than the need to be admired"».

[319] O'Neill, P. (2019), *How I Learned to Stop Worrying and Love the Dumb: Ed Atkins's Old Food at the Venice Biennale 2019*, in New Critique, https://newcritique.co.uk/2021/03/15/review-how-i-learned-to-stop-worrying-and-love-the-dumb-ed-atkinss-old-food-at-the-venice-biennale-2019/, (last accessed 11-02-24).

[320] Ibid.

representatives of sandwiches in the act of composing, in a moment of suspension of gravity, with human figures and objects of various kinds used as ingredients. Both the aesthetics and the content appear very different, while maintaining an alienating dimension and an attraction able to catalyse the gaze of visitors who enter the installation[321].

Focusing on the content of the first group, it is possible to identify the three characters in four television screens, two positioned vertically and two horizontally. Among them a hooded, weathered gentleman, presented as an exiled figure forced to wander on a dark night, he holds a candle that partially illuminates the scene. From the facial expressions he appears sad and resigned, crying and looking in the direction of the viewer[322].

On another screen, instead, appears the figure of a newborn with a decidedly oversized head compared to the body, also intent on crying from large, shiny and swollen eyes, with abundant tears that form near the lower eyelids. Seeing the characters cry profusely, is difficult, almost impossible, not empathize with them, wondering first of all what is the mysterious reason for their sadness. The reason for the tears, almost a constant in Atkins' CGI production, actually has deep roots in the history of art. Weeping has been a central theme for painting, especially the sacred one over centuries. In addition, many scholars outline the reasons that determine a more intense empathic response when faced with images depicting scenes of crying. According to this theory, it is possible to incorporate the crying action of the three characters used by Atkins, replicating it on an empathic level. The mirror neurons theory (proposed for the first time by Rizzolatti[323]) states that visual exposure to a phenomenon, or to an image, causes the activation of the same neurons that are activated in the act of performing the gesture that is witnessed. In short, from a neuroscientific point of view, seeing a person cry and the act of crying generate the same neuronal reaction, making the two phenomena coincide[324].

The child character in *Old Food* also appears in the video on one of two horizontal screens. Its dimensions appear here much oversized compared to the environment in

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[321] O'Neill, P. (2019), *How I Learned to Stop Worrying and Love the Dumb: Ed Atkins's Old Food at the Venice Biennale 2019*, cit., https://newcritique.co.uk/2021/03/15/review-how-i-learned-to-stop-worrying-and-love-the-dumb-ed-atkinss-old-food-at-the-venice-biennale-2019/, (last accessed 11-02-24).
[322] Ibid.
[323] Rizzolatti, G. (1988), *Functional organization of inferior area 6 in the macaque monkey: II. Area 169 F5 and the control of distant movements*, Experimental Brain Research, n. 111, pp. 246-252.
[324] Pinotti, A. & Somaini, A. (2009), *Teorie dell'immagine. Il dibattito contemporaneo*, Raffaello Cortina, Milano, pp. 271-287.

which it is located, the interior of a wooden hut, reaching the ceiling with his head. The change in size and scale, common to much of the CGI production, in this particular case evokes an episode of the book *Alice in Wonderland*, written by Lewis Carrol in 1865. The second chapter of the novel, in fact, opens with Alice who is inside a room, managing to touch the ceiling, after swallowing a pastry with magical powers. Given the sudden change in size she cries so much that once back to normal, she creates a small pond of tears in which she finds herself swimming. Atkins' scene features both the change in size and the crying, making this *Old Food* video appear as an almost direct quote from Carrol's novel[325].

Always in the horizontal screen and the adjacent one, there is also another character, a boy dressed in purple dress and tights intent on running along a path in the woods, near the hut. In the video in which it is shown while running it is possible to clearly notice the loop, because the run performs the same trajectory, and the boy finding itself after a few moments at the starting point. The thread that connects the two scenes (in addition to the wooden walls of the hut) is a black piano, located in the middle of the forest, which is also found next to the wall in the video on the right. The modern design of the vertical piano and stool, contrast with the clothing of the characters that places them in a generic past[326].

The piano becomes central to the construction of an additional scene, in which the protagonist character is the little boy. The scene opens with the piano in a white room with neon lights, on the right wall there is a circular hole open to the outside. The character appears as strange but curious to discover the mysterious object, coming from another era. Atkins decides to play the piano with transport and emotion from the boy who is moved during the performance. Music is little known and contextualized in a niche of conceptual contemporary music. The song is titled Extended Circular Music n.02, composed by the minimalist musician Jürg Frey and, like the video, is a loop, repeatable endlessly without change in the performance[327].

Focusing on the content of the second group, separated by a wooden wall, two other screens positioned at the bottom show images reminiscent of a fast-food advertisement.

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[325] Carrol, L. (trad it. M. D'Amico) (2012), *Alice nel paese delle meraviglie (1865)*, Rizzoli, Milano.
[326] O'Neill, P. (2019), *How I Learned to Stop Worrying and Love the Dumb: Ed Atkins's Old Food at the Venice Biennale 2019*, cit., https://newcritique.co.uk/2021/03/15/review-how-i-learned-to-stop-worrying-and-love-the-dumb-ed-atkinss-old-food-at-the-venice-biennale-2019/., (last accessed 11-02-24).
[327] Ibid.

People, objects, ingredients are compressed cyclically between two slices of bread. In the exhibition at the Venice Biennale, in front of the screens there were two seats, which encouraged visitors to stop and contemplate the work, in fact recreating the absorption felt in front of a screen and allowing a slower fruition than the other screens. The benches in front of a work function as tools for the channelling on the screens placed in front, however, it is in the content that the main opportunity for empathy and absorption in the work arises[328].

In these two screens appear small figures that are at one time in the absence of gravity and another crushed in the slices of bread (fig. 24). This movement, often of falling and twisting, evokes a greater emotional-empathic response than the other examples in the installation. No doubt we feel "as if" we were those little men violently slammed against other objects such as chairs, tables, slices of giant lettuce. But our neuronal activation has another level, because very quickly we lose our empathy in individual men in favour of the recomposed sandwich. In this last stage the sandwich appears to us as an affordance, that suggestion coming from a visual stimulus that suggests us how an object is manipulable. With the right level of immersion, we could theoretically believe that we could grab the sandwich to eat it, entering into interaction with it[329].

Figure 24. Atkins, E., *Old Food*, 2019, real time frame captured, 58th Venice International Art Exhibition (Venice).

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[328] O'Neill, P. (2019), *How I Learned to Stop Worrying and Love the Dumb: Ed Atkins's Old Food at the Venice Biennale 2019*, in New Critique, https://newcritique.co.uk/2021/03/15/review-how-i-learned-to-stop-worrying-and-love-the-dumb-ed-atkinss-old-food-at-the-venice-biennale-2019/, (last accessed 11-02-24).
[329] Ibid.

Atkins is aware of this iconic status and demonstrates this by creating a work that appears immersive for its ability to be crossed. His intent is to include the viewer in a physical relationship but deviating from seeking a single type of virtual reality, isolating digital videos in their own television frames, as imaginary windows open on a parallel world, using a practice not far from that theorized by Leon Battista Alberti[330]. In *Old Food*, the walls behind the screens are made of wood and refer directly to the material with which the hut contained in the videos is built. The screens then function like real windows[331].

The artist employs both types of art, adapted to digital, being the sandwiches of contemporary versions of still lifes, and the left screen with the little boy running in the woods a version of landscape, marked by the possibility of movement given by the animation. The artist seeks a distance between spectator and work to allow aesthetic enjoyment, to assert the characters CGI as fictional[332].

Old Food therefore appears as a work that is part of the path of Installation Art rather than being a full part of a digital art enjoyed in virtual reality contexts or on private and personal screens such as the computer or smartphone. Atkins maintains a double frame: a physics, which distinguishes its videos in CGI from the surrounding world, and an institutional, choosing to produce the works for a fruition always to the intent of galleries, museums or fairs, avoiding entering its production in a hybrid territory. Atkins' intervention is therefore recognizable artistic, but unconventional. According to Simone Arcagni: «Atkins' work is part of a future cinema that is possible precisely because of its ability to be an environment that can be crossed and multimedia, but also a place of narration, emotional participation»[333].

In the last analysis, *Old Food* remains perhaps the most complex and successful work of Atkins, knowing how to unite the two worlds: real and digital, two historical periods, the past of the stage clothes and the immutable one of the characters locked in an eternal repetition.

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[330] Alberti, L. B. (1435), *De Pictura. Trattato sulla Pittura*.

[331] O'Neill, P. (2019), *How I Learned to Stop Worrying and Love the Dumb: Ed Atkins's Old Food at the Venice Biennale 2019*, cit., https://newcritique.co.uk/2021/03/15/review-how-i-learned-to-stop-worrying-and-love-the-dumb-ed-atkinss-old-food-at-the-venice-biennale-2019/, (last accessed 11-02-24).

[332] Ibid.

[333] Arcagni, S. (2021), *Cinema Futuro*, Nero Edizioni, Roma, p.108.

3.3. Virtual reality and the Biennale

This subsequent section of the chapter is devoted to two case studies, *Rising* by Marina Abramović and *Biennale 4D* by University of Applied Sciences and Arts Northwestern Switzerland FHNW and Swiss Institute for Art Research SIK-ISEA, both of which, despite lacking official presentation at the Venice Biennale, share an intrinsic and inseparable connection with the event.

The decision to incorporate them into the discourse stems from the intention to underscore the unquestionable impact of the Biennale and its thematic elements, exerting influence, beyond the confines of Venice, in the broader realm of contemporary art.

3.3.1. *Rising* by Marina Abramović

Figure 25. Abramović, M., *Rising*, 2019, real time frame captured, Ca' Rezzonico Gallery (Venice).

In the sea of images of the 58th International Art Exhibition in Venice stands out the presence of a virtual reality work realized by Marina Abramović, set up in a space-gallery (Ca' Rezzonico Gallery) next to the Ca' Rezzonico Museum (fig. 25). The interesting project stems from two structures: the Canadian Phi Foundation for Contemporary Art in Montreal, an international Canadian association that is offering artists technologically advanced experiences in the field of virtual reality, in collaboration with Acute Art[334].

The latter is active since 2017, like the already mentioned VIVE Arts, is a company that has chosen to cooperate with visual artists as their core business, believing that artists could trigger innovative ideas. Its self-declared mission, as stated on their website's

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[334] Taiuti, L. (2019), *Tre artiste digitali alla Biennale di Venezia*, in Artribune, https://www.artribune.com/progettazione/new-media/2019/05/biennale-venezia-artiste-digitale/, (last accessed 11-02-24).

homepage, is to «collaborate with the world's leading contemporary artists, providing access to cutting-edge technologies that allow them to translate their creative vision into new digital mediums, including virtual, augmented and mixed realities»[335].

The list of artists involved with Acute Art includes figures whose popularity has transcended the limits of the art world, (besides Marina Abramovic) Jeff Koons, Olafur Eliasson, and Anish Kapoor. The company's peculiar ability is to stimulate already established artists to meet new challenges towards immersive technology and create new synergies between them and technicians It is no coincidence that a well-known contemporary art curator, the Swedish Daniel Birnbaum, was chosen as the company's artistic director. Birnbaum represents a true bonding figure between the company, artists, and the cultural world. He hasn't an utopian outlook on VR, but an acknowledgment of the major role played by VR in addressing issues of identity, materiality, perception, and empathy[336].

It is important to stress that the exhibition project presented in the private Venetian gallery, although not part of the official events of this Biennale, touches on current themes and in line with the theme chosen by the curator Ralph Rugoff, *May You Live in Interesting Times*. Thanks to the consistency of the times treated and the development in the same time frame of the Venice Biennale, the project perfectly camouflaged and entering almost in all respects to be part of the exhibition. The theme of the Biennale has a twofold nature, on the one hand evokes the idea of a "threatening and frightening" period of uncertainty and on the other offers the tools to better understand it. In this context finds its perfect location Rising by Marina Abramović directed by Daniel Birnbaum[337].

Rising, first presented at Brilliant Minds in Stockholm and later at the Art Basel Hong Kong 2018 international fair, is a work that fascinates for the huge possibilities offered by virtual reality. The work addresses the effects of climate change by transporting viewers to witness rising sea levels. It has the ability to tell the decisive effects of the

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[335] Acute Art (2023), *Homepage*, in Acute Art, https://acuteart.com/, (last accessed 11-02-24).
[336] Spampinato, M. & Carticalà, V. (2021), *Contemporary Art and Virtual Reality: New Conditions of Viewership*, Cinergie - Il cinema e le altre arti, n. 19, pp. 127-128.
[337] Viceconte, G. (2019), *Tempo presente. Marina Abramović e Renata Morales a Venezia*, in Artribune, https://www.artribune.com/arti-visive/arte-contemporanea/2019/05/mostra-marina-abramovic-renata-morales-venezia/, (last accessed 11-02-24).

progressive melting of glaciers and rising sea levels, also becoming a reason for reflection on the "levels" of water for the same city of Venice[338].

The gallery features two distinct spaces for the immersive experience of Marina Abramović's virtual reality artwork. In the first space, a backstage video of the shooting of *Rising* is showcased. It is visually surprising and significant to see the document of the "making of", in which the artist becomes physicality and is divided into fragments created by the strategies of three-dimensional technique and special effects necessary for viewing a virtual sequence of about 7 minutes. The second environment invites the audience to engage with the VR experience by wearing a headset and headphones enabling them to navigate a virtual space through a joystick (fig. 26)[339].

Wearing the immersive headset, viewers enter an intimate virtual space, where they come face-to-face with the Serbian-American artist. In fact, in the virtual environment, participants encounter Abramović's avatar enclosed within a vertical glass tank slowly filling with water (similar to those used by Houdini in his shows). The VR experience transports the viewer into a different reality, symbolizing the potential dramatic future of our planet and illustrating a dramatic portrayal of the disintegration of melting polar ice caps, leading to a rise in sea levels. The scene prompting viewers to consider their impact on the environment. Abramović interacts and invites them to choose whether to save her from drowning by committing to support environmental causes, resulting in a lowering of the water level in the tank. Choosing to save the artist, the user saves the planet[340].

The immersive VR work aims to provoke personal and emotional reflections on the consequences of human behaviour. Users, faced with choices within the virtual space, experience multiple energies and connections with the unfolding events[341].

Marina Abramović, known for her pioneering performance career, brings her presence into a new dimension with the work *Rising*. Acute Art developers utilized advanced technology, CGI with motion capture, to capture the artist's unique facial expressions,

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[338] Viceconte, G. (2019), *Tempo presente. Marina Abramović e Renata Morales a Venezia*, cit., https://www.artribune.com/arti-visive/arte-contemporanea/2019/05/mostra-marina-abramovic-renata-morales-venezia/, (last accessed 11-02-24).

[339] Taiuti, L. (2019), *Tre artiste digitali alla Biennale di Venezia*, in Artribune, https://www.artribune.com/progettazione/new-media/2019/05/biennale-venezia-artiste-digitale/, (last accessed 11-02-24).

[340] Acute Art (2019), *Behind the scenes of Marina Abramovic's Rising*, in Acute Art, https://acuteart.com/marina-abramovic-behind-the-scenes/, (last accessed 11-02-24).

[341] Ibid.

creating a realistic avatar for the virtual experience. This innovative approach allows users worldwide to interact directly with the artist, emphasizing the convergence of art and technology in the realm of contemporary performance[342].

The work preserves all the characteristics of a performance, where the presence of the artist, even if from a digital point of view, is the main medium of the final message. Despite the current technical and graphic limitations, *Rising* can be considered a good example of how a work of art can be built with the tool of virtual reality without necessarily taking away space to the artist and placing the viewer in a more privileged condition of enjoyment: «*Rising* allows users to directly interact with the artist virtually from anywhere in the world»[343]. It is not a site-specific installation: users are allowed to experience it on-site, in the case of presentations in exhibition spaces, or remotely, from any location, wearing immersive headsets. Carrying on the "performative" narration typical of the artist's work, the body becomes a door through which one experiences the traumatic impact of global warming. The user can finally fulfil the common desire of touching her body, as this haptic dimension is at stake in most of the artist's projects, from her early performances of the 1970s to the popular event *The Artists Is Present* which was staged in 2010 at MoMA in New York. Abramović, leaves to the public the choices to be made, both negative and positive, proving once again one of the first artists to want to experiment with new technologies, with the intention of extending his artistic research as much as possible and especially to as many people as possible[344].

In a behind-the-scenes documentary on the project, the artist states:

> With virtual reality, technology players will be immersed in a dystopian world. It seems increasingly likely to be the future of our planet. I hope to explore the questions if immersive play will increase empathy for the present and the future victims of climate change and how this experience will affect players' consciousness and energy[345].

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[342] Acute Art (2019), *Marina Abramović*, in Acute Art, https://acuteart.com/artist/marina-abramovic/, (last accessed 11-02-24).
[343] Ibid.
[344] Spampinato, M. & Carticalà, V. (2021), *Contemporary Art and Virtual Reality: New Conditions of Viewership*, Cinergie - Il cinema e le altre arti, n. 19, pp. 127-128.
[345] Acute Art (2019), *Behind the scenes of Marina Abramovic's Rising,* in Acute Art, https://acuteart.com/marina-abramovic-behind-the-scenes/, (last accessed 11-02-24).

Just like the live artistic performance, even the performance created with the tools of virtual reality and mixed reality maintain the characteristics of engagement and involvement. This type of performance promoting a type of active fruition and at the same time fulfilling the task of documentation and preservation of the work of art itself, characteristics that are not present in passive instruments such as screens of television, computers or other means, which may even be of the "cold media" that increase the gap between audience, artistic content and container, easily diverting the attention of the observer[346].

The extended realities represent the novelty, proving to be excellent tools for the creation of artistic content and able to effectively narrate the content conveyed by the artist, actively involving the public, more or less on the same level of a live performance. Nevertheless, they remain tools that enhance the artist's creativity, without compromising it. According to Marina Abramović, MR and VR must exist in function of the artist and the performance from life, not that they totally replace the live performance:

> If you are performing live, you are performing for live audience; if you are using technology and the virtual way of performing then you use the technology in virtual way of performing. Its two different contests, is not to appear to each other, is not that one will replace the other; I've seen them simultaneously part of the existence[347].

Figure 26. Abramović, M., *Rising*, 2019, photo of the VR experience, Ca' Rezzonico Gallery (Venice).

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[346] Obrist, H. U., Abramović, M., Eckert, T. (2020), *Marina Abramović in conversation with Hans Ulrich Obrist*, Video conference at Serpentine Gallery, London, 12 November 2020, https://www.serpentinegalleries.org/whats-on/marina-abramovic-in-conversation-with-hans-ulrich-obrist-plus-live-qa/, (last accessed 11-02-24).
[347] Ibid.

3.3.2. Biennale 4D

Figure 27. SIK-ISEA, *Biennale 4D*, 2017, screenshot of the virtual reality application prototype.

Figure 28. SIK-ISEA, *Biennale 4D*, 2017, screenshot of the virtual reality application prototype.

Since 1920, Switzerland has been participating in the Venice International Art Exhibition. In 1952 the country received its dedicated pavilion, designed by the Swiss architect Bruno Giacometti. During the Biennale, the space showcases the works of contemporary Swiss artists, encompassing diverse materials across various artistic disciplines. The Swiss Institute for Art Research (SIK-ISEA) extensively documents these exhibitions, and their comprehensive records can be found in the publications *Biennale Venedig. Die Beteiligung der Schweiz 1920–2013*[348].

To enhance the accessibility and understanding of these archives of the past events, the project called *Biennale 4D* aims to creates an interactive and explorative environment through the use of virtual reality technology. The Institute of 4D Technologies at FHNW and SIK-ISEA collaborated to develop a preliminary application for testing purposes.

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[348] Krähenbühl, R., Wyss, B. (2013) *Biennale Venedig. Die Beteiligung der Schweiz*, Scheidegger & Spiess, Zürich.

This pilot application enables users to navigate through the pavilion and view artworks from various eras using a virtual reality headset and interact with the historic exhibition content by the means of motion tracking and hand controller input (fig. 27, fig. 28)[349]. The choice fell on contemporary virtual reality technology, utilizing a *Head-Mounted Display* as the hardware, to develop an interactive exploratory setting. The objective is to render the archive content attractive to a new audience. Extensive research was conducted to assess the technological landscape within the specific application domain. While there exist several web-based art institution archives, along with a few virtual museums, *Biennale 4D* presents a distinctive challenge by integrating a virtual art exhibition experience enriched with archive functionalities. Other investigation was carried out concerning the standards for interaction patterns, guidance of users in spatial and temporal dimensions within VR applications. Special attention was dedicated to the design of interactions and mapping, the degree of freedom in user movements, and the provision of haptic feedback. Technical possibilities as well as limits of VR technology were explored, alongside examining techniques for conducting user experience assessments within the VR environment[350].

The culmination and result of these numerous research is a functional prototype of the *Biennale 4D* virtual reality application. This prototype is developed using Unity, employing the VRTK framework and is specifically optimized for the HTC Vive headset and hand controllers. It features a 3D representation of the original pavilion design and a visualization concept for the exhibition content from select Biennale years: 1952, 1984, 2007, and 2013. The application includes samples of various documentation levels for the exhibitions, encompassing thoroughly documented, fragmentary documented, and experimental art works, such as video installations[351].

The prototype provides an intuitive time-travel experience for users through interaction with a three-dimensional time machine object. This object offers cues to the user about the exhibition content of the years as they navigate through time, guiding them to the scene of the desired year. The application incorporates a navigation concept for spatial movement, allowing users to navigate within the virtual space, either by tracking their

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[349] Koebel1, K., Agotai, D., Arisona, S., Oberli, M. (2017), *Biennale 4D. Exploring the Archives of the Swiss Pavilion at the «Biennale di Venezia» Art Exhibition*, University of Applied Sciences and Arts Northwestern Switzerland FHNW, Swiss Institute for Art Research (SIK-ISEA), Zürich, p. 327.
[350] Ivi. p. 328.
[351] Ivi. pp. 328-329.

physical movements or through teleportation. Basic haptic feedback is included to indicate collisions. While alternative forms of spatial navigation (such as guided tours) were considered, testing showed a connection between the user's freedom of movement and the perceived user experience[352].

Furthermore, there is a guide in the form of a virtual booklet that provides metadata related to the exhibited objects, users can access this additional information by directing a laser ray toward the specific item. Interactive hotspots are also integrated into the application to present supplementary materials, such as archive photos. Moreover, the prototype underwent thorough testing to evaluate its user experience and usability[353].

Virtual reality technology opens up new approaches for reconstructing exhibitions. However, the development of suitable processes for editing exhibition content within this innovative medium is imperative for the comprehensive integration of historical material into this experimental virtual space. Given the distinctive nature of this application field, a thorough examination of factors such as substance, aesthetics, and the temporal aspect is crucial[354].

Working with diverse materials presents a major challenge for the application, involving three material layers: the original historical content (artwork), the dimension of its documentation (archive photos and other artifacts), and the medium of the virtual room (mapping space). Another challenge lies in the interaction mapping of three dimensions (time, navigation within virtual space, and interaction with metadata), which had to be streamlined onto the two hand controllers used by the user. Given the target audience's limited technical experience, simplicity and intuitiveness are key considerations for the application[355].

The ongoing project aims to enhance access to the complete Biennale archives through an even more interactive and immersive approach, allowing a broader audience to engage with this valuable segment of Swiss art and cultural history. The success criteria for the application encompass the seamless integration of the VR experience into a broader exhibition context, the intuitive and straightforward design of the application, suitability

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[352] Koebel, K., Agotai, D., Arisona, S., Oberli, M. (2017), *Biennale 4D. Exploring the Archives of the Swiss Pavilion at the «Biennale di Venezia» Art Exhibition*, University of Applied Sciences and Arts Northwestern Switzerland FHNW, Swiss Institute for Art Research (SIK-ISEA), Zürich, p. 329.
[353] Ibid.
[354] Ibid.
[355] Ivi. p. 330.

for use in public spaces, and the attractiveness achieved by striking the right balance between knowledge transfer and entertainment. In conclusion, *Biennale 4D* seeks to unlock new possibilities for exploring image archives, reconstructing exhibitions, and uncovering new applications for Virtual Reality within the realm of digital humanities[356].

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[356] Koebel1, K., Agotai, D., Arisona, S., Oberli, M. (2017), *Biennale 4D. Exploring the Archives of the Swiss Pavilion at the «Biennale di Venezia» Art Exhibition*, University of Applied Sciences and Arts Northwestern Switzerland FHNW, Swiss Institute for Art Research (SIK-ISEA), Zürich, p. 330.

Chapter 4. Virtual reality at the Venice Film Festival

4.1. Venice Film Festival

The Venice International Film Festival is the oldest film festival in the world. The first edition took place between 6 and 21 August 1932, as part of the 18th Venice Biennale Institution that in the same year organized the famous International Exhibition of Contemporary Art. It was held on the terrace of the Hotel Excelsior in Venice Lido. It was not yet a competitive event, but the exhibition already presented important titles for the history of cinema. The second edition took place two years later, in 1934, also simultaneously with the Art Biennale. In this case it was the first competitive festival, in which the nations represented were 19 with more than 300 accredited journalists. Given the international success of the exhibition, from 1935 it becomes annual and no longer biennial. It has more than 85 years of history and in 2023 it celebrated its 80th edition[357]. The Film Festival aims to promote the knowledge and dissemination of international cinema in all its forms of art, entertainment and industry, in a spirit of freedom and dialogue. Each year, 140 titles from the different sections of the exhibition are screened in the movie theatres. The Lion of San Marco, symbol of the city of Venice, gives its name to the main prize, which is the Golden Lion, it is awarded to the best film screened in competition at the exhibition. This award is considered one of the most important awards in the world of cinema[358].

The festival is now part of the so-called "Big Five", the five most important international film festivals in the world. Among them there are the "Big Three" European Festival: Venice Film Festival, Cannes Film Festival and Berlin Film Festival, along with the Toronto Film Festival and the Sundance Film Festival.

As already mentioned, since its first edition, the Venice Film Festival takes place at the Lido di Venezia, more precisely at the Palazzo del Cinema and the Palazzo del Casinò. The Palazzo del Cinema is the main venue, inside the building there is the historic Sala Grande (with 1036 seats), here are held the main projections of the exhibition and also the awards ceremony. Over the years the building has undergone a restoration of the interior and especially the addition of all the technologies adapted to the visual and sound

[357] La Biennale di Venezia (2023), *Mostra Internazionale d'Arte Cinematografica*, in La Biennale di Venezia, https://www.labiennale.org/it/cinema/2023/edizioni-passate, (last accessed 11-02-24).
[358] La Biennale di Venezia (2023), *Regolamento*, in La Biennale di Venezia https://www.labiennale.org/it/cinema/2024/regolamento, (last accessed 11-02-24).

standards. The monumental Palace of the Casinò, along with the numerous rooms dedicated to film projections, boasted gaming rooms, dining rooms and cafes. The Casino was closed at the end of the 90s, since then the Palace is used only by the Biennale during the Film Festival, it mainly hosts press services and some screenings for the public. Over the decades and editions, special modern structures were built to host the screenings during the Film Festival, like the PalaBiennale and the Sala Giardino. A short distance from the PalaBiennale is located the Sala Corinto, a room used only in recent editions. And last but not least, the island of Lazzaretto Vecchio, situated a short distance from the Lido, in front of the Riva di Corinto. The island hosts the Virtual Reality section of the exhibition, accessible by all accredited and subscription holders[359].

The Venice International Film Festival currently presents six different sections. The first is the main section of the Festival called *Official selection*, in which a maximum of 21 feature films can be presented and that will later be screened in the world premiere. Then there is also the section called *Out of competition*, in this can be presented some significant works, for a maximum of 20 titles, to which are added the films produced within the Biennale College Cinema. The works are defined as "significant" because they are made by well-known authors who have previously participated in the Exhibition, or films in which the spectacular dimension is accompanied by forms of expressive or narrative originality and lastly documentaries. As the name of the section suggests, these titles do not compete for the Golden Lion[360].

Another important section is *Orizzonti*, an international competition for a maximum of 19 films. The titles in question represent new aesthetic and expressive trends in world cinema, with particular attention to emerging and not yet fully established authors, minor and less well-known cinematography, but also works that are measured with genres and current production with intent of innovation and creative originality. This section hosts a competitive selection of short films lasting up to 20 minutes, chosen according to criteria of quality and linguistic-expressive originality. Alongside the latter, the *Orizzonti Extra* section has been created. It consists in a selection of 10 titles with a duration of more than 60 minutes, without constraints of gender, duration and destination. They can be part of

[359] La Biennale di Venezia (2023), *Luoghi*, in La Biennale di Venezia, https://www.labiennale.org/it/luoghi, (last accessed 11-02-24).

[360] La Biennale di Venezia (2023), *Selezione Ufficiale*, in La Biennale di Venezia, https://www.labiennale.org/it/cinema/2023/selezione-ufficiale, (last accessed 11-02-24).

auteur and genre films, experimental and artist, television series and crossover productions, preceded or accompanied by meetings and insights with authors, interpreters and personalities of the world of art and culture. This is not a competitive section but presents the possibility of awarding a Public Prize. The Festival also boasts a section dedicated to the classics of the cinema, called *Venice Classics*. It hosts in world premiere a selection of 18 titles of the best restorations of classic films made over the past year by film libraries, cultural institutions and productions from around the world. There are committed to the preservation and enhancement of the film heritage and the rediscovery of works from the past neglected or undervalued[361].

The most significant section for the purpose of this research is the *Venice Immersive*. It is entirely dedicated to immersive media and includes all the means of creative expression XR. Are present in the competition a maximum of 30 Immersive Projects in world and/or international premiere. XR 3DOF and 6DOF interactive works of any duration, including installations and virtual worlds, are allowed. In the Best of Immersive category, a maximum of 10 projects will be presented Out of Competition, exclusively at the invitation of the Management, selected from the best works already distributed or presented in other events after the last edition of the Exhibition. The Best of Immersive category will also include, Out of Competition, by invitation only, a Worlds Gallery, gallery of online worlds created after the last edition of the exhibition. The works of the teams participating in the edition of the Biennale College Cinema-Immersive will also be part of the selection[362].

Biennale College is a project created by the Venice Biennale dedicated to the practice of young people in the artistic sectors and in the activities carried out by the organizational structure of the Biennale. Since 2016, the Biennale College Cinema - Immersive (BCC-I) is a program created by the Venice Biennale with the aim of exploring immersive media as a new artistic form and the aesthetic and narrative opportunities offered by this medium. BCC-I provides professionals from the world of arts and film, who have a rich background of experiences in different fields, with the skills needed to develop their next immersive project. With the support of international experts working in the field, this

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[361] La Biennale di Venezia (2023), *Selezione Ufficiale*, cit.
https://www.labiennale.org/it/cinema/2023/selezione-ufficiale, (last accessed 11-02-24).
[362] La Biennale di Venezia (2023), *Venice Immersive*, in La Biennale di Venezia,
https://www.labiennale.org/it/cinema/2023/selezione-ufficiale, (last accessed 11-02-24).

program will help independent filmmakers and creatives from around the world to further deepen immersive media. Particular attention will be given to the acquisition and understanding of immersive storytelling, presence design and creative technology[363].

BCC- I intends to support the development of 2 Italian and 10 international projects at the conception stage and lasting up to 30 minutes, presented by teams formed by director and producer. The projects will be supported in their progress regarding the creative process, the production, the audience and the target markets and above all the financial aspect[364].

It is important to highlight that the Venice Film Festival over the years has maintained and increased its position of great international prestige, by virtue of the quality of the selections and sections, and also the redevelopment of its historic halls and the addition of the most modern technological equipment.

4.2. Virtual Reality Section at the Film Festival

In the renowned Venice International Film Festival, a section dedicated to virtual reality was officially launched in 2017. An oasis of innovation and creativity has been created and bought the cinematic experience to an unprecedent level of involvement and participation. In fact, through state-of-the-art headsets and technologies, spectators are transported into immersive worlds, interact with fascinating characters and immerse themselves in engaging stories. The virtual reality section has changed its name over the years, but despite the changes, it has always remained a showcase for the latest frontiers of film art, giving unprecedented emotions to all lovers of cinema and technology.

4.2.1. *Venice Virtual Reality* (2017-2019)

Over the decades, the world of film festivals has become one of the main vehicles for the diffusion of virtual reality, perhaps the only vehicle comparable to cinemas for the traditional storytelling. With regard to the creation of works of virtual nature, it is halfway between distribution and promotion, and it has not remained immune from the influence of this phenomenon.

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[363] La Biennale di Venezia (2023), *Biennale College*, in La Biennale di Venezia, https://www.labiennale.org/it/biennale-college, (last accessed 11-02-24).
[364] Ibid.

The most important example, of how this new media is linked to the most consolidated artistic conventions, is represented by the Venice International Film Festival, that for seven editions has introduced a section dedicated to the presentation of original linear and interactive works in VR[365].

The history of the *Venice Virtual Reality* section begins in 2016 with a first exhibition reduced and out of competition, lasting five days, held in a room of the Palazzo Casinò. Michel Reilhac, film producer and programmer of the VR section of the festival, in an interview released this statement:

> In 2016, so we did a very first pilot edition with about like ten VR pieces that I showed inside the Casinò on the Lido and with 50 seats and headsets, we did it for like, I think, five days and that was a very very big success that created a lot of attention. There was a lot of curiosity and it was for all the time. So, after that, I said ok, there is the potential, but we need to do it bigger, we need to do it in a way it becomes a real section of the festival and that's when we started doing it on Lazzaretto Vecchio, the island just off the Lido, that became known as the VR island[366].

Since the first experiment, the inclusion of the virtual reality tool in an official film festival has proved to be a winning formula, to the point of attracting the worldwide attention of all the press and inducting the stakeholders to invest more and personally on the Biennale event[367].

During the 74th Venice International Film Festival, held from 30 August to 9 September 2017, took place the first ever competition of films in virtual reality (VR) directed by Alberto Barbera. The competition was officially called *Venice Virtual Reality* and was held from 31 August to 5 September 2017 at the VR Theatre, equipped with dedicated stations for individual viewing of VR movies and 3 interactive stations, set up in the first floor of the Palazzo del Casinò on the Lido[368].

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[365] La Biennale di Venezia (2017), *Nuovo concorso di film in realtà virtuale (VR): Venice Virtual Reality*, in La Biennale di Venezia, https://www.labiennale.org/it/news/nuovo-concorso-di-film-realt%C3%A0-virtuale-vr-venice-virtual-reality, (last accessed 11-02-24).
[366] Interview with Michel Reilhac, film producer and selector for the Biennale "Venice Virtual Reality", made on date 22 January 2021.
[367] La Biennale di Venezia (2017), *Nuovo concorso di film in realtà virtuale (VR): Venice Virtual Reality*, cit., https://www.labiennale.org/it/news/nuovo-concorso-di-film-realt%C3%A0-virtuale-vr-venice-virtual-reality, (last accessed 11-02-24).
[368] La Biennale di Venezia (2017), *Venice Virtual Reality all'Isola del Lazzaretto Vecchio*, in La Biennale di Venezia, https://www.labiennale.org/it/cinema/2017/venice-vr, (last accessed 11-02-24).

A maximum of 18 VR films were presented in its setting and were judged by a jury of five prominent creative figures. The winners were awarded three prizes: Best VR Film, VR Jury Grand Prize, VR Creativity Award. To these have been added 2 films funded by Biennale College Cinema - Virtual Reality, but they have not competed for any prize[369]. The Biennale has once again proved to be an institution at the forefront and also at the height of its long tradition of promoting new artistic trends. It has recognized virtual reality as an emerging art form and consequently has recognized the importance of supporting authors who make this modern technology their own, using it as a new means of artistic expression. The organization felt that the time was ripe enough to give life to this first official competition. All this has sedimented the guarantee and confidence of the event, demonstrating, despite the initial fears of other festivals as the media of virtual reality can be evaluated and promoted as a new innovative form of conducting storytelling[370].

After the first successful official edition in 2017, other (more or less) important festivals around the world followed in the footsteps of the Venice Film Festival and opened their linked section of audiovisual content made in virtual reality, creating a series of links and expanding the promotion and distribution of works. For example: Tribeca Film Festival, Sundance Film Festival, Toronto International Film Festival and others.

As regards for the Italian scene, in 2019 the *VRE (Virtual Reality Experience) Festival* in Rome was born. It was the first festival entirely dedicated to the multimedia panorama of extended realities and virtual reality narration[371].

In the following years, the *Venice Virtual Reality* section has become a fixture in the calendar of the Venice Film Festival. In the 75th and 76th edition the competition changed location has changed location, in fact it took place in what is already known as "the Island of VR" that is the island of Lazzaretto Vecchio. The location is an empty building full of history surrounded by a courtyard where you can drink spritz overlooking the lagoon. A transport service has been organized from the exhibition area with shuttles connecting by road and by water to the island of Lazzaretto Vecchio and back. Access to the section is

[369] La Biennale di Venezia (2017), *Venice Virtual Reality all'Isola del Lazzaretto Vecchio*, cit. https://www.labiennale.org/it/cinema/2017/venice-vr, (last accessed 11-02-24).

[370] La Biennale di Venezia (2017), *Nuovo concorso di film in realtà virtuale (VR): Venice Virtual Reality*, in La Biennale di Venezia, https://www.labiennale.org/it/news/nuovo-concorso-di-film-realt%C3%A0-virtuale-vr-venice-virtual-reality, (last accessed 11-02-24).

[371] VRE (2023), Virtual Reality Experience, in VRE, https://www.vrefest.com/, (last accessed 11-02-24).

allowed only with compulsory reservation on the site and to all accredited upon reservation[372].

The fact that Venice VR is placed on an old hospital can be trivially interpreted as a metaphorical clue about the status held by virtual reality in the contemporary audiovisual panorama: something interesting, worthy of being included in a film art exhibition, but at the same time to be left in quarantine, waiting to understand if it is healthy or not. Given the results of the first edition is certain that it is contagious[373].

The selection of works in virtual reality includes those in Competition that are about thirty, the Best Of VR section consists of about ten works that do not participate in the competition and then the three projects of the Biennale College Cinema VR. Also out of competition, more or less 15 VR projects seeking funding will be presented as part of the Venice Production Bridge. VR remains a hybrid field between cinema, game, experience, action: sometimes the visitors watch, sometimes play, sometimes perform, and sometimes all things together. There are three VR viewing modes on the VR island: seated viewing with the headset in the VR Theater, "stand up" viewing in interactive and linear mode and three-dimensional installations with live interaction [374].

4.2.2. *Venice VR Expanded* (2020-2021)

Due to the global pandemic, the entire edition of the 77th Venice International Film Festival saw a reorganization of the entire exhibition program. The opening of the red carpet to the public has been prohibited, several contingent screenings have been introduced for each film presented, some sections were moved and collaborations with cinemas were born outside the island of Lido but within the limits of the Municipality of Venice. For the 2020 edition, the official international competition of the virtual reality section did not take place in Venice at the island of Lazzaretto Vecchio that was closed. It has been moved to the digital front and made available entirely online. In this way, a festival was literally created inside the festival, which was renamed *Venice VR Expanded*,

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[372] La Biennale di Venezia (2019), *Venice Virtual Reality all'Isola del Lazzaretto Vecchio*, in La Biennale di Venezia https://www.labiennale.org/it/cinema/2019/venice-vr, (last accessed 11-02-24).
[373] Brodesco, A. (2019), *In conflitto. Osservazioni erranti sul VR al Lazzaretto Vecchio 76. Mostra Internazionale d'Arte Cinematografica di Venezia*, Cinergie - Il cinema e le altre arti, n. 16, pp. 211-213.
[374] La Biennale di Venezia (2019), *Venice Virtual Reality all'Isola del Lazzaretto Vecchio*, cit., https://www.labiennale.org/it/cinema/2019/venice-vr, (last accessed 11-02-24).

to reflect on this aspect of expansion and the shift of the project, now become exclusively virtual[375].

A dedicated VRChat platform built by VRooM, with support from HTC Viveport and Facebook's Oculus, was made available throughout the festival. It was presented an exhibition hall with all the selected projects and instructions to view them, the accredited could access them through their avatars and attend conferences, interventions and interviews with the authors. As for the works presented in the section, 31 were the works in competition, 9 were that of the Best VR section and 4 were the projects of the Biennale College VR. The only aspect that was limited was the selection of works in interactive virtual reality, for a logistical matter[376].

For this edition, the *Venice VR Expanded* is restructured through a blended organization. The involvement of several institutions, foundations and artistic and cultural institutions within the Satellite Programme was fundamental. To broaden the possibilities of the global audience to participate in the virtual reality selection, the Venice Biennale promotes a partnership with several institutions around the world to ensure that their public space is dedicated to a Venice VR Expanded Lounge, where visitors can experience the immersive projects of the section in the same period of development of the International Film Festival, held from 2 to 12 September 2020. Fifteen venues in urban centres demographically different internationally, have decided to collaborate in the edition of the festival, here in Italy Mestre, Piacenza and Modena, providing its exhibition spaces and equipment for the distribution of projects and the enjoyment of the local public[377].

The M9 museum, located in Mestre, was chosen as one of the venues that hosted the Satellite Programme of the *Venice VR Expanded* section. The museum has been set up with individual stations equipped with a multimedia headset, the viewer accesses this environment and thanks to the private view is isolated from the surrounding space[378]. After the festival in the festival, it is possible to talk about the museum in the museum.

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[375] La Biennale di Venezia (2020), *Venice VR Expanded,* in La Biennale di Venezia, https://www.labiennale.org/it/cinema/2020/venice-vr-expanded-web-section, (last accessed 11-02-24).

[376] Ibid.

[377] Ibid.

[378] Fondazione di Venezia (2020), *In M9 dal 2 al 12 settembre arriva "Venice VR Expanded"*, in Fondazione di Venezia, https://www.fondazionedivenezia.org/in-m9-dal-2-al-12-settembre-arriva-venice-vr-expanded/, (last accessed 11-02-24).

Each projected work establishes a personal bond with the viewer, who feels part of the project because he has the opportunity to interact, ask questions and be part of the virtual reality. In fact, in some interactive films, the spectator who becomes an actor, can intervene in the story becoming in effect an integral part[379].

A strong point of the M9 Museum was the possibility to integrate the exhibition with the permanent collection inside the museum, through the purchase of a combined and discounted ticket. This strategy has had a positive impact on the local economy and more generally on society, attracting people not native to the medium, but native or local residents[380].

Moreover, considering the more general picture, it was extraordinary in itself that for the first time a section of the Venice Film Festival had left Venice and landed on the mainland. One of the positive aspects of this digital edition was to break the physical barriers of the exhibition VR, potentially expanding the participating audience, not only outside the boundaries of the municipality of the island, but also internationally. Despite the difficulties linked to the pandemic, this was a great achievement for the Venice Biennale and in particular for the section dedicated to virtual reality.

On the other hand, this edition also had to deal with negative aspects. For reasons of force majeure, in part, the figure of mediation of the festival has failed. It not only takes charge of selection and exposure, but in the case of virtual reality, also offers the use of the viewer on site, with the equipment hired by the Biennale foundation. One of the main limitations of this edition is that in order to participate at home, viewers must necessarily have a headset. From this point of view the *Venice VR Expanded* can be enjoyed only and exclusively by a loyal and above all equipped audience. In addition, the problem of the monopoly of VR content distribution platforms is indirectly addressed, in fact, not all viewers are compatible for the use of each selected work and as a result a further fragmentation of the accredited is created. These are the main difficulties to face, in order to expand the organization and enjoyment of the festival, as stated by Michel Reilhac:

[379] De Vincentis, S. (2019-2020), *Il Museo del Sogno. Dal Cinema alla Realtà Virtuale*, Atti dell'Accademia delle Scienze di Ferrara, v. 98, a.a. 197, pp. 154-155.
[380] Fondazione di Venezia (2020), *In M9 dal 2 al 12 settembre arriva "Venice VR Expanded"*, cit., https://www.fondazionedivenezia.org/in-m9-dal-2-al-12-settembre-arriva-venice-vr-expanded/, (last accessed 11-02-24).

Creating an online edition of a virtual reality exhibition of the size that we have is very difficult, because there is no way to provide an easy access to the different platforms, because you cannot show all of these VR works, all on the same platform, because they have different standards. […] So, what we needed to do, was to provide information on where to go to find these pieces and that was very difficult. From a technical standard, people who are not used to be in VR, it proved to be quite differently and very difficult[381].

The *Venice VR Expanded* section of the 78th International Film Festival was held again online, extending its duration from 1 to 19 September 2021. In addition to the last edition, from 1 to 11 September was set up the VR Gallery on the second floor of the Palazzo del Casinò, in the Sala Amici, in which equipped workstations have been made available to view online (by reservation) the projects of the section. The works in Virtual Reality of this edition of the exhibition will be available online on the HTC's Viveport and Facebook's Oculus platforms, through PCVR and Oculus Quest headsets[382].

A total of 37 projects (eight videos realized in 360, twenty-five VR projects and four VR projects on reservation), from 23 countries, were part of the official selection:

–   24 projects in competition

–   11 Best Of projects - Out of Competition

–   1 project of the Biennale College Cinema - VR

–   1 Special Event - Out of Competition[383]

In addition, a selection of 34 virtual worlds and 5 Special Events was be presented in the VRChat Worlds Gallery, accessible through the *Venice VR Expanded* 2021 world on VRChat. It hosted the social dimension of the section where all events, meetings, conferences and parties[384].

Given the huge success of the Satellite Programme of the previous edition, it was decided to propose it again and the works will be accessible thanks to the physical spaces set up in 15 cultural institutions in the world, such as the Centre PHI in Canada and Italy in Mestre, Milan, Modena and Turin. Each of these institutions, for the period of the

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[381] Interview with Michel Reilhac, film producer and selector for the Biennale "Venice Virtual Reality", made on date 22 January 2021.
[382] La Biennale di Venezia (2021), *Venice VR Expanded,* in La Biennale di Venezia, https://www.labiennale.org/it/cinema/2021/venice-vr-expanded-web-section, (last accessed 11-02-24).
[383] Ibid.
[384] Ibid.

exhibition, will set up a physical space open to the public and especially equipped with VR headsets and all the other necessary equipment, where viewers can watch the projects in competition of *Venice VR Expanded*, the projects Best of VR Expanded (including the VRChat Worlds Gallery), and the projects developed during the 5th and previous editions of Biennale College Cinema - VR, plus a Special Event realized on site only and not online. Thanks to the availability of these institutions, for the public who do not have the necessary VR equipment at home, it will be possible to view the projects by booking directly in each location[385].

4.2.3. *Venice Immersive* (2022-2023)

The virtual reality section of the 79th Venice International Film Festival, will return again in presence. From this year the section is dedicated to extended reality and changes its name from *Venice VR Expanded* to *Venice Immersive*. The name intends to welcome the growth of immersive media beyond the technologies of virtual reality, in this way it intends to include all the medium of creative expression of extended reality (XR): 360 game video and XR works of any duration, including installations, live performances and also virtual worlds. It took place on the renamed "Venice Immersive Island" from August 31 to September 10, 2022. The vision was only possible by reservation for accredited and also for subscribers[386].

The selection consisted of a total of 44 projects (seven 360 video, twenty Standalone projects, eleven Installations, five VR worlds on VRChat, one Special Event Projection) from 19 countries:

– 30 projects in competition

– 10 projects Out of Competition - Best of Immersive

– 3 projects developed during the Biennale College Cinema – VR

– 1 Screening Special Event Out of Competition[387]

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[385] La Biennale di Venezia (2021), *Venice VR Expanded,* in La Biennale di Venezia, https://www.labiennale.org/it/cinema/2021/venice-vr-expanded-web-section, (last accessed 11-02-24).
[386] La Biennale di Venezia (2022), *Venice Immersive,* in La Biennale di Venezia, https://www.labiennale.org/it/cinema/2022/venice-immersive-0, (last accessed 11-02-24).
[387] Ibid.

After the success of the last two editions of *Venice VR Expanded* online, the Venice Film Festival continues to give the opportunity to enjoy its contents even remotely. The public who cannot participate in person, can still access the virtual version of the Venice Immersive on the Virtual World on VRChat, designed with the technical support of VRrOOm. The Worlds Gallery section was also renewed and provided a selection of 30 virtual worlds and hosted 2 special events, accessible through world-hop tours. On Island of Lazzaretto Vecchio 10 stations dedicated to the vision of virtual worlds have been made available to the public[388].

The latest edition of the consolidated extended reality section of the 80th Venice International Film Festival, was held in presence on the Venice Immersive Island. With the same modalities and the same spirit of the previous edition, the *Venice Immersive* is dedicated to immersive media and includes all means of creative expression XR. From 30 August to 9 September 2023, the section was accessible to all accredited and those who have subscribed to the *Venice Immersive*. For the duration of the exhibition, a free shuttle service connects the Riva di Corinto of the Lido with the Island of Lazzaretto Vecchio[389].

The selection of works presented consisted of a total of 43 projects (five 360 videos, twenty-one VR Standalone projects, fifteen Installations, two virtual worlds on VRChat) from 25 countries:

- – 28 projects in competition
- – 9 projects Out of Competition - Best of Immersive
- – 6 projects developed during the Biennale College Cinema – VR[390]

For the third consecutive year, the International Film Festival continues to celebrate the community of virtual worlds. The official selection of *Venice Immersive* also includes the Worlds Gallery, collection of 24 virtual worlds, accessible at the Venice Immersive Island through guided tours called "world-hops"[391].

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[388] La Biennale di Venezia (2023), *Venice Immersive,* in La Biennale di Venezia, https://www.labiennale.org/it/cinema/2023/venice-immersive-0, (last accessed 11-02-24).

[389] Ibid.

[390] Ibid.

[391] Ibid.

4.3. Empathy machine

One of the extraordinary capabilities of the virtual reality medium is to overcome the limits of physical reality. The fluidity of virtual environments was strongly underscored by Lanier, he said that this medium would allow people to transcend the limits of verbal communication, filtered by codes such as language and gestures. This type of direct communication takes place through a «direct creation of reality»[392].

From the beginning, VR was seen as a complex communication system that promised the simulation and production of alternative worlds full of transportable and potentially sharable information[393]. As it was brought to light within the whole thesis, in these virtual environments it is possible to share information, but above all to experience reality and situations directly in first person.

According to Nonny de la Peña, director and researcher, the main feature of immersive journalism essentially consists in «news production in a form in which people can gain first-hand experience of the events or situations described in the news»[394]. The director has created some pioneering content, the events represented have the aim of being a transfer in virtual reality of the classic format of literary journalism or television. Through a virtual reality headset, the viewer is teleported to the place and passively but personally enjoys the event.

In the category of immersive journalism and interactive documentary (called with the term "i-doc") should be included a wide type of content made with 360-degree cameras: web-docs, serious games, ambient literature, live performance documentary and of course also VR content[395]. Similar productions are made with the aim of exploiting the sense of presence stimulated by the 360º shooting, this would also ensure greater objectivity. at least in appearance, since immersive journalism, like all existing mediums, is confronted with the problem of the relationship between reality and image and with the alleged ability of the latter to communicate better and faster, than language in oral and written form[396].

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[392] Lanier, J., Biocca, F. (1992), *An Insider's View of the Future of Virtual Reality*, Journal of Communication, pp. 150-172.
[393] Biocca, F., Levy, M. R., (1995), *Communication in the Age of Virtual Reality*, Lawrence Erlbaum Associates, Hillsdale.
[394] De la Peña, N. (2010), *Immersive Journalism: Immersive Virtual Reality for the First-Person Experience of News*, Presence: Teleoperators and Virtual Environments, pp. 291-301.
[395] Aston, J., Gaudenzi, S., Rose, M. (2017), *I-Docs: The evolving Practices of Interactive Documentaries*, Columbia University Press, New York-Chichester.
[396] D'Aiola, A. (2020), *Gli inganni dell'empatia. Giornalismo immersivo e realtà virtuale*, Meltemi, Milano, pp. 159-173.

As stated in the conference *Virtually There. Documentary Meets Virtual Reality* organized in 2016 at the Phi Centre[397]. The easiest way to use a new medium is to document an event. As with cinema, the documentary has historically served as an experimental platform for new technologies:

> Because the documentary does not need to create the rules of a fictional universe; it can immediately explore the expressive capabilities of a medium, since the basic functioning of the world is known and should not be invented before. It's no wonder that the collection of technologies combined under the term virtual reality has generated so much interest in the documentary community. And it's no wonder that the development of documentary VR is so closely watched by the larger creative community.

Contemporary immersive virtual environments foster multimodal and multisensory engagement of the user with images. This is possible thanks to the integration of the latest technologies in the field such as immersive audio, haptic, olfactory and gustatory stimuli. According to this discourse, virtual reality presents itself as a catalyst of empathy, understood as the ability to put oneself in the shoes of the other, sharing with him feelings or emotions, and decentralize from one's position assume another perspective[398].

In recent years, numerous research has been carried out in the field of cognitive neuroscience and experimental psychology. Thanks to these it has been possible to learn that the possibility of empathic perspective taking occurs even if the body in which we are invited to identify is that of another digital, or an avatar. This unique opportunity, after crossing the boundaries of laboratories, has reached the world of art and media, leading to the recent conversion of many artists and directors to the use of VR[399].

The testimonial power of virtual reality must be sought in its ability to be a simulation that goes beyond the contact with reality, but in which it remains possible to activate an empathic relationship with the simulated event. The ultimate Empathy Machine concept is clearly described by immersive filmmaker Chris Milk in a 2015 TED Talk:

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[397] Conference organized by the MIT Open Documentary Lab, The John D. and Catherine T. MacArthur Foundation and the Phi Centre on 6 and 7 May 2016.
[398] Biggio, F. (2020), *Augmented consciousness. Artificial gaze fifty years after Gene Youngblood's expanded cinema*, NEC-SUS European Journal of Media Studies, n. 9/1, pp. 173-192.
[399] Slater, M. (2010), *First person experience of body transfer in virtual reality*, PLOS ONE, n. 5/5.

When you sit here in the room and look at her, you're not looking through a TV screen, you're not looking at the scene through a window, you're sitting there with her. When you look down you are sitting on the same floor on which she is sitting. And that's what makes you feel her humanity in a deeper way. Empathize with her in a deeper way. I think it's possible to change minds with this machine.

Virtual reality becomes an empathic machine capable of transporting the viewer within the frame of the story and inducing more visceral emotional reactions, able to put the user in the shoes and situation of another person[400].

With a recording technology that combines 3D shooting and binaural microphones, Milk performs a powerful «environmentalization» of the image, the result is an iconic 360-degree landscape in which the viewer is fully immersed in the feeling of «being there»[401]. VR is conceived by Milk as an experiential medium, able to make you inside it. In his opinion, is only the beginning of a process of discovery of the true power of virtual reality, as this medium has the power to transform the perception that people have of other people, and consequently change the world[402].

Even if is not proposed a real embodiment in the body of others, this medium has the ability to assume the divided point of other people. The machine of empathy is therefore configured and above all as a matter of point of view. To better understand the empathic functioning it is fundamental to keep in mind the objective: force the user to adhere to a radical experience to better understand it and make it his own[403].

In the absence of a direct contact with the surrounding reality, the ethical effectiveness of virtual reality is based exclusively on an isolated and imaginative experience to arouse immediate emotions. But these emotions, once removed the viewer, need to be reflected in everyday reality. Despite the fact that with the latest technologies it is possible to achieve unprecedented adherence to history and the social world recreated virtually, once the experience is over, the effect is as dull as when you wake up from a dream. To prevent

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[400] Milk, C. (2015), *How virtual reality can create the ultimate empathy machine*, TED Talk, 22 April 2015, https://www.youtube.com/watch?v=iXHil1TPxvA&t=5s&ab_channel=TED, (last accessed 11-02-24).
[401] Ibid.
[402] Ibid.
[403] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Milano, pp. 124-128.

this from happening it is necessary to introduce within the medium an element of self-reflection inside for the user, for example in the form of an altered state of perception[404].

Another branch of the empathy machine involves several immersive installations that have altered states of consciousness as their theme. The representation of a state of mind in virtual reality environments coincides with the incorporation of state into the user's perception. In this case, it is not a simple representation encoded within a medium, but the production of a technologically designed hallucinatory condition in the user who uses of the medium. Immersive environments are primarily places in which to build a narrative within a delimited world that has specific rules, it is therefore an ideal place to give shape to exclusive experiences such as those of disability or the perception of altered states of consciousness[405].

Beyond the numerous applications of virtual reality for diagnostic and therapeutic purposes within the so-called "e-health". Currently virtual reality is developing a series of immersive VR environments dedicated to healthy subjects, who are invited to step into the shoes of the sick or disabled. This type of immersive film is based on the construction of a discrepancy between the normal perception of reality and the pathological one or linked to certain forms of disability. Different forms of deprivation have been tested, for example for Alzheimer's disease, in this case the immersion experienced by the user is similar to that that takes place in a sensory deprivation tank[406].

Immersive environments can be designed to give viewers access to altered and hallucinatory perceptions typical of psychophysical states that are not experienced in everyday life. One of the risks is to fall back into forms of generalization and schematization, interpreting and translating the symptoms of others in an arbitrary way. Those who have managed to make the most of the characteristics of this medium have produced very intense and impactful experiences[407].

According to the concept of narrative prosthesis developed by David T. Mitchell and Sharon L. Syder, in the field of disability studies, even an illusory artifice can have the function of prosthesis. The virtual reality headset is proposed for the prosthetic role, as it is a wearable element and that is designed to integrate the body. The viewer is not going

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[404] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, cit., p. 129.
[405] Ibid.
[406] Pinotti, A. (2021), *Alla soglia dell'immagine. Da Narciso alla realtà virtuale*, Einaudi, Torino, p. 201.
[407] Modena, E. (2021), *Nelle storie. Arte, cinema e media immersivi*, cit., pp. 82-83.

to correct the disease or disability, but rather has the goal of offering increased aesthetic possibilities. Compared to the machine of empathy, these are forms of perceptual diversity seen in another sense[408].

Through this type of immersive experiences, VR is not only shown as an optical device, but also as the device at the service of the entire human sensory apparatus and that consequently can multiply possible narrative strategies. It becomes the main vehicle to be able to live without danger psychotic, schizophrenic and hallucinatory experiences. It represents the human need to go beyond the limits imposed by the physiological constitution through the joint action of perception, imagination and technology[409].

In the following pages will be illustrated the case studies of immersive films presented at the Venice Film Festival that are based on virtual reality used as a tool to understand diseases or particular conditions of human beings, and more generally as an empathy machine. The examples must be considered as seminal to approach these particular declinations of VR. The first case study analysed will be the immersive project *Carne y Arena* by Alejandro G. Iñárritu, this work is outside the context of the Biennale, but is of fundamental importance to understand the use of virtual reality as an empathic machine. The installation is to be considered as a pioneering work in this field, which gave rise to all the subsequent ones that will be examined.

4.3.1. Virtually Present, Physically Invisible

Alejandro González Iñárritu put the idea of virtual reality as an empathic machine at the centre of his immersive installation *Carne y Arena. Virtually Present, Physically Invisible*. The work premiered at the 70th Cannes Film Festival in 2017[410] and then at the Fondazione Prada in Milan (which co-produced the work with Legendary Entertainment) from 7 June 2017 to 15 January 2018[411]. At the time, the artistic director of the Prada Foundation was Germano Celant (already mentioned in the previous chapters).

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[408] Mitchell, D. T., Snyder S. L. (2000), *Narrative Prothesis: Disability and the Dependencies of Discourse*, University of Michigan Press, Ann Arbor.

[409] Pinotti, A. (2021), *Alla soglia dell'immagine. Da Narciso alla realtà virtuale*, Einaudi, Torino, p. 203.

[410] Festival di Cannes (2017), *Carne y Arena (Virtually Present, Physically Invisible)*, in Festival di Cannes, https://www.festival-cannes.com/en/f/carne-y-arena-virtually-present-physically-invisible/, (last accessed 11-02-24).

[411] Fondazione Prada (2018), *Alejandro G. Iñárritu: Carne y Arena*, in Fondazione Prada, https://www.fondazioneprada.org/project/carne-y-arena/?lang=en, (last accessed 11-02-24).

The Mexican film director has transported the lucky ones, who have had the opportunity to live this experience immersive, in the middle of the desert along with a group of Mexican migrants that are trying to illegally cross the border that divides the United States from Mexico and are caught by the American police. The contrast between migrants and representatives of law enforcement, U.S. and T.H.E.M., is also shown in the graphic depicted in the poster of the installation (fig. 29)[412].

The project is based on the story of real events. As a starting point, the testimonies of Mexican and Central American immigrants and refugees personally collected by the artist are fundamental for the realization of the work. The testimonies of the police were also of fundamental importance. The experimental visual installation is an individual experience lasting six and a half minutes. Using the latest and most innovative virtual reality technologies, never used before, a large multi-narrative space has been created that includes real characters[413].

The immersive journey begins even before wearing the visor, in fact the spectators are first made to sit in a cold preparatory room, reminiscent of the cells of the first reception in which the migrants are taken prisoner. On the ground, there are shoes, slippers and other objects that migrants have lost during their escape. Iñárritu explained that the people interviewed described the importance of a single shoe during their journey, a matter of life or death. And because these people lost their shoes, the artist thought that even visitors should be barefoot, in fact at this point, visitors must take off their shoes and waiting for the beginning of the experience. After opening a large metal door, they find themselves in a dark room and with their feet on the sand, only at this time the staff provides the necessary tools: an Oculus Rift headset, a pair of headphones and a backpack[414].

Carne y Arena also has a subtitle: *Virtual Present, Physical Invisible*. The pros and cons of the installation are clarified thanks to this double specification in the subtitle. *Virtually Present* means that the feeling of being there that Milk was talking about is very intense. Thanks to the use of immersive instruments, the spectators find themselves in the desert, among men, women, children attempting the journey of hope. They are barefoot like them feeling the sand under their feet and also carry a backpack like them. the visitors are called to move with them, who are not only ahead but you can feel their presence all around.

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[412] Trione, V. (2019), *L'opera interminabile*. Arte e XXI secolo, Einaudi, Torino, pp. 463-488.
[413] Ibid.
[414] Montani, P. (2017), *Tre forme di creatività: tecnica, arte, politica*, Cronopio, Napoli, pp. 132-136.

The surrounding space is not easy to see as and night, the only source of light is given by the helicopter lighthouse flying over the heads. As for auditory stimuli, it is possible to heard the noise of the helicopter, the screams of border guards and the desperate laments of other migrants. Viewers live everything in the first person, reality is mixed with fiction, there are no actors, there are no borders, and above all it is not possible to distinguish between an inside and an outside[415].

Physically Invisible alludes to the fact that viewers are physically present, but at the same time we remain absent. They are present but no one sees them, both the migrants and the cops who yell at them and threaten them with rifles. They are also invisible to themselves, if they try to look at their feet or their hands, nothing appears within the field of vision, but you can feel the sand under their feet. The contact with the sand, with the wind and with the noises gives the illusion of being part of the physical environment, while in reality it is no longer possible to control their own physicality. This illusion triggers the desire to be noticed, to make others understand that one is not invisible. This need for presence is the same need for social recognition that is experienced by migrants, which nevertheless breaks against the limits of society as the need for presence breaks against the limits of the device. The concept of U.S. and T.H.E.M. returns, on one hand there are «we»: active witnesses, but powerless, unable to take initiatives and on the other hand, there are «they»[416].

As Iñárritu said in one of his interviews, he is exclusively interested in humanity and only wants to express what moved him. The best way to do it was the creation of an installation in three acts, in which the material dimension and the virtual one navigate together: a physical and narrative journey interspersed with a virtual part[417].

The screenplay of the installation is oriented to allow the user to share their own adventure «sensorially and emotionally»[418]. In this case the personal sharing of the event is instituted between the user (sealed in the virtual reality headset) and migrants, and not a sharing between the user and other users. Visitors are obliged to abandon every electronic device

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[415] D'Aiola, A. (2018), *Virtualmente Presente, fisicamente invisibile. Immersività ed emersività nella realtà virtuale a partire da "Carne y Arena"*, in *La realtà virtuale. Dispositivi, estetiche, immagini*, Mimesis Edizioni, Milano-Udine, pp. 119-134.
[416] Ibid.
[417] Iñárritu A. G. (2018), Interview Carne y Arena for BBC News Aircheck, https://www.bbc.co.uk/programmes/m001j3d9, (last accessed 11-02-24).
[418] Ibid.

(mobile phones, video cameras, etc.) so they do not have the opportunity to film, record or share in real time what they will witness during their immersive journey. It's a wonderfully unrepeatable experience. Iñárritu said:

> I love that the installation doesn't actually exist. It's virtual. It cannot be bought, it cannot become a commodity and be distorted by market prices, which have now turned art into a commodity, the object of the dominant billionaire market. *Carne y Arena* is [...] like a walk in the forest or a swim in the sea. You can not have, but you can live. And that's what I'm looking for: experiences[419].

Figure 29. Iñárritu, A. J., *Carne y Arena*, 2017, poster of the VR installation, Fondazione Prada (Milan).

4.3.2. Experimental realities

Porton Down is an immersive film written and produced by Callum Cooper in association with the MIT Open Documentary in 2018, it was and presented in the *Venice Virtual Reality* section of the 76th Venice Film Festival in 2019[420].

In this short video, lasting 15 minutes, the user wearing the visor becomes the guinea pig of a series of military experiments conducted by a human experimentation program of the government that administered the LSD. The immersive experience is based on the true story of Don Webb, a former military man who found himself unwittingly entangled in a secret British Cold War programme and involved in tests with some chemical weapons,

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[419] Iñárritu A. G. (2018), Interview Carne y Arena for BBC News Aircheck, https://www.bbc.co.uk/programmes/m001j3d9, (last accessed 11-02-24).
[420] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 245.

including lysergic acids, commonly called LSD. The director defines the work as an «experimental biography»[421] of Don Webb, he actively collaborated on the writing of the script, what happened to him during the experiments was faithfully reported in the VR installation, the side effects of the experiment changed his whole life[422].

The visitor is invited to sit on a desk and is equipped with a button, a microphone and a VR headset (fig. 30). Inside the virtual environment are represented both the bench and the user's arms, in an almost physical way, the movements are created in real time by a tracking technology. After the initial preparation, the viewer is subjected to some elementary psychophysical tests, to which he can respond by speaking to the microphone or pressing the button. At some point, in the middle of the tests, he realizes that he took, without wanting, a hallucinogenic substance. As a result, the immersive environment becomes a hallucination delivered by a psychotic medium: the bench seems to liquefy, the arms enlarge and shrink without control and the room seems to explode from moment to moment[423]. At the end of the experience, once the headset is removed, the comparison between virtual reality and psychedelic experience becomes even more evident. The user, unintentionally, has literally been a guinea pig for an experiment, just like the protagonist who inspired the work, and can download the biometric data of his performance[424].

Callum Cooper's work spans the field of moving image, from traditional standard cinema to interactive and technology-based artworks. Callum is a fellow at the Sundance Institute New Frontier Story Lab and also at the MIT Open Documentary Lab, where he focuses on the study of the convergence of technology and content[425]. His statement on *Porton Down* during the Film Festival is as follows:

> I wanted to explore notions of trust and consent through Don's 1953 experience. […] His story resonates today as we too have become guinea pigs through the pervasive rise of VR and AR. I co-opt the technology in *Porton Down* to examine its unprecedented capacity to not only intimately track us, but also manipulate our understanding of the world[426].

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[421] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, cit., p. 246.
[422] Ibid.
[423] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Monza, p. 130-131.
[424] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, cit., p. 246.
[425] Ibid.
[426] Ibid.
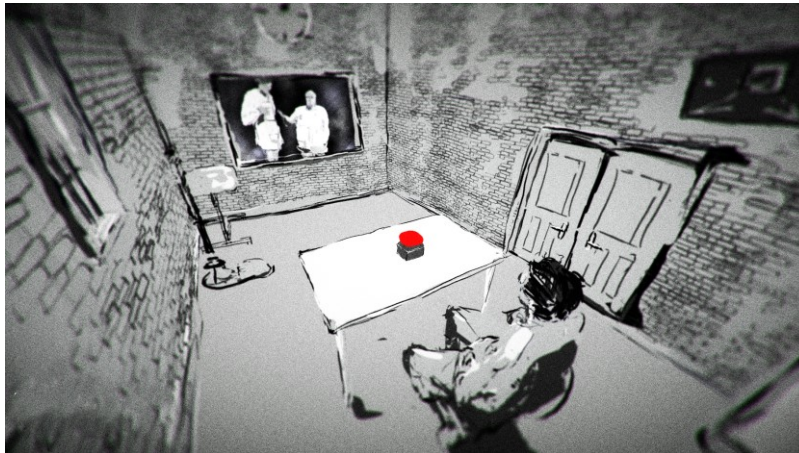
Figure 30. Cooper, C., *Porton Down*, 2019, real time frame captured, 76th Venice International Film Festival (Venice).

4.3.3. Virtual journey into fading memories

Cosmos Within Us is an immersive film directed by Tupac Martin in 2019 and presented in the VR section of the 76th Venice Film Festival in the same year. This installation offers visitors the opportunity to experience first-hand the cognitive, perceptive and emotional experience of a subject suffering from Alzheimer. Thanks to this story they are catapulted, for about 30 minutes, into the mind of Aiken, a 60-year-old man suffering from Alzheimer, because of the disease is losing memory and consequently also his personal identity. Viewers will travel through the spaces of his past, which are not stationary but constantly moving, as in a state of constant reconstruction within his fragmented brain. The precious moments of childhood that Aiken can barely remember feel contaminated and as if they were slowly slipping into oblivion. Other memories that he would rather forget remaining intact or almost[427].

The user is free to move within a defined physical area, his body movement is transmitted within the virtual environment thanks to tracking technologies. This type of experience is called "layered reality" or even "room scale virtual environment". In layered reality, the object of the experience comes from a synthesis between an immersive environment in which there are visible virtual characters, and invisible physical and corporeal reality that continues to act underground, integrating the image with other sensory impulses. In addition, a choreographer discreetly accompanies the user, rendered incapacitated by the

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[427] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 252.

pathological viewer, she plays a fundamental role orienting him within the stage and producing tactile, olfactory and even gustatory sensations at the right moment. In this way, viewers are included in the representation, both physically and virtually, becoming co-actors and co-authors[428].

Once the viewer has put on the headset, enters an inner world that is crumbling, as suggested by the title of the work. Fragments of images appear in a deconstructed manner, an unrecognizable house in which it is impossible to move in a coherent way, memories of the past, pieces present life but without a logical continuity. Despite the logical disconnect with which long and short term memories alternate, remains a small chance to recognize a sense of the life of the protagonist, before his existence was devoured by the void. One of the most important moments of the work is represented by the sequence in which the grandmother offers the protagonist of freshly baked cookies (fig. 31), at that precise moment, the user really finds himself munching and enjoying the virtual cookie offered by an immersive image. In this installation the multisensory character of technologically implanted images becomes central, because thanks to them it is possible to come into contact with the entire body sphere of those who live them[429].

The experience is an even more complex mixture of performance and narration, physical and virtual environment. It reflects on the characteristics of the dimension of memory, in a way similar to what happens during real life within virtual reality the sense of presence is witnessed only by the whole of the senses. It aims to embrace the more general question of loss as a universally human experience. This work was created to provide a sense of hope and understanding to anyone suffering from this very common and devastating disease. As the director stated «With advances in virtual reality, we strive to remember the forgotten. After all, memory is all we are»[430], the last sentence is also the subtitle of the work.

The multidisciplinary artist Tupac has worked successfully in various creative industries. His background in painting allowed him to master the use of colour and excel in strong visual languages. He has collaborated with icons such as Elton John and Danny Boyle, as

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[428] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Monza, pp. 132-133.

[429] Ibid.

[430] Humprey, T. (2019), *Venice 2019 VR Dispatch: COSMOS WITHIN US Is Perhaps The Biennale's Brightest Star*, in Screenanarchy, https://screenanarchy.com/2019/09/pending-venice-2019-vr-dispatch-cosmos-within-us-is-perhaps-the-biennales-brightest-star.html, (last accessed 11-02-24).

well as fashion houses Prada and Alexander McQueen[431]. Below is his statement about Cosmos Within Us:

> Loss is an inevitable part of life. Some are devastated by it, while others draw on it for motivation. The way memory influences our identity inspired me to tell this story in VR and bring to life what it means to forget. My grandfather told me that if you can see something of yourself in others, there's also something of them within you[432].

Figure 31. Martin, T., *Cosmos Within Us*, 2019, making-of photo, 76th Venice International Film Festival (Venice).

4.3.4. Breaking free in VR

VR Free is a virtual documentary made in 2019 by the young director Milad Tangshir and produced by the National Cinema Museum Association (Valentina Noya). It was presented in the VR section of the 76th Venice Film Festival in the same year. The 10-minute Italian production explores, with the use of plenary cameras, the nature of the spaces of imprisonment by portraying some fractions of life within the Prison House of Turin[433].

The experience is limited by the perspective of the director who proposes the events in the same way, the user finds himself in an "objective" environment to contemplate distance, as the images and spaces manifest themselves before him. It is a 360-inch video

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[431] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 252.
[432] Ibid.
[433] Ivi. p. 266.

in which the point of view is that of a video surveillance camera of the prison, empty environments are displayed, animated only by the screen of older generation TVs on a program of judicial proceedings, desolate corridors and cells, the courtyard confined by the walls, etc. (fig. 32). The sequence of scenes changes in a rhythmic and regular way, as a mirror reflection of the rhythm of life of the prisoners, they advance in their days as ghosts waiting for redemption[434].

The prisons call themselves anonymous, they are spaces that show themselves as punitive because they condemn to anonymity, assuming the character of "non-places": spaces of intersection in which the one who passes through them cannot read anything about his own identity and the relationships between one and the other. Through the cold review of these environments, the evocation of the precariousness of space and constriction as a characteristic element of the relationship between them and the spaces in which they are located, the prison is represented as Gothic[435].

The HMD headset is worn by the user, but it is not the only one, in fact the docu-film captures the sequence of a detained person wearing an headset and moving in silence trying to interact with a virtual environment. Through the use of VR headset, which in this case assume an important dialogue function, prisoners can virtually participate in some collective and intimate situations that are no longer within their reach, detainees during their encounter with engaging videos of life outside the prison: a night at the disco, a picnic, a game at the stadium, etc. The user after an initial moment of disorientation, becomes a witness of their way of perceiving time and virtual space[436].

This mirror effect of experiences, in which the user of sees in the prisoner wearing the headset for virtual reality does not reach the feeling of presence. This meeting aims to increase empathy and sympathy towards the prisoner who, like the user, is trying to familiarize himself with the virtual medium. The experiential, social, cultural gap between the two remains, but in this case, it is shortened when both find themselves interacting with the virtual medium. In this precise moment the "inside" and the "outside" merge into a single space of «virtual freedom»[437].

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[434] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, cit., p. 266.
[435] De Nicolò, G. (2021/2022), *Tesi di laurea magistrale: Prigione e VR. «Una macchina per riformare gli spiriti»*, Relatore Ch. Prof. Pietro Conte, Università Ca' Foscari Venezia, pp. 73-78.
[436] Ibid.
[437] Barbato, G. (2019), *Dentro e fuori le mura del carcere grazie alla realtà virtuale*, in Senti chi parla, https://sentichiparla.it/cultura/vrfree-realta-virtuale-carcere-tangshir/, (last accessed 11-02-24).

A particular scene in which a prisoner meets his family, showing the prisoner's reaction, which melts into a painful cry inside his visor, triggers an emotional shock in the spectator who is witnessing the show of punishment. The film invites to take note of the prison spaces and delivers only portions of lived experiences, placing the user at a distance. But thanks to the feeling of empathy this distance eventually shortens, and the viewer feels pity for the inmates. The objective view of the video surveillance camera turns into a moving virtual escape[438].

When the director manages to fully exploit the characteristics of this medium, the result is convincing also in emotional terms. In this specific case, the capacity for use and perception of space is limited, like those of prisoners. The headset is worn to experience a claustrophobic feeling, which on the one hand causes a discrepancy between expectations and reality, and on the other hand paradoxically enhances the narrative value of the experience itself[439].

The emotional reactions deliberately provoked by the director are oriented to the use of virtual reality as a medium that encourages the user to take part in the social debate on the subject of detention. The documentary, as previously highlighted, lends itself to an objective and factual presentation of the narrative and spaces, even prisoners are represented as exemplary[440].

The user who experiences this gap between himself and the prisoner, does not identify with them and does not imagine himself in the same situation, because he is not called to participate actively in the action, but sympathizes with the prisoners whose are subjected to his gaze. Observing the objective suffering, he becomes a witness of the life that prisoners lead and of the representation of their feelings[441].

The experience of imprisonment told by Milad Tangshir is not the only present in the context of the Venice Biennale of 2019. In fact, the case study *3x3x6* by Shu Lea Cheang described in the third chapter and presented at the Venice Art Biennale deals with the theme of the prison space and surveillance. The director Milad Tangshir made a statement about the documentary:

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[438] De Nicolò, G. (2021/2022), *Tesi di laurea magistrale: Prigione e VR. «Una macchina per riformare gli spiriti»*, Relatore Ch. Prof. Pietro Conte, Università Ca' Foscari Venezia, pp. 73-78.
[439] Modena, E. (2021), *Nelle storie. Arte, cinema e media immersivi*, Carrocci Editore, Roma, pp. 81-82.
[440] Ibid.
[441] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 266.

> I believe that virtual reality is a powerful tool in dealing with the concept of space. We tried to use this potential in an expressive and dramatic manner, by bringing this new medium inside a world which is per se full of harsh and aggressive spaces. *VR Free* is an attempt to bring the hidden world of prison in front of the public's eye, a call to participate in the urgent discussion about our detention spaces[442].

Valentina Noya, cultural designer for the National Cinema Museum Association in Turin, is also Project manager of the *LiberAzioni Festival*, a set of initiatives aimed at dialogue between inside and outside the prison thanks to the tools of art and technology. Every year, *LiberAzioni* also proposes a film competition on the theme of freedom and its limits, in 2018 the first prize was awarded to Tangshir who participated with the short film *Displaced*[443].

Figure 32. Tangshir, M., *VR Free*, 2019, making-of photo, 76th Venice International Film Festival (Venice).

4.4. Beyond the empathy machine

Within the prestigious Venice Film Festival, the area dedicated to virtual films offers a diverse perspective on film art, beyond the concept of the empathy machine. In this unique and innovative space, visitors are encouraged to explore creative and visionary worlds, without necessarily focusing on the theme of empathy. In the next section, several immersive films will be analysed, these offered a wide range of experiences and adventures related to cinema, art, dream world, and more.

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[442] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, cit., p. 266
[443] Barbato, G. (2019), *Dentro e fuori le mura del carcere grazie alla realtà virtuale*, in Senti chi parla, https://sentichiparla.it/cultura/vrfree-realta-virtuale-carcere-tangshir/, (last accessed 11-02-24).

4.4.1. Immersive cinema

The Horrifically Real Virtuality is a film made in 2018 and directed by Marie Jourdren, it was also presented in the VR section of the 75th Venice Film Festival in the same year. The film, which lasts 50 minutes, has the objective of painting an introspective portrait of the emerging virtual reality, and at the same time it also aims to evoke its relationship with cinema through tenderness and self-irony[444].

The experience is provided for groups of six visitors at a time, who initially enter without wearing the headset in a set where they are greeted by two actors. The first actor plays the role of the American director Ed Wood (Tim Burton also dedicated a film to him[445]); the second shows up wearing only a suit for the motion capture and represents Bela Lugosi, famous Dracula and fetish actor of the director. The canonical image of the vampire is visible only in the two side screens, which translate in real time gestures of the actor in a digital animation. The installation is based on the use of a new technology of recording and real-time translation of bodies and their movements in digital images, called "volume capture"[446].

At this point, viewers can wear the headset and turn around digital images representing real objects and bodies, thus acquiring a sense of presence enhanced. Users are invited to contribute to the realization of the new masterpiece of director Ed Wood, resulting in hilarious comic effects because they are non-professional actors. Only after participating in the making of the film, visitors can pay for the ticket, and finally sit in a cinema and enjoy the fruit of their work (fig. 33). The imagery in which users find themselves is meta-cinematic, because their avatars, with which they are represented and interact, belong to the hallucinated diegetic world of Ed Wood; and then because they have the opportunity to enter a virtual cinema that projects the film just shot, which sees them as protagonists[447]. Users find themselves in the room surrounded by an audience of avatars similar to them, so much that it is difficult to distinguish the group of six visitors from the virtual figures.

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[444] La Biennale di Venezia (2018), *75. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 222.
[445] *Ed Wood* (1994) is a film realized by Tim Burton inspired to the life and the works of Ed Wood, considered by Burton "the worst director of all time".
[446] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Monza, p. 142.
[447] Ivi. pp. 142-143.

The film adopts the staging of multiple media contexts that absorb each other: immersive theatre that imitates the making of a film, while the same cinematic situation is in turn reintroduced within the linguistic regime of the virtual[448]. After the festival in the festival and the museum in the museum, now it is possible to talk about the film in the film.

Buster Keaton was the first to think of the dream as a space where it was possible to merge two media experiences, in that case cinema and theatre. With the passage of time and especially with the advancement of technology, thanks to the latest and complex virtual reality installations, now it is possible to live a similar experience. In fact, in a virtual environment, understood as a shared dream, spectators and actors, in the form of avatars, meet and give life to artistic productions made from images in the virtual world[449].

Inside the environment created by virtual reality, Keaton's dream is finally realized, in which the "spect-actors" can cross the screen and enter the film. The screen has always been seen as a limit, in this case it acts as a frontier of emerging and immersive paths. Emerging because the avatars appear as figures belonging to the imagination of Ed Wood and as actors in his film, so their crossing the border of representation is actually a return home. Immersive because the avatars are visitors from the real and external world, thanks to the medium of virtual reality cross the border and enter the universe of the image[450].

The ability to enter the screen is presented and experienced first-hand by users. Thanks to this so-called invasion of external visitors, who become internal actors of the film, it is no longer called virtual reality, but as the title suggests "real virtuality". This is made of bodies that live a shared dream and is the medial realization of an ancient experience of the image, in which the vision is closed to the external world and wide open on a universe visible only from within, the fiction is as enveloping as the sense of presence and above all, the visitors become as much authors as actors and spectators[451].

Marie Jourdren is Chief Creative Officer for DVgroup. In 2017, she created *Alice* (The Virtual Reality Play), the first ever immersive VR play performed in real time by reactive actors. Alice was acclaimed by the critics for offering unrivalled levels of immersion and personalization, and for disrupting the spectator's traditional passive posture, transporting

[448] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, cit., pp. 142-144.
[449] Ivi. p. 142.
[450] Ivi. p. 143.
[451] Ivi. p. 144.

him at the centre of the stage to become a character of the story[452]. The director made a statement about the film during the Venice Film Festival:

> *The Horrifically Real Virtuality* is an immersive theatre VR play that allows the viewer to evolve in a virtual setting, while physically and in real time interacting with characters and material objects[453].

Figure 33. Jourdren, M., *The Horrifically Real Virtuality*, 2019, real time frame captured, 75th Venice International Film Festival (Venice).

4.4.2. Scream VR

Le Cri VR is a virtual reality film directed by Sandra Paugam and Charles Ayats, with the support of Centre National du cinéma et de l'image animée (CNC) and presented in the VR section of the 76th Venice Film Festival in 2019. The short film offers visitors the interactive opportunity to touch *The Scream* (1893-1910) by Edvard Munch. They also will be dragged into the depths of the tormented unconscious of the artist, by demons and ghosts that are released from the live canvas (fig. 34)[454].

The Scream of Edvard Munch, thanks to its effective symbolic synthesis, became an icon of human, personal and collective suffering of the twentieth century. The famous face distorted by terror has so inflamed the imagination of the audience that it has become a universal symbol of terror.

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[452] La Biennale di Venezia (2018), *75. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 222.
[453] Ibid.
[454] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 275.

The Cri VR is part documentary, part exhibition and part sensory experience that brings who wears the headset face to face with one of the most captivating (and disturbing) paintings in history. It can be defined as a journey that offers the opportunity to see the painting change, while in the meantime its story is told, and also a journey through the mind of the painter who, like the artwork, continuously takes new forms. This experience will lead the user to dark and unhealthy places, where he will be forced to face his fears and demons, thus also becoming a journey of self-discovery. The project concerns not only the exploration of the work of art, but above all the experiences of the artist from which the painting originated: emotions, fears, anxiety[455].

Below is a statement by the two directors made during the Venice Film Festival:

> With *Le Cri VR*, we hope to offer viewers a brand-new experience, by transforming their museum visit into a journey into the heart of the emotions stirred up by this haunting artistic work[456].

It has already been seen in previous case studies, inside the viewer is offered an alienated visual universe, which separates viewers from the surrounding world, just as psychosis, hallucination, and dreams. Various digital and immersive installations promise to make possible a further dream experience, with open eyes: the imagination of the artist. Their goal is to bring users into the interior and creative universe of those who create works of art, which are nothing more than the material concretization of ideas, and sometimes even torments, artists[457].

Virtual installations of this type, dedicated to works of art, adopt a particularly effective strategy. The latter does not consist in the translation of a two-dimensional pictorial image framed in an immersive and enveloping environment, that is the simple escape from the frame by the image, but in the reproduction of an entire psychic universe that corresponds, as a whole, to the artistic imagination. In this hidden world that is discovered for the first time are also represented the historical and sociocultural context that have determined it, the philosophical and ideological vision and several works of the author merged together

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[455] Seghedoni, S. (2019), *"Le Cri" Interview: The Scream comes alive in VR*, in Loud and Clear, https://loudandclearreviews.com/le-cri-vr-interview/#google_vignette, (last accessed 11-02-24).

[456] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 275.

[457] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Monza, pp. 133-134.

to create a global and coherent environment. The character of the virtual experience related to the dream can be read in two different ways: first as a process that leads the viewer to immerse themselves in the work and as second as the world imagined by the artist[458].

Sandra Paugam has been involved in the making of a multitude of documentaries on art and culture, since 1996 she has made more than 50 documentaries. In 2009, she decided to begin directing her own films. In 2016, she won the Best TV Documentary Award at FIFA Montreal with the work *Cocottes et courtisanes* made in collaboration with Musée d'Orsay and RMN. Charles Ayats graduated in Interactive Digital Experience at the Gobelins School of Images. He is an expert in designing experiences that facilitate the transmission of knowledge, often incorporating gameplay mechanics. He recently developed an interest in VR by creating interactive fictions and documentaries for this new medium[459].

Figure 34. Paugam, S. & Ayats, C., *Le Cri VR*, 2019, real time frame captured, 76th Venice International Film Festival (Venice).

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[458] Grossi, G. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, cit., 133-134.
[459] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 275.

4.4.3. Unlocking dreams with virtual reality

The Key is a virtual short film directed by Céline Tricart and presented in the VR section of the 76th Venice Film Festival in 2019, in which it won the Grand Jury Prize for Best Immersive VR Opera. The film won not only in Venice, but also in the same year was the winner of the Tribeca Film Festival. The work is an interactive 15-minute experience that combines immersive theatre and virtual reality, once again dedicated to the memory process in dreams[460].

«Enter into my dreams. Search in their tracks disconnected sense of my forgotten past»[461] these are the words with which they are welcomed participants, spoken by an actress who is located at the entrance. In reality, the words are not spoken by her because her mouth is closed, but come from a device she is wearing. After the welcome, the long dream journey of the participants begins, they will bring with them a single object that must be kept all the time and must never be lost: a key. After the delivery of the key, viewers can wear the headset that will separate them from the outside world and make them enter the dream world[462].

The virtual environment is represented as the interior of a house suspended in the clouds, from the windows it is possible to see part of a celestial city with similar buildings. Thanks to a virtual hand, the user feels free to interact with three animated spheres, these must be protected from a number of different dangers. But soon this task proves more difficult than expected, because the spectators are surprised by an explosion that destroys the walls of the house and, despite the efforts to try to recover them, the spheres are scattered in the open sky space. After the explosion, the user falls and the feeling of lack of balance pervades the whole body, he will land in apocalyptic and infernal scenarios where he will find himself marching in a row with hominids wearing white masks, advancing in the direction of a monstrous leviathan (fig. 35)[463].

The immersive environment passes from the CGI animation to the photographic image, from the dream to the reality, and in the passage between these two visions the trauma is finally revealed. It shows a bombed house in Iraq, with the consequent need to protect

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[460] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, cit., p. 256.
[461] Ibid.
[462] Grossi, G. (2021), *Dreamlike Environments: "Story-living" in Virtual Reality*, Cinergie - Il cinema e le altre arti, n. 19, pp. 147-154.
[463] Id. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Monza, pp. 145-148.

loved ones, emigrate to a safe place but having to deal with the lack of acceptance. The images can be raised and under them is it possible to read information about migratory flows and refugees who escaped from Iraq because of the conflicts[464].

At this point the headset is removed, with the gesture that is compared to waking from the dream. The key is the only dreamlike element linked to the experience that remains to the spectators and becomes a symbol of the houses that refugees have left and that have been destroyed, it also becomes the last physical trace of those lost places. This is also the explanation of the title chosen for the work[465].

The virtual reality experience is produced by the director with the aim of producing a sense of awareness towards the real world. It is necessary to underline that *The Key*, is not a machine of empathy theorized by Chris Milk, does not force the user to put himself in the shoes of another, but aims at a less immediate and more complex process of interpretation of the experience. Viewers are not forced to impersonate a migrant and try something that they have never experienced firsthand, the trauma is experienced and only later recognized in its emotional implications under the disguise of the virtual dream. leveraging emotions that anyone may have experienced and can easily recognize, linked to the experience of estrangement: the loss of usual references, the inability to protect and retain the affections, the fatigue of an aimless journey, becoming part of a faceless crowd. The virtual dream that is at the same time foreign and familiar to everyone, allows you to get in touch with your personal experience and according to Celine Tricart only in this way you can truly realize those of others. According to this theory the subject achieves a direct understanding of the collective and historical trauma, bringing together individual and social memories[466].

The immersive medium has the ability to isolate the user from the real physical environment and to catapult him into an imaginary virtual world, while maintaining, as in a dream, a precise relationship with reality. In this case the dream is not an escape from reality but rather a space to understand it, elaborate it and make it your own. For Tricart, virtual reality is conceived as a «first-person means», avoiding «squeezing participants

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[464] Grossi, G. (2021), *Dreamlike Environments: "Story-living" in Virtual Reality*, Cinergie - Il cinema e le altre arti, n. 19, pp. 147-154.
[465] Ibid.
[466] Id. (2021), *La notte dei simulacri. Sogno, cinema, realtà virtuale*, Johan & Levi Editore, Monza, pp. 145-148.

into people's bodies and telling them what to think and when»[467]. This is the statement of the director released at the Venice Film Festival:

> The main challenge for me creating *The Key* was to find a way to craft interactivity so that it doesn't get in the way of emotion. I believe VR is a first-person medium. We bring a lot of ourselves in with us: our identity, our thoughts, our emotions. It's story-living, instead of storytelling[468].

To describe the very easy and user-friendly narrative and interactive design he designs for virtual reality installations, the immersive artist has coined the concept of "storyliving", since the participant's personal social and historical understanding is founded in the sense of the virtual environment[469].

Céline Tricart is a director who has developed a unique and recognisable style with a strong visual sense due to her background as a director of photography. Her work was showcased in numerous Academy Awards qualifying festivals including the Sundance Film Festival, Tribeca, SXSW, the Austin Film Festival, the Clermont-Ferrand Film Festival and the Chicago Film Festival. Céline was the recipient of two Lumière Awards by the Advanced Imaging Society, two Telly Awards and a Platinum Aurora Award amongst many other accolades[470].

Figure 35. Tricart, C., *The Key*, 2019, real time frame captured, 76th Venice International Film Festival (Venice).

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[467] Tricart, C., Yu, K. (2019), *Unlocking the Mystery of "The Key"*, in No Proscenium, https://noproscenium.com/unlocking-the-mystery-of-the-key-q-a-2f8958d65c9b, (last accessed 11-02-24).

[468] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 256.

[469] Grossi, G. (2021), *Dreamlike Environments: "Story-living" in Virtual Reality*, Cinergie - Il cinema e le altre arti, n. 19, pp. 147-154.

[470] La Biennale di Venezia (2019), *76. Mostra internazionale d'arte cinematografica*, cit., p. 256.

4.4.4. Virtual trip down memory lane

The Book of Distance is a VR film directed by Randall Okita and presented in the *Venice VR Expanded* section of the 77th Venice Film Festival in 2020. The director in this 25-minute short film tells the story of his great-grandfather, Yonezo Okita, who in 1935 left his home in Hiroshima (Japan) to start a new life in Canada. Shortly after the emigration with his family, made to have a better life, the Second World War broke out, later he will live in the difficult times of racism and will be in the position of enemy only because Japanese and will be imprisoned. It is an interactive virtual pilgrimage through the emotional history and geography of immigration and family, with the aim of recovering and preserving what was lost[471] . This is Randall Okita statement on the film made during the Venice Film Festival:

> What we know about our grandparents and family history often comes in bits and pieces. *The Book of Distance* is my attempt to recover those things my grandfather didn't say- including moments that may have been too painful for him to remember. I wanted to reimagine what he lived through, to recreate an experience that allows others to participate and to bear witness[472].

In this documentary, the author guides the user through the experience and does so firsthand, appearing as an avatar and using his own voice. He is a guide across countries and generations and there was no better narrator to tell the story of his family. The viewer is invited to a virtual space full of memories belonging to the author-narrator, in fact, real and personal artifact are used, such as family photos, newspaper extracts and other objects that have much importance for the family[473].

The Book of Distance is a virtual reality experience in scale environment that imagines new possibilities for personal storytelling. It has narrative design and at the same time interactive, the viewer is not only encouraged to observe, but also and above all to interact with objects. The latter are significant for the narrative and the viewer is given the opportunity to take in hand photos, documents, newspapers, touching them and watching them closely (fig. 36). These gestures work as triggers in two ways: on the one hand,

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[471] La Biennale di Venezia (2020), *77. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 256.
[472] Ibid.
[473] Ruszev, S. (2021), *Tracing Embodied Narrative in VR experiences*, Cinergie - Il cinema e le altre arti, n. 19, pp. 9-18.

advance the narrative and on the other, add an important emotional depth to the virtual narrative[474].

One of the most emotionally impactful scenes in the entire film is when the Okita family must cross the border and viewers are asked to repeat the same gesture physically through a virtual line. It is a simple step, but in this case combined with the crossing of a virtual border takes on a symbolic meaning and has the power to activate knowledge and memories stored by the body of users. One of the peculiarities of virtual reality lies in its multisensory character to which the viewer is exposed, which in this case becomes a spectator-explorer. The final result is an experience of great impact thanks to these virtual but also physical stimuli but also physical that create a hybrid environment. As has already been pointed out, more than any other existing technology, virtual reality makes users experience two realities simultaneously, the real and the virtual[475].

The viewer-explorer is guided by the narrator-author through the episodes of Okita's family life. The inclusion of the spectator in the narrative space of the experience is realized following the example of the theatre, in fact stylized theatrical funds are used and the progression of events is shaped through the elegant use of light[476].

Once again, thanks to virtual reality, it is possible to make the user participate through interaction with important objects in the life of an immigrant. Through repetition and mirroring viewers are actively involved both mentally and physically, the fact that objects can be touched or approached just as in the act of browsing through a scrapbook of memories, exponentially increases the emotional depth of the gesture. Thanks to these gestures a "kinesthetic empathy" is activated at the body level and enriching the raw and engaging experience[477].

Randall Okita is a Canadian artist and filmmaker whose work employs sculpture, technology, physically challenging performances, and rich cinematography. His work has been shown in both group and solo exhibition, awarded internationally, and screened at festivals around the world[478].

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[474] Ruszev, S. (2021), *Tracing Embodied Narrative in VR experiences*, cit., pp. 9-18.
[475] NFB (2019), *The Book of Distance*, in National Film Board of Canada, https://www.nfb.ca/interactive/the_book_of_distance/, (last accessed 11-02-24).
[476] Ruszev, S. (2021), *Tracing Embodied Narrative in VR experiences*, cit., pp. 9-18.
[477] Ibid.
[478] La Biennale di Venezia (2020), *77. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 256.

Figure 36. Randall, O., *The Book of Distance*, 2020, real time frame captured, 77th Venice International Film Festival (Venice).

4.4.5. Alice in virtual Wonderland

Down the Rabbit Hole is a VR short film directed by Ryan Bednar, produced by Cortopia Studios and presented in the Venice VR Expanded section of the 77th Venice Film Festival in 2020. The 5-minute virtual reality adventure is a prequel to Lewis Carroll's classic *Alice in Wonderland* story[479].

In this game the viewer is teleported to the Land of Wonder, more precisely at a time before the arrival of the famous Alice. The player immediately discovers a girl looking for her pet named Patches, which is lost in that mysterious land. The viewer will have to put himself in the game by guiding and helping her in the search, but that's not all, in fact there will be many twists. The game was defined by its creator as an «immersive diorama»[480] in which players control their own destiny by tracing a path. The players find themselves exploring the wonderful corners of Wonderland, solving puzzles, discovering secrets and making choices, not only for themselves, but also for the girl and other characters they will meet along the way (fig. 37)[481].

After graduating from the University of Syracuse, Ryan Bednar managed to get an internship at the Warner Brothers Games in Boston as a game decor designer. After his first year, he was offered a full-time position as "World Builder" (level designer). He has

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[479] La Biennale di Venezia (2020), *77. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 250.
[480] Ibid.
[481] Pinotti, A. (2021), *Alla soglia dell'immagine. Da Narciso alla realtà virtuale*, Einaudi, Torino, pp. 47-50.

over 15 years of experience in developing games with experience in design, UX, user interface, VR/AR development. To date, he has won four successful titles and has worked with well-known studios such as EA, DICE, Turbine and Warner Brothers[482].

Since the early days of VR, when the term virtual reality did not exist yet, it was associated with the fairy tale *Alice in Wonderland* by Caroll. In 1965, Ivan Sutherland, inventor of the head-mounted display and one of the pioneers of interactivity, stated that his devices involved the greatest number of senses and were capable of being kinesthetic, to have the ability to correspond to the movements of the subject and its perceptual modifications, and to be able to simulate all the degrees of freedom allowed by the human arts[483]. He also stated «With appropriate programming, such a display could be literally the Wonderland in which Alice entered»[484]. Then in 1987, the designer Ann Lasko, collaborator at the VPL of Jaron Lanier, inventor of the term itself "virtual reality", had created a virtual world based on the model of Alice in Wonderland, where the user could enter inside the hole of the White Rabbit[485].

«Wonderland is the perfect world to explore in virtual reality»[486] is what we read on the press release of the virtual exhibition *Curious Alice: the VR experience* held in 2021 and inserted within the larger project *Alice: Curiouser and Curiouser* made by the Victoria & Albert Museum in London. The event invited the audience to jump into the rabbit hole and embark on a journey to Wonderland through the playful dimension of virtual reality. This experience was the result of a partnership between the museum and HTC Vive Arts, produced by the immersive game studio PRELOADED and with original artwork by the illustrator Kristjana S Williams. It has been made available to users both with and without headset, through the ENGAGE VR platform using a Windows PC or an Android device, and also through a live recorded event, which broadcast on the YouTube channel of the V&A Museum[487].

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[482] La Biennale di Venezia (2020), *77. Mostra internazionale d'arte cinematografica*, La Biennale di Venezia, Venezia, p. 250.

[483] Pinotti, A. (2021), *Alla soglia dell'immagine. Da Narciso alla realtà virtuale*, cit., pp. 47-50.

[484] Sutherland, I. E. (1965), *The ultimate display* in *Proceedings of International Federation of Information Processing (IFIP)*, Macmillan, London, vol. 2.

[485] Pinotti, A. (2021), *Alla soglia dell'immagine. Da Narciso alla realtà virtuale*, cit., pp. 47-50.

[486] V&A (2021), *Curious Alice: the VR experience*, in Victoria & Albert Museum, https://www.vam.ac.uk/articles/curious-alice-the-vr-experience, (last accessed 11-02-24).

[487] Ibid.

The experience took place in a virtual environment inspired both by the physical space of the museum and the characters of the story of Caroll, thanks to advanced technology, participants were able to attend the event as avatars, interacting with each other and discovering the 5 sections of the exhibition[488]. It has been a completely immersive and interactive re-imagining of the Land of Wonder, realized with the aim of celebrating the most iconic and stimulating stories of all time[489]. Kate Bailey, Senior Curator of Theatre and Performance at the V&A said on the occasion of the exhibition:

> *Alice: Curiouser and Curiouser* reflects the global impact and legacy of the Alice books across creative disciplines. Since their creation the Alice books, with their mind-blowing ideas and concepts, have been a source of inspiration for new technologies from silent film to CGI. It has been an extraordinary adventure to work with HTC Vive Arts and Preloaded to take our exhibition into a playful new dimension of VR[490].

With these examples that start from the first experiments of VR and reach today, it is possible to declare the link between the history of Caroll and virtual technology, as thematic and narrative content, but also as an effective metaphoric for the immersive virtual technologies and their conceptual models.

Figure 37. Bednar, R., *Down The Rabbit Hole*, 2020, real time frame captured, 77th Venice International Film Festival (Venice).

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[488] V&A (2021), *Curious Alice: the VR experience*, cit., https://www.vam.ac.uk/articles/curious-alice-the-vr-experience, (last accessed 11-02-24).

[489] Artribune (2020), *Alice nel Paese delle Meraviglie in realtà virtuale. L'evento del V&A Museum di Londra*, in Artribune, https://www.artribune.com/progettazione/new-media/2020/10/alice-paese-meraviglie-realta-virtuale-londra/, (last accessed 11-02-24).

[490] V&A (2021), *Curious Alice: the VR experience*, cit., https://www.vam.ac.uk/articles/curious-alice-the-vr-experience, (last accessed 11-02-24).

Conclusion

This thesis has undertaken a comprehensive exploration of the use of virtual reality within the Venice International Art Exhibition and Venice International Film Festival. In addition, the work aims to provide readers with an in-depth analysis of virtual reality as a cultural and technological phenomenon, highlighting its evolutions over time, different applications and the influences that transform and redefine the cultural experiences. This study recognized the opportunities and challenges presented by immersive environments in different contexts and contributes to a deeper understanding of their role within the evolution of the contemporary cultural landscape.

The research project revealed the existence of a significant disparity in the way virtual reality is used in the artistic and cinematic context. In addition, there is also a disparity in the level of attention that is given to this technology.

In general, within the artistic realm, virtual reality is used as a tool. Artists, thanks to this medium, have the opportunity to explore new creative dimensions, crossing the boundaries of traditional art. Visitors are made to participate in the direct interaction that takes place between them and the work, which comes to life beyond the frame.

In this field, the strong point of virtual reality is certainly the ability to adapt and put itself perfectly at the service of the unique and inimitable language of each artist. This fusion of art and technology opens up new creative possibilities for artists, allowing them to explore complex concepts and turn their ideas into tangible and engaging experiences for the audience.

In the context of the Art Biennale, virtual reality is an innovative platform for artistic exploration. The presence of virtual environments and pioneering devices is nothing new, in fact, from 1970 onwards it has been gradually introduced within the cultural event. In recent editions, in particular in the 58th edition in 2019, there has been a boom of virtual works. The proliferation in the artistic field has gone hand in hand with the marketing of numerous headsets and headphones on the market, sold at increasingly affordable prices for the public, and at the birth of a growing number of virtual video games, virtual exhibitions, amusement parks, interactive theatre productions, etc.

Within the exhibition there is no section dedicated to virtual reality, as in reality does not exist for the other artistic techniques. A division of this type is not carried out but is organized according to the structure of the institution that provides for the division

between the national pavilions, the international exhibition organized by the curator and the collateral events.

As evidenced by the case studies analysed, the presence of virtual reality pervades all areas of the exhibition and demonstrates the versatility of the medium. It also testifies to the constant dialogue between artistic tradition and technological innovation. The works presented at the 58th edition of the Venice International Art Exhibition demonstrate the affirmation and the consecration of the medium within the cultural panorama, which occurred especially in recent editions. Overcome the initial scepticism, the art world defines virtual reality as a valuable and revolutionary tool. Articles, academic essays and experts in the art sector highlight the potential of virtual reality and more and more artists are using it as their own language of expression.

The "great mother" of all biennials has always been at the forefront of research and the promotion of new artistic trends, exposed according to a multidisciplinary model unique in the world. The gradual integration of virtual reality demonstrates the coherence of the institution with its general objectives and demonstrates that it is still able, after 128 years of history, to offer a unique perspective on the artistic trends and challenges of the art of the 21st century.

Instead, within the cinematic realm, virtual reality has managed to transcend its role of simple technology and emerges as a cinematic genre. Although immersion is used by film directors as a tool for improving storytelling, it has been recognized as a film category. The recognition took place mainly thanks to the birth of the virtual reality section within the Venice International Film Festival.

Immersive films are a new frontier for film exploration, offering audiences a unique and, above all, unrepeatable experience, in which viewers are teleported into the heart of the narrative and become participating actors in the story.

This type of new interactive storytelling challenges the traditional conventions of cinema, for this reason the VR section was "confined" to the Isola del Lazzaretto Vecchio, later called Immersive Island. Some scholars attribute this choice to physically remove the section dedicated to immersive projections from the traditional context of the festival, as a clue about the state of virtual reality. It has been considered as a novelty worthy of being included in an international film festival, but to leave temporarily separated from the rest, in order to understand first the consequences and possible risks.

Probably this interpretation can be applied to the first editions, but later, accomplice the arrival of the global pandemic, the use of virtual reality devices has become almost common use for millions of people. The approach of a large audience towards this new technology and the impossibility of performing the event in presence, have transformed the concept of virtual reality from threat to salvation. In fact, it was possible to carry out the two editions of Venice Expanded entirely online (with many difficulties) in 2020 and 2021. In recent years, the location of the Venice Immersive section at the Film Festival has been maintained on VR Island, mainly due to the need for different spaces than traditional film screenings.

A fundamental difference between the artistic and the cinematographic context is the contamination of the many uses of virtual reality. The utilization in the artistic field remains quite unchanged, because it is used as a language and must have a necessary adherence to the artistic context, while for the cinematographic one the possibilities are potentially endless. As has been highlighted in the pages of the research, virtual reality has many applications in the medical, educational, military, industrial fields. Thanks to the well-established recognition of virtual reality as a cinematic genre, the themes of immersive films range more widely and sometimes encroaching on other fields of applications.

The case studies presented in the last chapter, dedicated to the Venice Film Festival, underline the variety of topics covered by virtual works. For consistency with the studies on virtual technologies applied to cinema, they have been divided into case studies that fall within the concept of "empathic machine" and in case studies that go beyond this concept. The first that adhere to the so-called virtual machine of empathy fully exploit the emotional and sensory potential of technology, which allows viewers to get into the shoes of other people. This type of immersive cinematic work is used to document real events or to represent altered states of consciousness such as disease, the effect of drugs and incarceration. While the seconds, which do not fit into the concept just mentioned, embrace the representation of experiences related to the most different times: the world of dreams, the world of fairy tales, art, family ties and personal life experiences, etc.

The film genre represented by virtual reality certainly presents some cons as having an impact on sociality, typical of the traditional cinematic experience. In fact, the use of virtual reality by nature tends to isolate viewers from the real world and everything around

them, therefore also other spectators, thus limiting dialogue and comparison. It can also have negative effects on the health of users, prolonged or incorrect use can lead to health consequences such as nausea, fatigue, vertigo, etc.

The Venice Immersive section tries to mitigate the negative aspects of this technology. First of all, the presence of halls with expensive specialized equipment makes the VR accessible to all those who have a subscription. In the rooms for virtual screenings there is always a specialized staff, who instructs and helps viewers and remains available for any type of problem. Moreover, the environment of the Venice Film Festival intrinsically promotes dialogue between viewers, both of traditional and virtual projections.

Currently the section dedicated to virtual reality has reached its seventh edition, and the eighth is already scheduled. Over the years it has been able to cope with various problems, starting from initial scepticism, passing through the global pandemic and reaching the daily difficulties of renewal. It proved to be a functioning and efficient machine, up to the challenges and at the same time keeping up with trends.

The inclusion of immersive environments within the Art Biennale takes place in a hybrid space, where all the artistic techniques are present. The fact that virtual reality is placed in the general artistic context and placed at the same level as other media, on the one hand is a positive aspect, but in reality, the absence of a dedicated section involves several problems. For example, the uniqueness of the immersive experience could divert attention from other works, thereby compromising the interaction between virtual reality and traditional art. Some critics argue that, because of its temporary and irreplicable nature, the virtual experience can be considered less authentic than a real work, while others claim the opposite, namely the superiority of virtual works over physical ones. Despite the recognition of virtual works in the artistic environment, this medium still creates conflicting opinions in the art sector.

In conclusion, it is undeniable that virtual reality offers new possibilities and engaging experiences both at the Venice International Art Exhibition and Venice International Film Festival. It is important to critically address the problems that may arise due to this technology, so that its inclusion truly enriches the viewers' experience. It is necessary that scholars and professionals in the fields of art and cinema continue to investigate and explore virtual reality and its facets, so that its enormous potential can be fully exploited.

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