DESIGNING THE VIRTUAL REALITY NARRATIVE

Embodiment & The Ludonarrative Dissonance

MASTER THESIS

Aalborg University, Denmark
Media Arts Cultures Consortium

Course
Media Arts Cultures

Supervisor
Prof. Morten Søndergaard

Co-supervisor
Prof. Palle Dahlstedt

By:
Stefan Palitov

August 2018

Topics: virtual reality, extended reality, narratives, interactivity, user experience design, ludology, ludonarrative dissonance, embodiment, presence, phenomenology, media art, virtual reality arcades

Name Author: Stefan Palitov

Course/Year: Media Arts Cultures 2nd Cohort, 2016-2018

4th Semester Placement: Aalborg University, Denmark

Pages: 104

Content: This thesis explores the relationship between the principles of embodiment and the interactive narrative design in the contemporary virtual reality format. The aim is to establish a baseline framework for the format specific narrative modalities of VR and how they build a unique first-person perspective experience. Furthermore, the exploration aims to reflect on the differences between interactive and non-interactive narratives, in order to outline the spectrum of VR experiences. This is compared to films, computer game narratives and interaction, as well as ludic experiences in general. The thesis continues to explore the conflict between the narrative and the game mechanics of computer games, known as the ludonarrative dissonance. Eventually, it is analyzed to which extent this concept is applicable for understanding the contemporary VR experience. The research approach is predominantly through a constructivist methodology. Additionally, the comparative methodology is present. Using these approaches the thesis navigates through an interdisciplinary topic that incorporates findings from the fields of psychology, philosophy, neurocognitive sciences, narratology, film studies, ludology, VR, game and user experience design. Case studies include critically acclaimed works from the contemporary Danish VR scene, experiences from the VR arcade VR ZONE Shinjuku in Tokyo, other relevant VR works and computer games. The views of creators, researchers and designers are also provided. The results of this thesis show a high level of interrelation between embodiment, presence, interactive and narrative design in VR. Furthermore, because of the inherent possibility for a conflict between the principles of VR embodiment and the affordances of the design, it is proposed to expand the traditional definition of the ludonarrative dissonance to a VR ludonarrative dissonance. Through analysis and comparison, it is observed how these principles are used to design engaging and successful VR experiences. The implications of these results shed light on possible developments of best practices in contemporary VR interaction and storytelling.

Supervisor: Morten Søndergaard **Co-supervisor:** Palle Dahlstedt

Declaration of Authorship

I, **Stefan Palitov**

born on **08.03.1989** in **Skopje, Republic of Macedonia** hereby declare,

1. that I have written my Master Thesis myself, have not used other sources than the ones stated and moreover have not used any illegal tools or unfair means,

2. that I have not publicized my Master Thesis in my domestic or any foreign country in any form to this date and/or have not used it as an exam paper.

3. that, in case my Master Thesis concerns my employer or any other external cooperation partner, I have fully informed them about title, form and content of the Master Thesis and have his/her permission to include the data and information in my written work.

Copenhagen, Denmark

....

Place Date

ACKNOWLEDGEMENTS

This thesis would not be possible without the expertise, discussions and support by many professors, content creators, colleagues, friends and family. These are people from around the world which I had pleasure to meet and hope to have in my life for many more years to come. Special thanks goes to my supervisor Morten Søndergaard for his incredible ability see beyond my creative interdisciplinary process and keep my mind on track. I thank Palle Dahlstedt, Oliver Grau, Olli Tapio Leino, Maurice Benayoun, Ryszard Kluszczynski and other professors I have met through the Media Arts Cultures program which have influenced my research. Another special thanks belongs to Margit Rosen and the wonderful ZKM crew where I did a research on their history of VR development. Therefore, this thanks extends to Jeffrey Shaw, Peter Weibel, Bernd Lintermann, Christian Ziegler, Dennis Del Favero and Sarah Kenderdine for the insightful conversations we have had on this topic. Thanks to Mads Damsbo, Signe Ungermand, Maria Herlholdt Engermann and Lucas Rizzotto for providing valuable answers to my questions about their practice. Thanks to Astrid Kahmke for every multifaced conversation we have had. Thanks to many colleagues and friends which contributed with their own knowledge and support: my entire Media Arts Cultures cohort, as well as, Lukasz Mirocha, Johnathan Harrington, Eugenia Kim, Kyle Chung, Atiq Hasmi, Danko Dimoski, Jessica Bicking and my Tokyo VR teammates Zorica Petkoska and Simon Kalajdzjiev. Last but never the least, I thank my family for their support during these exquisite and intensive times.

CONTENT

INTRODUCTION

MOTIVATION

The motivation for the topic of this thesis comes from many years of exploring film, games, technology, philosophy and psychology. In the recent years I have expanded my research in media art. This was inspired by my interest for the relationships between human and technology. More specifically, I was concerned about the nature of this communication: the way we observe the world through the technologies we build, how we interpret what we find, how we express ourselves through these technologies and how they are increasingly being integrated in our everyday lives. The tools for communication we build are everywhere around us. These technologies develop to reveal new information. From simplest pen and paper to complex interactive AI systems, step away from quantum computing – we are expanding our abilities to interpret the world and express ourselves at incredible rate.

However, these technologies are not neutral. They have a format specific language that promotes certain interpretation of the reality that it transmits. In a way, any technology for communication and representation of information, simulates the content to its own specificities. Books are not films, films are not operas, operas are not games etc. Formats that have multimedia qualities may incorporate parts or even the entirety of another medium into themselves. I can walk in the cities of *Morrowind* and instead of spending my days fighting creatures in the mountains I can read of the vast history from the many books available in the game. Although games simulate the technology necessary for reading, they do not simulate the materiality of it. I cannot take the book in my hands, feel its weight, smell the paper and write my notes in its margins. The books I read gladly in *Morrowind* are books because their functionality is sufficiently simulated. However, as a medium with a specific materiality they are not translated into the game world. The physical book has attributes that create its own reality which is not directly accessible through the simulation of the functionality of the book. I would say that these two books, although sufficiently similar in their functionality as technologies, share different realities. The book in the game is not less of a book - it is just a different, virtual book. This virtual book has some different potentials than the physical book. At the same time, it is lacking the potentials (and restrictions) that the material of the physical book has. This difference of realities between media formats is always there. In

The Book To Come Derrida notes this virtualization of the book or as he puts it "dislodging or supplement the codex"[1] of what constitutes the book in a historical sense. The codex which demands for papers to be gathered and bound together is no more, dispersed by the affordance of the computer. Derrida insists that we either accept that the end of the book has come or we accept her transformation by the technologies.

And then, we develop a format that promises it can simulate the realities of the other formats into itself. A perfect multimedia format. A reality to incorporate all of the other realities. It promises even more – that it can simulate the reality of our consciousness. In a fully materialistic sense, it will invade from the outside and influence our senses and bodily faculties to create a seamless experience. Just as Baudrillard's 1:1 ratio map that covers the entire world, this format promises to cover all we sense and all we do. However, where techno-utopist see the becoming of the holodeck, realists see a potent but fairly undeveloped format. Instead of the holodeck, for now it promises that the simulations are sufficiently believable for us to neglect that it is Baudrillard's map and not the real world. Then, if we look at how we observe the everyday world all we will see are approximations. We do not use all of the senses to build interpretation of the reality. Sometimes we see and do not hear, hear and do not see. Sometimes we touch in the dark and vocalize what cannot be written. Our minds interpret these fragments and create what we consider to be real. The totality of the reality remains to be desired through the notions of ever-aware consciousness – the all-seeing eye of the gods and the techno-utopist AI. But if a person walks, talks, sleeps and lives on the Baudrillard's map just the same, does it matter to know if the map is in fact a map? If a person's reality can be affected only by sound, is that reality less real?

Luckily, these questions are of such a magnitude that I cannot address here. What I want to look at, however, is the nature of this format; to look at its potential to absorb the reality of the different formats and senses and create them in a new, virtual reality. Honesty demands to dismiss any megalomaniac claims of the totality of this reality. However, the impact of a simulation of a partial reality may have an effect on our overall experience. If sufficiently overwhelming, we may even forget that this is only a

[1] Derrida, Jacques. "Paper Machines". Stanford University Press, 2005. pg. 9

partial reality. If the doors and the windows of our house are shut and our reality stays inside, can we open only one window and let a gust of another reality to completely fill in the house? This becomes even more important when proponents of the format proclaim that it can simulate realities that have not been accessible to us before.

Luckily again, this thesis will not have such poetic and prophetic voice. These thoughts will be somewhere in the back and they will give way to more practical questions. My interest in extended realities, including virtual reality, is sparked by a more recent surge of the format. In 2016 Oculus Rift and HTC Vive reintroduced VR to the general public. The present iteration of the technology comes from a long history of military training, industrial design and fine art simulations. As such, this is not a revolutionary moment. However, the technologies are more mature than the what was available in the 90's, they became accessible to a larger public and reignited the fantasies of many people. Oculus and Vive are not the only technologies. China has a vast market of local devices possibly dwarfing the market in the west. No matter the device, the technology is finally good enough to explore more elaborate and finalized experiences. Far from perfect, it reignites the idea that such format is possible. It also offers a baseline quality from which it can grow and develop. From the Hollywood studios to the enormous Chinese VR arcades and every independent and semi-independent explorer in between, we see enthusiasm that starts to bring in some results. These are not the holodecks sci-fi stories envisioned, but they are a small step in a format that offers a unique experience of the world.

This is why the steps I am taking in this thesis are smaller than the general motivation. It is substituted with smaller, attainable motivations. As a storyteller, I am interested to explore how do we experience the reality through this format? What are the opportunities for interaction it gives us? What can and cannot we do with the technologies in their current state? I believe that these questions are answerable and my motivation is to give a contribution in that direction. This research led me to many different fields, topics, histories, artworks and most importantly – people. Hopefully, by writing this thesis I give something back. If nothing else, I would like to give recognition to the creative processes employed by the people exploring this format. Maybe that will give some insight in how these realities can be made.

PROBLEM DEFINITION & RESEARCH AIM

Addressing the nature of the VR experience content, specifically the narrative and interactive elements present there, have already been done by many researchers. The contemporary VR experience have been addressed by authors such as Brenda Laurel, James Bates, Janet Murray, Frank Biocca, Marie-Laurie Rian just to name few. The necessity to see VR as its own specific narrative medium alongside theatre, literature and cinema is observed by Aalett & Louchart.[2] They argue that each of these narrative mediums have their own specific way of showing and telling their stories. They note that VR through its interactivity possesses characteristics that are not present in other formats. Indeed, interactivity is seen as a disruption in the traditional narrative structure to the extent that Ascott proposes a decentralization of the power over the creation of the artwork.[3] I argue that this interactive nature with a computer-generated content is already very well explored in computer game studies. Therefore, my position is that analyzing the issues of narratives and interactivity in computer games may offer some insight in the nature of the VR narrative. This further promotes the idea that the VR narrative is not outside of a broader discussion on human-computer interaction. Additionally, the VR narrative format should be seen in a comparative context with other mediums. My view is that the audiovisual nature of VR can be observed from the angle of narratives in cinema and the interactive nature can be observed through computer games. The nature of interactive narratives has already been explored in ludology. A conflict has been noted between the interaction which is happening in real-time and traditional narrative structures which are inaccessible worlds of the past.[4] Even when interaction occurs, there can be a conflict between the narrative of the game and the mechanics of the game. This concept is called “ludonarrative dissonance”.[5]

However, advocating for the co-authorship of the experience and locating the problems in interactive narratives, does not necessarily give insight on how that occurs in the VR experience. When this interaction is analyzed there is a need to give a

[2] Aylett, R. & Louchart, “Towards a narrative theory of Virtual Reality “. S. Virtual Reality, 2003. 7: 2.
[3] Ascott, Roy. “Telematic Embrace: Visionary Theories of Art, Technology and Consciousness”. University of California Press, 2003. pg. 195
[4] Aarseth, Espen. "A narrative theory of games". Conference: FDG'12.
[5] Hawking, Clint. “Ludonarrative Dissonance in Bioshock”. Blog. *Click Nothing,* 2007.

baseline view of the VR experience and the position the user occupies. Before narratives and interactions become a point of interest, there is a more technical discussion to be held. Therefore, I argue that the first-person perspective (FPP) nature of the format and how it is constituted must be addressed first. Without doing so I will not have the necessary background to engage into a more precise discussion about the overall experience. The FPP aspect should be approached explicitly in the context of the VR experience. This means there should be a basic analysis of what the experience aims to achieve and how does it intend to achieve that. There are two subtopics that are intertwined. First, the question of how embodiment occurs and second, how does it occur in a virtual environment.

As it is visible, reaching to the nature of the VR narrative format and its possible similarities with computer game experiences is not straightforward. It is an interdisciplinary research that should cover various topics. In order to cover the angles that need to be addressed I introduce two main hypotheses:

First hypothesis: Embodiment in the virtual environments gives a unique quality to VR format.
Second hypothesis: The interactive narrative of the VR experience is closely related to interactive narratives in computer games.

My argument is that these topics are complementary and should be addressed in the same context of one research. They incorporate subtopics that reflect one another. Additionally, they offer interdisciplinary insight that cover many required angles of the VR experience. Therefore, the research questions of this thesis aim to analyze:

1. What constitutes the VR experience?
2. How is the simulation of embodiment in virtual environment achieved?
3. What are the similarities and differences between narratives in VR and other formats?
4. To what extent can computer games be used as a reflection for the VR experience?

5. Is the ludonarrative dissonance inherent to the VR experience?
6. If it is, how can it be avoided or used in VR design context?

METHODOLOGY

Due to the interdisciplinary nature I have decide to have a constructivist approach towards the thesis. Deciding to look at different fields and contextualize them in relation to the VR narrative, makes the connection between non-explicitly related findings more evident. This will be especially visible in Chapter 2, where many of the issues analyzed previously in the thesis will come together in order for me to make analysis on contemporary VR experiences. This will require for constant revisiting of the conclusions from previous sections in order to verify how they relate to findings in sections later in the thesis.

The limitation of this method is visible through the choice of which topics will be analyzes and which will be left out. For example, the exploration of the hypothesis that the embodiment in virtual environments gives a unique quality to the VR format, can be approached from many different angles. One of the angles I have decided to use is the phenomenological position of embodiment due to the way it incorporates the idea of sensory stimuli and agency in creating self-awareness. This position is reviewed and expanded with psychological and neuro-cognitive tests on virtual body ownership. The goal of this is to identify sensorial stimuli and agency that are the building blocks of embodiment and presence in VR. These building blocks will then be used in the context of narrative creation, interaction design and VR analysis in Chapter 2.

However, discussing self-awareness can be done from many different philosophical and neuro-cognitive angles with relevant concerns on their own. This is where the limitation of the constructivist method is most visible. In order to prevent the thesis to become a thesis on embodiment, these topics will not be opened. Similarly, the historical context of the VR experiences is relatively limited. Aside from giving some art history context of the motivation behind the development of such works, the VR works that I will analyze are produced post 2016. Only one example of an earlier, non-head mount display work, is from 2007. This also shows that the exploration in this thesis will

be focused on head-mount display (HMD) works. Although I do believe that parts of these findings are applicable the various iterations of the format, this will not be addressed. Regarding the discussion on first-person perspective, narratives and interaction, the biggest topic that is omitted is the issue of avatars and how that relates to VR. Other topics that I would love to explore more, but will not do so in the context of the thesis, include more detailed analysis on emergent narratives and questions of interface aesthetics and use of AI in VR. There are many examples of topics in this thesis that can branch out with their own relevant questions. In a way, much of this exploration will be navigation between the massive fields that I will have to thread through. **The goal is to keep the discussion in the direction of how interactive narratives in VR play out in relation to the embodiment.**

In some instances I will also use the comparative method. Competing views will be analyzed together. Additionally, similar contemporary VR experiences will be compared. This will be more visible in Chapter 2, where the main discussion on interactive narratives will take place and the differences in VR designs will be observed.

There are several case studies involved, some of them supported by interviews with their creators. These works are contemporary VR experiences produced in Denmark and have received international critical acclaim. Other case studies include my experience with the VR arcade VR ZONE Shinjuku in Tokyo. Some points are illustrated with other contemporary examples, including computer games. These are all chosen because analyzing how they are build will shed light on how the findings in embodiment, psychology, narratology, film studies and ludology, come together in a unified experience. Additionally, I have conducted interviews with several UX designer, artists and researchers in order to give a rounded view on the contemporary practice.

Before I began the research I observed that the topic will demand slightly non-traditional thesis structure. Some discussions later in the thesis will be analyzed through the findings of theories and experiments previously outlined. However, they will require for new theories to be introduced in order to give comprehensive understanding from an interdisciplinary position. This will make the exploration much more dynamic. Because of this, some sections discuss two topics in parallel, reflecting one another. For example, in section 2.4. on the ludonarrative dissonance, this issue is addressed

alongside the relationship between the VR creator/game designer and user/player. This is done because they are mutually inclusive and should be addressed in their complex interaction. Additionally, implications from previous findings keep the discussion of section 2.4. framed through the lens of the narrative and technical similarities and differences between VR and computer games. This shows that some sections, especially later in the thesis will be akin a river that accommodates several streams.The thematic structure of the thesis is as follows. In **Chapter 1** the concept of VR is analyzed. Then, the phenomenological principles of embodiment are outlined and introduced in the context of VR. This demands to explore the questions of how presence in VR occurs and what are the sensorial building blocks (modalities) of the experience. Hopefully, the findings in this part of the research will provide ground for addressing the narrative and interactive aspects of the VR experience. My first hypothesis was that the material and cognitive principles of embodiment provide the base for everything built in VR. I believe that the structure outlined for Chapter 1 covers the basic elements required to comprehend this view.

The first three sections of **Chapter 2** analyze the nature of various narrative formats, especially those that reflect on the VR narrative. Here I attempt to locate the ludic qualities of the VR experience. The last two sections are concerned with the issues that arise from the conflict between the narrative and interactive elements in computer games and VR experiences. This structure is proposed because of my second hypothesis, which stated that the ludonarrative dissonance inevitable issue of the interactive narratives and must be addressed during the creation process.

The hybrid nature of the methodology that I decided to use is in order to give access to the topics that eventually lead to the discussions on the ludonarrative dissonance in the context of VR. The findings in this thesis will hopefully shed more light on the content related design aspects of the format. Additionally, other implications that are not focus of this thesis may become visible. Hopefully, the plethora of interconnected implications will create space for more research and artistic practice in the future.

CHAPTER 1

FRAMING CONTEMPORARY VIRTUAL REALITY

INTRODUCTION TO CHAPTER 1

In Chapter 1 of this thesis I explore the elements that constitute the relationship between the user and the VR format on a technological level. However, this is not a chapter on technologies and devices. It is a chapter that aims to observe the basic elements that constitute the format, regardless of the specific technologies used. I argue that due to the first-person perspective (FPP) of the medium, any such elements have to be taken in account in relationship to the embodiment of the audience. Attempting to clarify this relationship, I look at several different fields and draw the parallel between them. Discussing the conceptual and technical side alike, I observe how the computer gave life to the idea of **virtuality** – the potential of change of the digital artifact through the use of the computer. Virtuality is considered to be the basic element on any computer-based experience. From there I proceed to observe the basic views of what is considered a VR experience both by theoreticians and practitioners. There I observe the various VR **modalities** – mostly sensorial stimulations on which the VR experiences are built. In section 1.3. I use the idea of **telepresence** and attempt to see if VR can be understood from that angle, which in turn can demonstrate what are the main goals of designing such experiences. Section 1.4. attempts to demonstrate the basics of the FPP, which I believe is the necessary first step in understanding the user's position and interaction with virtual environments.

The other four sections of Chapter 1 focus on **embodiment** and the complexities that arise in VR related to this phenomenon. Here I outline some positions in phenomenology related to the body, self-perception and the intentionality to act in the environment. Avoiding ontological discussions, I keep the focus on the materiality of the body as a tool to interact with the environment. Additionally, I compare if such understanding of embodiment can also be used when addressing the embodiment in virtual environments. In relation to the subjective experience of embodiment in VR, referred in the literature as **presence**, I observe how human-computer interaction (HCI) affords for such experience to occur. In order to outline more specific positions on VR fidelity and sense of presence, in section 1.7. I look at psychological experiments that are concerned with how body-swapping occurs in VR. Additionally, I observe how FPP

is generally created in virtual environments through the bodily faculties. In section 1.8. I look at how different modalities are interplaying with the narrative elements of a specific VR experience in order to create satisfactory level of sense of presence.

All of the topics addressed in Chapter 1 are chosen for their possible contribution in giving a more detailed overview of the principles that are establishing the VR format. My angle is specifically focusing on the nature of the HCI from a FPP, while having the conceptual background of what VR is considered to be. This is done in order to filter out all of the related topics that each of the fields bring with themselves. For example, virtuality opens many different discussions in HCI which are not explicitly addressed here. The conversations of how reality and consciousness function are a perennial topic in philosophy, psychology and recently in neuro-cognitive sciences. In this thesis, only the materiality of the body is considered. While acknowledging the vibrant fields that explore these question, I decided to take this angle in order to focus on more practical and technical matters regarding embodiment. Even more fundamental discussions are potentially present on the ontological status of virtual reality. In this thesis I dare not to venture in that direction at all. Additionally, in each section there are many smaller topics that can be expanded into a thesis on their own. However, my attempt is to guide the exploration of Chapter 1 through all of these potent subjects and filter out everything that does not contribute explicitly to the understanding of the VR nature in a practical, HCI context. This approach will hopefully reveal the key elements on which the narrative and interactive structures in VR are based. Such results will give me the terminology, theoretical positions and practical design tools that could be used to analyze the implementation of interactivity and narrativity in VR experiences in Chapter 2.

1.1. VIRTUALITY

The term virtual reality encompasses wide range of technologies and experiences. The broad categorization arose when Jaron Lanier coined the term in the late 80's. By placing various research and technologies in the field of HCI under one label, he aimed to create a catch phrase for this developing medium.[6] The phrase itself

[6] Grau, Oliver. "Virtual Art". MIT Press, 2003. pg. 169

has been seen as paradoxical by some authors since it "describes a space of possibility or impossibility formed by illusionary addresses to the senses."[7]

When discussing virtual reality, researchers and artists Peter Weibel and Maurice Benayoun analyze the emergence of virtuality as a more specific relationship between the audience and the artwork. Benayoun understands virtuality as a condition for the world to exist, the **potentiality** for one thing to become another.[8] This potential for change in relation to an artifact defines its meaning. Furthermore, he states that "the opposite of reality is fiction, not virtuality. Virtuality is in reality".[9] I interpret this in a way that through the use of computers we can now develop experiences that have the potential to react to the user and change accordingly. The fiction possesses the power to adapt and react, which is a behavior that is not necessarily connected to a specific technology, but nevertheless it has to be accessed through one.

> "For the first time we were introducing virtuality inside the fiction. That means inside the fiction we introduce the fact that things could happen differently for different people. That didn't exist in books, in cinema. That was only present in live shows where people improvise with you."[10]

Virtuality as a potential for change within an object through the means of a computer is something that Peter Weibel perceives as a critical change. Additionally, this has emerged as a result of the developments in art throughout the 20th century.

> "Since 1900's Malevich and Duchamp started a process where everything that was a representation became reality: instead of a painted portrait you had a real body. Instead of painted landscape we had a land art. Instead of painted water you had a real water. Instead of painted blood you had a real blood. Instead of painted fire you had a real fire. What we did was substituting the complete property of representation with reality. Finally, the last real instance was the public."[11]

This development promoted an overall shift of understanding of the role of the audience in relation to the artwork. The audience was given the opportunity to stop being a passive observer of a representation and become an active participant in the final state of completion. As Wiebel observes, we have developed numerous technologies and

[7] Ibid. pg. 15
[8] Benayoun, Maurice. Interview with Stefan Palitov. Video. Hong Kong, 2017
[9] Ibid.
[10] ibid.
[11] Weibel, Peter. Interview with Stefan Palitov. Video. Karlsruhe, 2017

techniques to render a believable representation of landscapes, people and reality in general. However, in classical art the artifacts of our creation remain to exists only as representations. With the inclusion of audience participation in the process of creating and observing artworks a final breakaway from classical art was made. Furthermore, this simulation of reality through the artwork could not exclude the audience's position, since in reality self-awareness makes us part of the experience of our surroundings. As Weibel formulates it, "we are constant internal observes".[12] His final point is that breaking the myth of the external observer in art opened the possibility to explore the virtual spaces more directly.

In the context of cinema, these tendencies provoked an experimental approach to the technologies that created moving images. Additionally, it promoted the inclusion of the audience in the artwork. Weibel notes that the entire development of the expanded cinema explorations in the 60's and the 70's was a part of the deconstruction of the cinematic apparatus. Equally important, it was development of the nature of the interaction between the audience and the image space.[13]

Weibel notes that cinema in its nature had the goal to simulate life. The improvement of the film apparatus progressed from being able to capture and reproduce movement, to include sound and color. However, the audience participation was still outside of the artwork and this was because of the materiality of the format. He notes that the content recorded on cellulose could not be changed without destroying the original. Additionally, the freedom to observe reality in 360-degrees was not replicated in cinema. However, with the introduction of computer-generated image (CGI) virtuality started to occur. The image was now consisted of pixels that could not only be changed back and forth but could also react in responsive manner to our inputs.[14]

> "Virtuality is directed to storage of the information… Content is variable because the storage is virtual. This means that the behavior of the audience in front of the apparatus can change the content because the storage is virtual. The image system behaves as a living creature".[15]

[12] Ibid.
[13] Youngblood, Gene. "Expanded Cinema". Clarke, Irwin & Company Limited, 1970.
[14] Weibel, Peter. Interview with Stefan Palitov. Video. Karlsruhe, 2017
[15] Ibid.

The virtuality of the storage promoted the inherent interactive nature of these works. Here I note that Weibel's view on virtuality is in similar lines with Benayoun's. Virtuality is the potential of change, the possibility to participate in an adaptive environment that reacts to our behavior. The situation is enabled from the specific format storage and what the computer affords as to do. The 360-degree panoramic projection is a separate aspect of these types of works, that was included to compensate for our natural inability to observe our entire surrounding at the same time.

> "We invented panoramic cinema and panoramic projections to be closer to the experience of life. So panoramic projection and interaction, even when it was virtual, it was the last step in the simulation of life through cinema."[16]

This understanding frames a large part of my further investigation. First, it shows that we can discuss virtuality and 360-degree environments as not being necessarily codependent. In the next section this will reflect on the concerns of the purist VR position regarding non-interactive 360-degree video being labeled as virtual reality. Second, understanding virtuality as an interactive potential for change of the content that exists outside of VR and is located into the technology that stores it, namely the computer, opens up the space to analyze other interactive forms. My second hypothesis is that the interaction with computer games is a possible proxy discussion for the human's relationship with the VR experience. Computer games, as inherently interactive, have been using the virtuality of imaginary spaces for decades. Here I can observe which aspects of building interactivity in computer games can be borrowed in the experience and narrative design of VR content. It is here where I locate my discussion with hopes of finding elements which explain if VR experiences can be analyzed to some extent through the interaction between players and computer games.

1.2. THE PURIST VIRTUAL REALITY APPROACH

The extent of the issue of establishing what is the VR experience, is demonstrated by the ongoing problem of placing various experiences under the same

[16] Ibid.

category. One of the broadest definitions as "interactive, immersive experience generated by a computer"[17] may apply to a broad range of technologically enabled experiences. This definition offers some elements that are critical for VR experiences, such as interactivity and immersion with/in CGI. However, it lacks clarification on what is the position of the audience in these experiences. Furthermore, this definition can equally apply to augmented, mixed and virtual reality experiences.

Another position, which I call the purist VR approach, asks for more specific demands to be fulfilled in order for an experience to be considered as VR. Brenda Laurel outlines this position. She states that the experience has to be a complete surround environment, there should be affordances for depth perception and motion parallax, direction of the gaze, the participant's sensorium as the camera and spatialized audio. Additionally, it has to afford independent tracking of direction of motion, natural gesture and movement, affordances for narrative construction and a principle of action with its **kinesthetic** (perception of moving body parts) and proprioceptive aspects (awareness of spatial orientation and presence).[18] [19] All of these demands have a goal to achieve a high degree of simulation and user's agency. This presumably brings the experience as close to a real, everyday state of perception and interaction. Here I observe two sets of demands. First, freedom of body movement and audiovisual stimuli have to be simulated to correspond with everyday human physical faculties. Second, the audience should be given the ability to influence the space and the narrative with their decisions, essentially exploiting the virtuality. All of these elements are the **modalities**. Modalities are the alterable elements that constitute the VR experience. These modalities may possess different characteristics because they address different senses and ways through which interaction may occur.

However, I note that there are other sensory stimuli which are not included here. More apparent one is the haptic feedback – the resistance and tactile feedback that occurs when we touch an object or texture. Others senses, such as smell and heat, may also be included. Natural language processing and general artificial

[17] Pimentel, Ken and Teixeira, Kevin. "Virtual Reality: Through the New Looking Glass" New York: Intel/Windcrest McGraw Hill, 1993. pg. 11
[18] Laurel, Brenda. "What Is Virtual Reality?" Medium, 2016.
[19] Affordance is property of a material, object, space, technology or a system that allow for specific actions to the entities that interact with them.

intelligence/creativity/life integration will be required to believably simulate our interactions with everyday surroundings. In other words, the goal of these demands is creating as detailed simulation of the way we interface with our reality. I observe that as the interaction becomes more complex, the believability of the agency in the imaginary spaces becomes more complex to simulate as well.

The purist VR position is somewhat additive approach to defining VR experiences and it comes short only to direct simulation inside the brain, Matrix style. If we adhere to the purist approach, then many of the works considered to be VR experiences will not be part of the category. However, the purist VR approach is probably too rigorous towards the experiences considered to be VR by creators and consumers that are unaware of the broader conceptual, practical and even ontological differences between different content. For example, as I will explore in Chapter 2, VR games and 360-degree videos have numerous differences in the modalities included and the agency allowed. As discussed in the section 1.1., it is the lack of virtuality in 360-degree videos that makes them problematic for such rigorous categorization. This is a problem of the experimental and fluid nature of the field today which is understandable for the current maturity of the format. If unchecked, the inappropriate labeling may lead to confusing products and false marketing that can hinder the mainstream development of the field. More importantly, making the distinction of which modalities and types of agencies are present in this broad spectrum, contributes to clarifying the approaches content creators can take.

On the other hand, strict definition may narrow the field to the extent that it will omit possible solutions found in "non-pure" VR experiences. I argue that at this stage of the development of the format they are certainly welcomed. Additionally, such findings may galvanize in their own specific extended reality (XR)[20] formats and at this time they also benefit from the joint explorations in the field. From the perspective of the reader in the future, this conflict may not exist if there is a clearly systemized and widespread ecosystem of XR experiences. In 2018 this is an ongoing process.

Furthermore, following the purist VR paradigm to its extremes reveals its limitations. Many of the states experienced by humans do not encompass large number

[20] Extended Reality (XR) is an all-encompassing term for the entire spectrum of virtual, augmented and mixed reality.

of the aspects described above. Dreams, sleeping paralysis, illnesses, handicaps, altered consciousness etc. may change available bodily affordances or sensory stimuli of the everyday reality. However, that certainly doesn't make them less real. This becomes evident if we offer VR experiences with embodiment in animals, objects and states of body and consciousness that do not possess some of the modalities demanded by the purist VR position. Additionally, it remains questionable to which extent we can introduce external stimuli to a level of sophistication which will completely simulate the way we interface with reality in our waking moments. This doesn't mean that increasing and improving stimuli and agency is not a desirable goal, as it will be explored in sections 1.7. and 1.8.

On the positive note, the purist VR approach demonstrates the multilayered and interdisciplinary complexity of the general topic of VR and XR experiences. For me, it represents an overview for exploring the format. It is a useful point of reference for design purposes as well. It outlines most of the possible modalities that may constitute VR experiences. Depending on the specific form, this approach gives way to enhance one set of simulations while omit others, as long as the satisfactory quality of the experience is maintained. It is also a tendency for constant improvement of the technological and narrative aspects that consist the VR experience. As such, it encompasses most of the themes that we encounter during the content creation process and insists on the constant awareness of which aspects are included or not included in a specific VR work.

1.3. VR AS TELEPRESENCE EXPERIENCE

Some of the discussions regarding VR are framed in a way to reflect on the state of the user inside the virtual space instead of the specific device. As demonstrated in the previous two sections, technology is the necessary enabler of virtual spaces, but understanding only the technology doesn’t necessarily explain the state of the user. Benayoun believes that this issue arises from the misunderstanding that the medium is its device. He makes the parallel with music – its carrier in the 60’s was the vinyl, later it became the CD and eventually it became digital in the cloud. The technologies that

would reproduce these carriers evolved to include turntables, Hi-Fi, CD players and eventually be separated from any specific device. Similarly, to music content, fiction is not about the specific device, but about the specificity of the worlds it creates.[21]

> "If you consider that VR is a very specific kind of fiction in which you can be immersed – that means you exist inside the fiction and for the fiction- the fiction knows that you exist and modifies itself accordingly. That is a big change and it is not about the resolution, projectors, headsets. It is just about content and quality of interaction made possible by using virtuality as a medium."[22]

In this context I notice how VR (and XR) related questions are generally asked. When we ask someone if they have tried VR, it is not a question if they have tried HMD. It is a question if they have interacted with a computer generated virtuality, enabled through the dominant device at the moment – the HMD. Regardless of the future development of the devices that will enable the VR experience, we can expect that the virtuality, which is the medium we are working with, will retain its basic attributes. Steuer notes that device-oriented definition is insufficient for grappling with the issue because:

> "It fails to provide any insight into the processes or effects of using these systems, fails to provide a conceptual framework from which to make regulatory decisions, fails to provide an aesthetic from which to create media products, and fails to provide a method for consumers to rely on their experiences with other media in understanding the nature of virtual reality."[23]

To avoid this problem Steuer approaches VR experiences as telepresence experiences since "telepresence refers to the mediated perception of an environment."[24] Here we find the notion that VR belongs to the wide category of telepresence since it transports the user into an environment through the use of a technologically mediated interaction.

Telepresence as a term gained traction through Marvin Minsky's seminal paper in 1980 in which he states that "telepresence emphasizes the importance of high-quality sensory feedback and suggests future instruments that will feel and work so much like

[21] Benayoun, Maurice. Interview with Stefan Palitov. Video. Hong Kong, 2017
[22] Ibid.
[23] Stauer, Jonathan. "Defining Virtual Reality: Dimensions Determining Telepresence" in Biocca & Levy. "Communication in the Age of Virtual Reality". 1995. pg. 33
[24] Ibid. pg. 36

our own hands that we won't notice any significant difference."[25] Johanson expands with several more attributes. He understands telepresence as "the sensation of being physically present at the same location as another person… or to have an effect on the remote environment, through telerobotics or teleoperation."[26] Here I notice that there are two overlapping processes between telepresence and VR experiences. First, the user should be transported from the surroundings of his physical body to another location. Second, inside this new location there is some level of agency given to the user.

Roy Ascott further observes the nature of the telematic experience as one which is inherently a collaboration between the creator, the user and the technology involved. The power given to the user to participate with his presence into the structure of the work, insists that "meanings are not asserted and consumed in one-way linearity, but negotiated, distributed, transformed, and layered in multiple exchanges, where the authorial role is decentralized and scattered in space and time."[27] This means that as telepresence experience (and by breaking the relationship between the subject (the user) and the object of representation), VR experiences eventually support decentralization of the power over the virtual space. This should promote the user as a co-creator of the experience. Therefore, the virtual space is not completed outside of the interaction with it, similar to other telematic experiences where the interpretation of the work is embedded in the process of communication between all of the parties that constitute it.[28]

Analyzing why telepresence is a good angle to understand the nature of the VR experience, Stauer continues by pointing out the two critical attributes of telepresence that also apply to the presence and agency into the virtual environments.

> "The first, *vividness*, refers to the ability of a technology to produce a sensorially rich mediated environment. The second, *interactivity*, refers to the degree to which users of a medium can influence the form or content of the mediated environment".[29]

[25] Minsky, Marvin. "Telepresence". In Omni Journal, Vol 2 No 9. Omni Publication International Ltd., 1980. pg. 45
[26] Johanson, Mathias. "The Turing Test of Telepresence". Cornell University Library, 2015. pg. 2
[27] Ascott, Roy. "Telematic Embrace: Visionary Theories of Art, Technology and Consciousness". University of California Press, 2003. pg. 195
[28] Ibid. pg. 203
[29] Stauer, Jonathan. "Defining Virtual Reality: Dimensions Determining Telepresence" in Biocca & Levy. "Communication in the Age of Virtual Reality". 1995. pg. 41

The main contribution introducing the telepresence angle is the liberation of the VR discussion from being hostage to a specific device. That doesn't exclude the technology as an enabler of the experience, but demonstrates the variety of issues, namely the quality of sensory stimuli and agency, that can be used to analyze the spectrum of VR experiences. Additionally, it demonstrates that if I want to give a constructive analysis of how some content is produced, I have to be aware of how the technology is used to enable sensory stimuli (vividness) and affordance for interaction with the environment. I note that there is some significant and context-specific overlapping between the findings from the previous sections in this chapter. Vividness is concerned with the sensorial aspect - the stimuli that enable reliable understanding of the virtual environment. It is through this vividness (sensory stimuli simulation) that the initial transportation – telepresence – occurs in the virtual environment. Consequently, interactivity is enabled from the virtuality of the computer-generated content. These elements where introduced as modalities of the VR experience in section 1.2. Here I also note that there is diversification of the terminology that covers similar if not the same notions. Stauer finds the reason of the problem of not having a finite and field-specific taxonomy, in the complex and somewhat confusing overlapping of the terms 'virtual reality', 'telematics' and 'cyberspace'. Furthermore, he notes that the application of any technologically mediated experience will have to work with variable and contextual terminology that is applied to it.[30]

Here I observe that VR is not present in a specific technology, but it is an experience emerging by the combination of various technological affordances and the way the user interacts with them. Therefore, after the virtual embodiment is achieved, purposefully altering that state through additional devices or interaction design will not disrupt the nature of the VR experience. What that achieves is a multitude of various applications that all have a virtual aspect to them. This view departs from the strict purist VR demands. The current practice demonstrates that various seated, free-roaming or room-scale experiences share large part of the creative process and the problem-solving involved in their design. These applications may differentiate even further, but we can observe them as part of the same field, as long as the practice is concerned.

[30] Shanken, Edward. "From Cybernetics to Telematics". pg. 5

1.4. VR AS A FIRST-PERSON PERSPECTIVE FORMAT

The purist VR approach brings forth the position and the role of the audience as critical for understanding how these experiences are constituted. Resonating Weibel, I note that we have reached a technological point in the development of cinema and computer games, that when virtuality is introduced we inevitably discuss the interaction between the audience and the work. The audience is both an inner observer and an agent in the virtual environment. This makes the format to revolve around an unprecedented position of technologically mediated interaction from a first-person perspective (FPP). This is in line with the previously declared demands of the VR purists that come out of the need to establish, maintain and design for FPP.

One of the key aspects of contemporary VR is the freedom to at least observe the surrounding in a 360-degrees space. Vision plays a dominant role in verifying personal embodiment and that is the reason why some authors see it as a dominant aspect of the VR experience.[31] Unlike computer games where avatars are the vessels of embodiment and agency in the virtual game world[32] [33], presence in the virtual environment is established around the user's physical embodiment. More precisely, it is established through the consistency of the kinesthetic (perception of moving body parts) and the proprioceptive (awareness of spatial orientation and presence) sensations. Experience which affords free movement of the point of view (POV) inevitably makes it a "first-person medium for every participant in the same world."[34] Hansen notes that HMD promote vision to be the dominant sense. However, non-HMD VR environments are also dominantly visual experiences and this follows his conclusion of the correlation between knowledge with vision, a stance mostly dominant across our species.[35] In that sense it can be accepted that if we observe VR as technology, then it is an extension of the human body affording at least visual access into a virtual world.

However, virtuality enables agency into the virtual space through our actions. This poses a critical turning point and reinforces the first-person nature of the

[31] Hansen, Mark. "New Philosophy of New Media". MIT Press, 2004. pg.161
[32] Klevjer, Rune. "What is the avatar?". University of Bergen, 2006.
[33] Vella, Daniel. "Who am I in the computer game?". University of Malta, 2016.
[34] Laurel, Brenda. "What Is Virtual Reality?". Medium, 2016.
[35] Hansen, Mark. "New Philosophy of New Media". MIT Press, 2004. pg. 131

experience. Hansen reflects on Bergson's and Simondon's positions who place the centrality of affection into the perceptual and sensory experience[36]. In this context, the affectivity is present not only in the image but also in the body and may be manifested through any of the senses. Going back to Weibel's and Benayoun's positions, I must clarify that in order to completely establish a VR experience, interaction is needed alongside perception. Virtuality is the element which finally makes first-person dynamics sustainable in VR. This arises from the pairing of the agency and the senses that verify the result. Although vision is dominant in contemporary VR experience *Touching Masterpieces*[37] is designed for blind people. The user wears gloves that mimic haptic feedback through vibration. Famous sculptures are modeled in a 3D program which allows the blind users to "touch" the virtual objects (Fig.1). To this I add spatialized audio as one of the possible phenomenological verifiers of embodiment. This only demonstrates that vision is dominant, but not the only modality used when the first-person aspect of VR is analyzed.

Here I note that I have to be careful with the further use of the term first-person perspective. There is a diversity of how the FPP may be established which means I have to be specific when discussing certain modalities that are included. Additionally, this opens the complex question of embodiment that I will have to analyze next.

1.6. BASICS OF EMBODIMENT

In virtual environments, the audience is not only incorporated into a virtual space, but also becomes a pivotal element of the experience. The position of the inner observer becomes visible through the first-person point of view in a technologically mediated environment. This position of the audience, now a participant or a user, opens the potential for engagement with the work through the bodily faculties. As such, the body becomes critical tool for interaction and puts the questions of embodiment and sense of presence into the virtual environment in the center of the VR experience.

[36] Ibid. pg. 132
[37] Touching Masterpieces. Neurodigital Technologies, 2018.

The main aspect of the phenomenological approach in philosophy of how we understand the world around us, revolves around the idea that the we observe and act into the world through our bodies. The body, as argued by Merleau-Ponty, is always present in the perceptual field and is experienced by the person directly. To clarify this, I note that he differentiates between how we experience our bodies and how we experience objects. Objects possess "relative permanence"[38]. They are laid in front of me, I can perceive them and handle them from different angles. However, the fact that they can eventually get out of my perceptual field is what makes them objects. On the other hand, I cannot observe my body as an object, because it is always presented to me from the same angle. The body's permanence is not a "permanence in the world, but a permanence on my part".[39] The body is always present and it cannot be taken outside of the perceptual field. Furthermore, he continues that the body, although always present, cannot be completely seen in the perceptual field. For example, my head is given to my perceptual field only partially. To me only parts of my nose, eye-sockets, cheekbones and lips are visible.

> "It is neither tangible nor visible in so far as it is that which sees and touches. The body therefore is not one more among external objects, with the peculiarity of always being there."[40]

Every perception that my body has, comes from its locality or from within itself – for example, pain is experienced directly as something coming from within the body. He continues that direct experience is what makes the body affective, unlike the objects which are given to the perception as representations.[41] Additionally, he argues that the body also possess a kinesthetic sensation, which is awareness of its movement and the objects it touches. More specifically, he elaborates that this means that the final result of the movement of the body, the action, the intention, is what is given as a perception to the body. In the same line of thinking, he continues to explain how the body exists in the

[38] Merleau-Ponty, Maurice. "Phenomenology of Perception". Routledge Classics, 2002. pg.102-110
[39] Ibid. pg. 104
[40] ibid. pg. 105
[41] ibid. pg. 107

space. It possesses a situational spatiality - it is perceived by the person as an "attitude directed towards a certain existing or possible task."[42]

This is the backdrop of Merleau-Ponty's understanding that consciousness arises not through 'I think' but through 'I can'. The ability to observe and act in the sensible world takes place in it as a co-existence between the perceiver and the perceived. Furthermore, the sensible world, is part of the relationship of co-existence with the body that perceives. He continues that sensing doesn't exist in the subject or the object alone but emerges from the undividable interaction between the two. This promotes the idea that the perceiving body and the perceived object in the environment are active and receptive in a way that "the sensible gives back to me what I had lent to it, but I received it from the sensible in the first place."[43]

Looking at this understanding of embodiment I note several different aspects that are encapsulated in the self-awareness through the body and its interaction with the environment. To clearly state the ways embodiment is understood by Merleau-Ponty, I use Dreyfus' observation on his three different aspect of embodiment. First is the physical embodiment of the human, the parts of the body with their shape and size. Second, the bodily faculties that enable situational responses. Third, the cultural skills and abilities which stem from our gained knowledge of the cultural. They all simultaneously affect the self-awareness of the phenomenological body, as well as our embodiment as understood by others.[44]

To take a step back, I note the main takeaways from these stances in the context of VR. First, the awareness that we are somewhere comes from the awareness that we are someplace. This is defined by the locality of the POV. With Merleau-Ponty there is an evident pairing between the visual and the haptic – we observe the environment as a potential to act. As I mentioned in section 1.4. the artwork *Touching Masterpieces* uses VR technologies, specifically haptic gloves, to let blind people touch virtual 3D objects of famous statues. This shows that establishing the sense of the FPP may differ depending on any of the stimuli used. Instead of establishing FPP through vision and

[42] ibid. pg. 114
[43] ibid. pg. 249
[44] Dreyfus, Hubert L. "The Current Relevance of Merleau-Ponty's Phenomenology of Embodiment." The Electronic Journal of Analytic Philosophy. 2016. doi:10.1145/1690388.1690464.

intention to act, blind people do so through touch, intention to act and hearing. From this I conclude that when we are transported into a virtual environment the establishment of the FPP is given by the following elements: a dominant sense through which we observe the environment and the intentionality to act in it. Arguably, the blind people or users of VR experiences lacking visual stimuli use different modalities for observing and interacting with the virtual environment.

Additionally, while acting in the world we observe our bodies only partially. Most of the contemporary interactive VR experiences visually establish the body only through the hands. However, this is sufficient for us to establish FPP as if in a body. The movement of the virtual hands (or items attached to them), provide the kinesthetic sensation just the same. This means that the technical capabilities and the demand to partially see our body from FPP meet half way through.

Another important element of embodiment, as described by both Paul Dourish and Merleau-Ponty is its temporal aspect. Dourish is very precise when giving the embodiment's aspects.

> "Embodiment is the common way in which we encounter physical and social reality in the everyday world. Embodied phenomena are ones we encounter directly rather than abstractly".[45]
>
> "Embodied phenomena are those that by their very nature occur in real time and real space."[46]

The second definition expands on the first one, to incorporate a range of phenomena that may be encountered in the world but are not of physical nature. Furthermore, Dourish continues that embodiment "denotes a form of participative status". Continuing in the same line, he eventually defines the embodiment as a term for a phenomenological presence that emerges from direct participation in the world, consisting of both physical and social phenomena.[47] Following through, Dourish focuses on the possibility for embodied interaction as the "creation, manipulation and sharing of meaning through engaged interaction with artifacts".[48]

[45] Dourish, Paul. "Where the Action is". MIT Press, 2011. pg.100
[46] Ibid. pg. 101
[47] ibid. pg. 115
[48] ibid. pg. 126

Looking more closely at the second definition, I conclude that in VR real time begins from the moment we observe the potential to act. Even in non-interactive 360-degree environment we enter with the previous knowledge of how the visual corresponds to our ability to act in it. The inability to act may be agitating, so creators may seek for a narrative justification of that restriction. As I will observe in Chapter 2, one of the solutions is to place the FPP in a body that is bound to a chair or a bed.

These initial understandings about which states and relationships are covered by the definition of embodiment, show a variety of topics that all put the body as a central aspect of the interaction with the world – both everyday and virtual alike. Furthermore, the body is not defined by itself, but through the interaction with its environment. Experience, as demonstrated by Merleau-Ponty, "breaks forth into things and transcends itself in them, because it always comes into being within the framework of a certain setting in relation to the world which is the definition of my body".[49] He observes that experience doesn't happen outside of the intentional network in which the embodiment occurs. As seen by Dourish the intentional network also supposes a present temporalization of our experience of the world and ourselves. The moment of experience is always in the now and is opened towards the future as a possibility to act. As such, experience happens in the present inside the 'field of presence'. Therefore, the awareness of the experience is to have a presence.[50] [51]

Specifically, for the VR experience this demands more in-depth approach that expands further from the observations on the phenomenon of embodiment. Building on Dourish, who is looking into human-technology interaction in much more layered way[52], I agree that the concept of presence is likely more effective in terms of interaction design. This is also hinted in Dourish's definition of embodiment from earlier, encompassing a 'phenomenological presence'. In the context of HCI it supposes awareness of the embodiment in relation to the object in the present time.

[49] Merleau-Ponty, Maurice. "Phenomenology of Perception". Routledge Classics, 2002. pg. 353
[50] Ibid. pg. 483
[51] Ibid. pg. 494
[52] Dourish, Paul. "Where the Action is". MIT Press, 2011. Chapter 1.

1.6. PRESENCE IN VR

In comparison to embodiment, presence is a term that is more specific and common in the context of VR research since it is concerned with the subjective experience of the world. Unlike embodiment, presence addresses the quality of the awareness of the user about the transportation in the virtual environment. Jerald Jason uses the following definition to describe presence:

> "Presence is a psychological state or subjective perception in which even though part or all of an individual's current experience is generated by and/or filtered through human-made technology, part or all of the individual's perception fails to accurately acknowledge the role of the technology in the experience."[53]

He continues that presence is a subjective feeling of 'being there' – into a space that is not the same as the physical surrounding. More specifically in the context of VR, Mel Slater understands presence as the "extent to which the unification of the simulated sensory data and perceptual processing produce a coherent 'place' that you are 'in' and in which there may be a potential for you to act".[54] I note again, this use of presence is explicitly in the context of how much the users believe they are present in a virtual environment. I am aware that there are significant ontological implications when discussing the nature and quality of awareness of presence and that they vary radically across different philosophical positions. However, that is beyond the scope of this thesis. What I analyze here is the relation between presence and the body and the user's reactions. This choice is due to the fact that when VR is seen through the lens of telepresence and experience design, the discussion revolves around the stimulation of the senses through technology. This will serve to open the thesis to more practical topics of how we interact with the virtual environment.

There are both internal and external factors that amount to presence. The internal factors may vary from person to person, since they are reactions to the external factors that enable the virtual environment. There are three main indicators for presence according to Slater. First, the users sense of 'being there' as an overall psychological state in relation to the (virtual) environment. Second, the extent to which the user feels

[53] Jerald, Jason. "The VR Book: Human-Centered Design For Virtual Reality". ACM Books, 2016. pg. 46
[54] Slater, Mel "A Note on Presence Terminology". Researchgate, 2003. pg.4

the virtual environment as more real or present than the physical space. Third, to which extent the virtual environment is considered to be a locality or a place visited, instead of only a set of images that are represented.[55]

Slater continues that the qualities of presence in a virtual environment are defined through the interaction of the internal psychosomatic factors of the user and the external factors of the technology. Such external factors require for high-quality stimuli to be given to the user's sensory organs in a way that the existence of the device will be obscured. He continues that there should be a consistency of the virtual environment presented. The possibility for the user to interact with the objects and the characters should be provided, as well as the spontaneous reaction of the environment to the user's presence in it. The relationship between the user's actions and the results they create should be understandable and consistent. Finally, the self-representation of the user in the virtual environment which is established through the virtual body should correspond to the participant's own body and correlate successfully to its movements.[56]

One of the crucial elements for presence in the virtual environment is the user's perception of the virtual body. If the user achieves association with a virtual body as their own, then the user demonstrates a higher degree of belief that he is present in the locality of the virtual environment and that the events happening to the virtual body happen to him directly. From this I conclude that according to Slater the virtual body can significantly enhance the feeling of presence in the virtual world. As he continues, this is supported by the presumption that an indication for high presence in a virtual environment implies a responsive user to the events that happen to his virtual body.[57] He supports this by observing how almost every subject included into his studies would avoid collision with the virtual objects that were about to hit their virtual bodies.[58]

Here I observe that there is correlation between Stauer's position on critical attributes of telepresence (elaborated in section 1.3) and Slater's view on presence in virtual environment. When Stauer uses the words 'vividness' and 'interactivity' they strongly resonate with Slater's requirements for high-quality stimuli for the senses and

[55] Slater, Mel. et al. "Depth of Presence in Virtual Environments". 1994. pg.25
[56] Ibid. pg.3
[57] ibid. pg.25
[58] Ibid. pg.28

certain quality of interaction, specifically about the correspondence between the actions of the physical and the virtual body. In the previous sections I looked at the demands of the purist VR approach which is concerned with high VR fidelity. Additionally, if I make a comparison between those demands, the positions of Stauer, the findings of Slater and the research in presence and body-ownership that will follow, I see significant overlapping between their positions. From this I can conclude that VR fidelity is the general goal for the VR experience. As observed by Jason[59], VR fidelity has three factors that also mostly coincide with these positions. First, there is a representational fidelity. This relays both to the nature of the image, but also to the affordance of depth and movement of parallax that reacts to the movement of the head. Second, is the interaction fidelity which looks at the degree to which the physical actions for a virtual task is related to the physicality of the same task in the real world. Third, is the experiential fidelity that is concerned with the degree to which the personal experience of the user is related to the intention that the creator of the VR experience had. These factors evidently include more than just sensorial, proprioceptive and kinesthetic elements and expand to the narrative and interactive design factors. For my research, recognizing that interactivity and narrativity of the experience are equally important as the sensorial simulations is very significant. Because of that conclusion I can look at interaction and narratives as a continuation of embodiment and presence in VR. I will analyze this issue in greater detail in Chapter 2.

I want to note again that the differences in understanding presence are a valid philosophical discussion, which has an ontological nature that is beyond the scope of this research. Here presence is taken as a state of the subject in relation to the fidelity of the reality they occupy. Some ontological positions can certainly argue that VR experiences are built through illusions. The researches mentioned later certainly use that nomenclature (e.g. body-swapping illusion). However, I would argue against using presence and illusions as antonyms. Even if we consider illusion as something which is not real, presence can also incorporate our subjective reaction to the illusionary. As the following research in virtual body ownership will reveal, being present in an illusion is equally valid as being present in reality.

[59] Jerald, Jason. "The VR Book: Human-Centered Design For Virtual Reality". ACM Books, 2016. pg. 51

Before going in more detail on how the virtual body ownership influences presence in the virtual environment, I will note that the methodology of how presence is measured can differ. As observed by Lombard and Ditton, the lack of standardized definition of the notion of presence makes the effort to give a standardize measuring methodology futile.[60] They observe that there are three methodologies of measuring presence in virtual environment. One observes physiological reaction to the environment such as increase in blood pressure, heart rate, ocular responses etc. However, they note that Prothero, Parker, Furness, and Wells object this approach since it is lacking sufficient evidence for direct correlation. Another method is self-reporting through a questionnaire, which is a subjective interpretation by the subjects. They note that the most reliable methodology would be to use asynchronous virtual and physical cues that conflict each other, e.g. to touch the physical body when the virtual is not touched and vice-versa. Then the presence would be indicated through the extent to which subjects react to the virtual instead of the physical cues. However, they also note Sheridan's 'related behavioral measure' which proposes that presence is achieved when there is mirroring of the expected behavior in the virtual environment from a similar situation in the everyday world. Evading objects that are about to hit the virtual body is one of the possible manifestations. Previously I have observed how Slater comes to the same conclusion. The methodology for the studies and experiments that I am referring to in the following part include all three of these methodologies.

The extent of correlation between presence and different ways of presenting the virtual body and FPP, will offer more detailed insight in the position of the user in the virtual environment. Especially interesting can be any conclusions about the relation between the ways of presenting and interacting with the virtual body and the narrative of the experience. This will clarify the nature of interaction for the analysis in Chapter 2 where I analyze the relationship between game design and narratives.

[60] Lombard, Matthew and Ditton, Theresa. "Measuring Presence". Presence 2000: The Third International Workshop on Presence.

1.7. THE BODY IN VR

There are several different components that work together to support the sense of presence. First is the experience of owning a body. Second, the body is given within a certain location in order to promote self-location. Third, it enables the ability to perceive the environment from a first-person POV. Forth and in the context of phenomenology, it possesses the ability for agency through bodily functions.[61] [62] [63] [64] [65]

The above-mentioned elements and the findings by Slater presented in the previous section do not necessarily exhaust all the components that constitute self-consciousness. However, they are a strong indicator that bodily presence is another factor that induces presence in a virtual environment. The body becomes one of the modalities that can be included in building the VR experience. The first hypothesis of this thesis is that embodiment give the unique quality of VR. Then, this quality extends to the content. Before I can get into that question I have to look at the possible alterations of the virtual body as a modality. To unpack this topic, I am analyzing studies focusing on virtual body ownership and body swapping illusions.

One paradigmatic experiment in this area is the rubber hand experiment, which demonstrates how perceptual illusions can affect the experience of other bodies or parts of bodies as our own. In this experiment the test subjects are led to believe that a rubber hand belongs to their body. This is done by placing a visible rubber hand on a table in front of the subjects, while having their real hands placed hidden in the proximity of the rubber one. Simultaneous touches are administrated on both hands for a period of time. In the end the rubber hand is attacked with a sharp object prompting a recoiling reaction by the subjects, as if their real hand was threatened. This suggests that the subjects felt the rubber hand to be part of their body. Expanding this experiment further,

---

[61] Serano, Andrea. et al. "Bodily Ownership and Self-location: Components of bodily self-consciousness". Consciousness and Cognition. ELSEVIER, 2013

[62] Blanke, Olaf and Metzinger, Thomas. "Full-body Illusions and Minimal Phenomenal Selfhood." Trends in Cognitive Sciences, 13(1), 2009.

[63] Ionta, Silvio. et al. "Multisensory Mechanisms in Temporo-parietal Cortex Support Selflocation and First-Person Perspective". Neuron, 70(2), 2011.

[64] Jeannerod, Marc. "Motor cognition what actions tell the self". Oxford: Oxford University Press, 2006.

[65] Petkova, Valeria. et al. "From Part- to Whole-Body Ownership in the Multisensory Brain." Current Biology, 21(13), 2011.

Petkova and Ehrsson have conducted research on perceptual illusions of body swapping with given to the subjects that received a HMD.[66] Their findings support the rubber hand experiment and furthermore, they demonstrate that same body ownership principles apply in the case of VR.

In one of the experiments, they place a camera on the top of a mannequin's body where the head should be. The camera is faced down, mimicking the view a person would have if they look down at their body. The subjects observe from the same POV by watching a streamed video from the camera. Both the real body and the fake body are touched at the same time and the same part. After few minutes, the mannequin's body is cut with a knife prompting a bodily reaction in the subjects that indicates high levels of anxiety. This can be interpreted that the body swap was made and the subjects felt body ownership of the mannequin's body. The research is consisted of five experiments analyzing different aspects of body swapping and virtual body ownership. Petkova and Ehrsson conclude that in order to establish a successful illusion of body swapping there should be:

> "a continuous match between visual and somatosensory information about the state of the body, the usage of a sufficiently humanoid body, the adoption of a first-person visual perspective of the body."[67]

Going in more detail with this finding, I see that almost in every case, similar to the rubber hand experiment, the researcher applies touch to both the fake and the real body. This makes the experience multisensory, associating both visual information from the first-person POV and the touch that corresponds to the same area on the physical body. The multisensory aspect shows that additional stimuli to the visual information, both with HMD and without, increases the sense of body ownership. Additionally, they show that a passive viewer which has no somatosensory information may have lower sense of presence. This is particularly interesting when analyzing various VR experiences and more specifically, when analyzing standard 360-degree videos and 360-degree videos that are multisensory experiences. As discussed in the previous

[66] Petkova, Valeria and Ehrsson, Henrik. "If I Were You: Perceptual Illusion of Body Swapping". PLoS ONE, 3(12), 2008.
[67] Ibid. pg. 6

sections, the problem of the 360-degree video is the lack of direct interaction with the virtual environment since it is just a video file playing. However, in order to increase the fidelity of the experience and the presence, creators introduce additional stimuli (modalities) such as touch, smell and taste. In the following section I will analyze this in greater detail. Second, they note that the body has to be humanoid in order for body swapping to happen. This shows that there may be difficulties for presence to happen in non-humanoid bodies. They noted this with an experiment in which the virtual body is a cube. It is clear that for healthy subjects the dominant and required verification of the body is visual. Other findings from Petkova's and Ehrsson's research, is that the sense of body ownership is not affected even when the subjects encountered their physical bodies as other people in the virtual environment. One experiment had another person shaking the hand of the subjects. The person had a camera mounted in front of their face and was streaming a first-person view. The subjects saw that point of view through their HMD. This means that they would be swapped in a body that shakes hands with their physical body. The subjects reported that this did not affect the illusion of possessing the body which is not their real one. Lenggenhager arrives to the same results in separate experiments.[68] Furthermore, he observes that seeing one's own body from a disembodied POV has no effect in associating the locality of the POV as belonging to the subjects. This has contrasting implication to how seeing the body is crucial to establishing FPP.

Reflecting on all of these findings, I see that the FPP is critical to the initial establishment of the VR experience. The question here is what establishes FPP? As demonstrated above, the awareness that there is a locality of the self can be achieved in different ways. Adopting a visual first-person view of the body reflects on the remarks by Hansen from the previous sections that VR is dominantly visual. However, as I have argued before, there are other ways to establish presence, as in the case with *Touching Masterpieces* where blind people "touch" sculptures through the vibrations of haptic feedback gloves. In the experiments above the subjects were mostly without any agency. Any changes in the level of presence due to changes of stimuli (e.g. asynchronous touches between the virtual and the physical body as done to the control

[68] Lenggenhager, Bigna. et al. "Video Ergo Sum". Science, 317(5841), 2007. pg. 1098

group) or lack of presence when embodied in non-humanoid body, may be attributed to the lack of agency to support proprioceptive and kinesthetic sensations. As discussed earlier by Merleau-Ponty, Dourish, Slater, Jason and Jeannerod, the self-awareness is also closely connected to the ability to act through the body. This supports the notion that not seeing the body does not necessarily destroy presence, but only if there are other modalities to establish FPP. Even more, it opens the possibility that the affordance for agency and narrative justification of why the presence is constituted as it is, may have equal power over the VR fidelity.

From all of this I conclude that FPP is not tied to any specific sense, but it can be built through any of them. Furthermore, I argue that agency is always present in the experience. This is the case even in 360-degree videos where the user has no direct agency over the environment and sometimes even no visual perception of the body. Being able to move the POV is one significant affordance that establishes at least some basic proprioceptive and kinesthetic sensations. Furthermore, vision incorporates the intentionality to act. This means that even when we have visuals that completely shut us out from the physical world and we can move the head to look where we want, the FPP is already established. We may argue if the presence and fidelity is higher or lower, but the baseline is there. Blind people have their FPP established without vision, but with agency. Their hands become the sense through which they see the virtual environment, and simultaneously interact with it. I would argue that this is the case because we enter into the virtual environment with the contingency of agency embedded in our senses (now modalities in VR) from the everyday life. However, meeting that expectation or not can have effect on the presence. This is why the experiments above show that multisensory stimuli can have a positive effect.[69] [70]

However, I want to propose that it is not necessary for all of these modalities to be met in order to have a satisfactory VR experience. All of the sensory stimuli, affordances for agency, technical properties of the device, the narrative and aesthetical properties of the embodiment and the presence can be seen as separate modalities. In

[69] Petkova, Valeria. et al. "From Part- to Whole-Body Ownership in the Multisensory Brain." Current Biology, 21(13), 2011.
[70] Ehrsson, Henrik. et al. "Touching a Rubber Hand: Feeling of Body Ownership is Associated With Activity in Multisensory Brain Areas. Journal of Neuroscience, 25(45), 2005.

section 1.8. I analyze how creators attempting to create versatile VR experience pair these modalities in a very similar way as the multisensory experiments for virtual body ownership. These modalities constitute the experience and may be manipulated separately to create a baseline for believable presence. For example, touch and smell may be modalities that are introduced to a passive experience to increase the sense of presence and body ownership. However, introducing the affordance for agency, which is another strong modality, may make the previous modalities obsolete. The strong presence is established by the ability to directly interact with the virtual environment, instead of being supported by other multisensory constructions. In the reverse manner, the presence in a 360-degree video that does not afford interaction, may be fortified through the modalities of touch and smell. Furthermore, the lack of affordance for agency in the virtual environment can be justified by what is happening to the virtual body in the narrative. The example in the next section analyzes this issue in greater detail. Finally, one of the major issues is the problem of low presence when embodied into non-human bodies. The studies above suggest that the virtual body should be at least a humanoid. However, it is not explored if agency, aesthetics or narrative can affect presence when embodied into non-humanoid body. I argue that simulated agency or body movement in a manner of mimicry may have similar effect on VR presence. For example, the HMD VR experience Birdly,[71] places the user in the POV of a bird flying over 3D models of cities. The users lay down on their stomach on a bed-like device and place the hands in flaps. The users may fly by flapping and change the direction of movement by changing the angle of the flaps. There is no body to be seen, but the presence is established through the agency that approximately mimics the movement of birds. In some versions this experience is multisensory since they introduce wind into the face of the user to simulate air friction while flying.

1.8. STACKING MODALITIES

In the previous section I compared different studies on body ownership and self-location. What I have concluded from Petkova, Ehrsson, Lenggenhager and Slater, is

[71] Birdly. Somniacs SA, 2018.

that FPP can occur from various different modalities that belong at least to one sensory organ. As they observe, in the general healthy population the modality of vision is considered to be the baseline for the experience. Additionally, establishing FPP may be done by other modalities as well. Building on the positions of Merleau-Ponty and Dourish, and following Jeannerod, I observed how the intention to act is also an important modality in constituting VR experiences. Furthermore, Slater observes that virtual environments may be built around a single modality, although it is preferred for them to be created in all sensory modalities. Users also experience presence different in different modalities. Additionally, the user may be simultaneously aware of several different modalities, thus being aware of several different environments.[72] This suggests that if done skillfully the interplay between the modalities affects the overall experience, as seen by the multisensory experiments described in section 1.7. Another takeaway from the previous section is my position inspired by Merleau-Ponty and Dourish that any sensory modality has the intention to act embedded in itself, even if the affordance is not given in the particular experience. Furthermore, the contemporary VR experience is mostly relying on HMD, which offers at least the ability to redirect the visual POV. This simulates some kinesthetic sensations, even without direct interactivity.

In this section I will use these positions in a constructivist manner to analyze if VR modalities work together in a narrative VR work to convey different ways of presence. I am also interested if the inclusion of one modality can cover the exclusion of others. In order to keep the analysis focused, I decided to look at a multisensory cinematic VR artwork that gives no direct agency to the users over the narrative.

MANND is a production company based in Aarhus, Denmark that produces VR works and installations such as *Separate Silences*[73], which won the Golden Lion at Venice Film Festival in the VR competition in 2017. The story puts two users in the bodies of two bedridden siblings, that drift in and out of coma and sleep paralysis in their hospital beds after suffering a traffic accident. MANND's founders, Signe Ungermand and Maria Herholdt Engermann covered several aspects regarding the creative and practical processes behind Separate Silences.

[72] Slater, Mel. et al. "Depth of Presence in Virtual Environments". 1994. pg. 5
[73] Separate Silences. MANND, 2017.

> "Separate Silences is categorized as a hybrid cinematic VR installation experience. The 'hybrid' stands the interconnection between cinema, theatre and the technology of VR; 'cinematic' due to the genre and aesthetics of the production; VR due to the viewing platform; 'installation' due to the requirements of the participants actively positioning themselves within the boarders we have built; and 'experience' because it is the motion of trying."[74]

The visual modality of Separate Silences is non-interactive, 360-degree video, recorded by two 360-degree cameras placed next to each other in order to recreate stereoscopic vision. The installation allows for two members of the audience to lay down on any of the two beds and put HMD. Then, they are transported into the POV of one of the siblings, either Noah or Rebecca. Each of the FPPs gives different experience and interpretation of the story as seen by the two characters. Additionally, touches on the virtual bodies are replicated on the physical bodies, making it a multisensory experience (Fig. 2 & Fig. 3). Additionally, smell is added as a modality, synchronous to the narrative elements in the story. Another interesting aspect is how the narrative supports the change of the embodiment modalities. Because the story takes the user in and out of the states of sleep paralysis and coma, the depiction of the body in the two states also changes. In sleep paralysis people are aware of their bodies, so in that segment of the experience, the body is also visible to the user. In the segment where the character is falling into a coma, the POV is disembodied and floats around. This exemplifies how different states of embodiment (similar to the experiments previously described), have become modalities in the VR experience which are supported by the narrative.

In the discussions with test audiences, Ungermand and Engermann observe that integrating touch and smell in the overall experience had intensive effects that were not always narratively needed. This forced them to alter or remove some initial ideas in order to maintain a balance throughout the experience. Reflecting on the discussion of VR fidelity and presence from before, I note that this also testifies how modalities may have strong effect on presence in VR. Additionally, I note Sheridan's related behavioral measure as evidently present in the experience of MANND's test audiences.

[74] Ungermand, Signe and Engermann, Maria H. Interview with Stefan Palitov. Writing. Denmark, 2018

The end goal is for the audience to establish presence by embodying the specific mental state of one of the characters. Since presence is subjective experience and the level of simulation required may vary from person to person the reactions to the VR experience also differ. As the creators note, the people that have experienced VR before, may demand more from the experience. Others may achieve presence only by looking in a 360-degree virtual environment. In other words, more complex stacking of modalities may be preferred by experienced audiences. As MANND observes, there is a requirement for certain suspension of disbelief in which the audience has to give in to the story and the character they embody, essentially accepting to role-play the experience. Staking different modalities makes this role-playing easier.

Through this example we also see the issues arising from lack of interaction. Because in *Separate Silences* the audience cannot interact with the virtual environment questions regarding the classification may arise. If we follow a rigorous definition of a VR experience where the audience must have agency, this works is not considered VR. However, although there is no agency from the audience over the virtual environment, the environment interacts with the audience. Even more, the environment created by the visual modality and the environment created by the haptic modality, merge to create a unified experience and increased presence. Underlying all of it, there is at least the modality for kinesthetic sensation by moving the head and looking around.

I argue that the level of presence and immediacy of the experience for the audience, in which they feel the narrative is happening directly to them, is more important than having all the modalities simulated. As demonstrated, this is achieved through staking modalities, e.g. synchronous visual and haptic stimuli and redirecting the visual POV. Equally critical for the success is the narrative justification of what happens to the character the audience embodies. In this case, being immobilized due to narrative demands plays in favor with the lack of agency. Therefore, it is useful to look at *Separate Silences* as a VR experience in the broader context of the category, since it successfully achieves presence through the modalities and their narrative justification.

1.9. OPERATIONAL DEFINITION OF VR

Framing a detailed definition of VR experience may pose much greater task than previously thought. As explored in this chapter, different fields overlap in a layered cross-section and bring with them terminological and contextual implications. However, looking at these different angles, shows for the purposes of this thesis an operational framework for understanding the VR experience can be set. Within that framework discussions on narrative and interaction in contemporary VR emerge, while constantly having the defining elements of the technologies and embodiment principles on mind.

As previously discussed, some authors see virtuality as the main constitutive element of the VR experience. Virtuality also belongs to other interactive, computer generated content. Additionally, the FPP is a critical element for establishing the VR experience alongside virtuality. However, FPP is not exclusive to VR alone and is also a critical element in augmented reality. Therefore, since VR is enabled through technologies that promote state of telepresence, embodiment and specific aesthetics of interaction through virtuality and FPP, it should ncluded in a broader category of similar XR experiences. XR is a topic that is outside of the scope of this thesis, but covers VR and as such it should be noted in the VR definition.

I define extended reality as a state of a technologically mediated, first-person embodiment into a narrative. On one side of the spectrum is virtual reality, which shuts us from the immediate environment and by inciting a state of telepresence, transports us in a world of artificial making. On the other side of the spectrum is augmented reality, which superimposes stimuli and affordances for interaction over what we consider our objective, everyday reality.

CHAPTER 2

NARRATIVES & INTERACTIVITY IN VR

INTRODUCTION TO CHAPTER 2

Chapter 1 focused on the basic aspects that define VR as a specific form of experience. In section 1.1 I observed how virtuality, as one of the principle constitutive elements, stands for the property of the content to be changed through the interaction with an audience/user. This attribute was made possible with the introduction of the computer, which opened up wide range of dynamics in the relationship between the audience and the audiovisual content. In 1.2. I have observed what are the most extreme demands when creating a VR experience. I have named this position 'the purist VR approach'. Further inquiry showed that such rigorous stance may be unattainable in principle. However, it gave a general overview of the topics that must be taken into account when discussing VR. In 1.3. I discussed the views on VR as FPP format. In 1.4. I got into the idea of telepresence and to what extent VR belongs in that discussion. Telepresence supposes technologically mediated transportation of the user in another environment and the ability to operate in that environment. Opening the questions of the body and embodiment, as well as the sense of presence in VR, the following sections focused on these topics. In 1.5. I analyzed the basics of embodiment and the importance of the intentionality to act. In 1.6 and 1.7. I looked at how virtual body ownership was established and how that has an effect on the sense of presence in VR. Furthermore, analyzing the sensorial and interaction modalities that are used for building the experience, in 1.7. I observed details in establishing, maintaining and grading presence in virtual environments.

All of these findings were used to observe the conceptual and technical aspects that define the VR experience in relation to the sensory stimuli and bodily faculty of the user. The goal of Chapter 2 is to see if the nature of the VR experience is necessarily riddled with ludonarrative dissonances. Furthermore, if that is true, how does the creators deal with that issue in order to preserve the sense of presence? I will follow similar constructivist method and also continue to compare different theories and works.

Chapter 2 begins with a section that explores the basics of a narrative. It expands to explore the similarities and differences in modalities between film and VR as visual narrative formats. Next, the issue of interactive, real-time narratives is open.

The implications of the present time of interactive content such as computer games and VR is addressed in section 2.2. I explore if there is overlapping in the nature of interactive narratives between computer games and VR experiences. Various positions are compared on the question if games can be narratives. In this section I outline the structure of the playable experience, which has broader implication on world-building, narrative development and interaction design. In 2.3. this is expanded on analyzing the differences between VR narrative forms. The issue of the 360-degree video, which reoccurs throughout the thesis, is analyzed further. The first three section are used to give broader framing of the VR narrative in relation to other narrative forms. Additionally, the observations on its structure offer better understanding on what the creators and designers must do in order to produce such experience. This is done with the goal to demonstrate how a possible friction with the rules of the virtual environment may occur.

The ludonarrative dissonance, as one of the pivotal elements of this thesis, is opened in section 2.4. This clash between what games are as narratives and what behavior they promote through the game mechanics is approached through the field of ludology. I attempt to locate the dissonance more precisely – in the restrictions and the freedoms creators give to the users. Also, I propose that the ludonarrative dissonance in VR occurs on two levels, which has a broader implication on the design process. In the final section 2.5. I use the findings from Chapter 1 and Chapter 2 to analyze VR examples and how the ludonarrative dissonance is avoided or used in each of them.

2.1. VR AND OTHER TYPES OF VISUAL NARRATIVE FORMATS

The first question I am interested in when analyzing a narrative form is what its building blocks are. Another question is, which narrative formats are useful to be analyzed comparatively in relation to VR. I believe that film narrative may be a good starting point since film and VR share a dominant visual aspect. VR as being dominantly visual medium was observed by Hansen in 1.4. and in the later sections of Chapter 1. Additionally, I have noted how other modalities aside from the visual may constitute and reinforce the FPP experience. Comparing the differences between how VR and film narratives are conveyed may offer a good insight in the nature of the VR narrative.

Before addressing David Bordwell and narrative in film I will look at the basics of narrative. Meyer notes ne of the broadest definitions of narrative as described by Holman, as "an account of actual or fictional events".[75] Here I find that the two main elements are: events happened and these events are recalled. Another similar view is held by Lamarque who states that for something to be considered a narrative "at least two events must be depicted in a narrative and there must be some more or less loose, albeit non-logical relation between the events. Crucially, there is a temporal dimension in narrative."[76] Additionally, Menary observes Lamarque's view that "there can be no narrative without narration…" and also "a story must be told, it is not found".[77] As Menary continues, there is an act of telling the narrative, which in turn requires for someone to tell the narrative – a narrator, and a language in which the narrative is conveyed.[78] Eventually, he agrees with Nelson that "narrative is the vehicle of communicating representations of events between people by verbal means."[79] Bordwell agrees with the strong verbal element to the act of narrating as evident by the word *storytelling.*[80] He considers the language-based narration to be the default one, since that is a dominant form of sharing information across our species. However, Bordwell also insists on more elaborate definition of narrative, that also incorporates more traditional, Aristotelian views. Bordwell sees two tendencies in approaching narratives in the broad literature, in the form of action-centered narrative and agent-centered narrative.[81] The first recognizes the narrative as a structure of events and the second as actions undertaken by specific characters. Bordwell analyzes both approaches together to arrive at a more layered definition. He states that the narrative must have events which are arranged in time and these events must demonstrate some causality between each other. The agents that participate in the events must demonstrate some continuity. Finally, there should be some change happening, in the sense of 'change of fortune'.

[75] Meyer, Keneth. "Dramatic Narrative in VR" in Biocca & Levy. "Communication in the Age of Virtual Reality". 1995. pg. 221
[76] Lamarque, Peter. "On Not Expecting Too Much from Narrative". Mind & Language 19, 2004. pg. 394
[77] Menary, Richard. "Embodied Narratives". Journal of Consciousness Studies 15, 2008 pg. 64
[78] Ibid. pg. 64
[79] ibid. pg. 65
[80] Bordwell, David. "Poetics of Cinema". Routledge. New York, 2008. Pg. 87
[81] Ibid. pg. 90

This change of fortune was already observed by Aristotle and is known as peripety (*peripeteiae).*[82]

Going back to Menary and Nelson, I note that there is strong language-based approach to narrative, to which Bordwell also agreed. In the case with Menary and Nelson it is obvious that the verbal aspect is critical in defining narrative. Here I have to note that when compared to other formats, defining language as purely verbal element is limiting in the context of this thesis. Furthermore, as it was observed earlier by Aylett & Louchart in the context of VR, theater, cinema and literature, there are medium specific attributes of the narrative. They elaborate that this is due to the different representational nature of the formats.

> "Considering narrative representation first, it is clear that the format of the book is very different from a computer application, a cinema screen or a theatre stage. Novels largely deliver the story in such a way that the audience has to proceed to a mental representation of the narrative in order to image and imagine it, whereas, VR, Cinema and Theatre directly provide a visual form for the narrative."[83]

Linda Gerry notes how Bordwell makes a similar distinction. Bordwell, states that "traditionally narration was paired to a story that was told, and drama paired to a story enacted, contemporary film and transmedia storytelling evoke narrative as a preverbal phenomenon."[84] This preverbal attribute of film and transmedia is attached to the very structure of what conveys the narrative in the medium. Bordwell explains how a film is being continuously narrated by its constitutive elements. The camera position, camera movement, zoom ins/outs, arrangements of the objects and actors in the frame, their movements, lines of dialogue, the editing, the sound - they all works as a whole to convey a multilayered film narrative.[85] As someone with a filmmaking background, I can testify of the incredible importance of the non-verbal language of cinema. This is very well analyzed by authors such as Daniel Arijon and his monumental book *Grammar of the Film Language*.[86] In Arijon's book the focus falls on the narrative structure of film as

[82] Ibid. pg. 90
[83] Aylett, R. & Louchart, "Towards a narrative theory of Virtual Reality ". S. Virtual Reality, 2003. 7: 2. pg. 4
[84] Gerry, Lynda Joy. Subjective Alignment and Audience Entanglement in First-Person Cinema: Defending The Divi ng Bell and the Butterfly as an Exemplary Case". University of Copenhagen, 2006. pg. 19
[85] Bordwell, David. "Poetics of Cinema". Routledge. New York, 2008. pg. 110
[86] Arijon, Daniel. "Grammar of the Film Language". Silman-James Press, 2015.

conveyed by non-verbal elements such as: framing, mise-en-scene, camera movement and editing. This strongly resonates with Bordwell's observation of the preverbal nature of cinema and for that matter of other visual narrative formats. These are the format specific modalities of the film's narrative format.

To highlight the differences between literary and non-literary narratives, I point out the differences even within literary formats that have different purposes. As observed by one of the most prominent authors on screenwriting, Robert McKee, there is evident difference between screenwriting and novel writing.

> "If a screenwriter fails to move us with the purity of a dramatized scene, he cannot, like a novelist in authorial voice, or the playwright in soliloquy, hide behind his words. He cannot smooth a coating of explanatory or emotive language over cracks in logic, blotchy motivation, or colorless emotion and simply *tell* us what to think or how to feel."[87]

This issue emerges from the differences in purpose between the screenplay and the novel, namely, that the screenplay is to be **translated** into a film. This means that it will be translated into other non-verbal modalities, such as framing, mise-en-scene, camera movement and editing. For filmmakers this distinction is very clear. One of the first advices regarding filmmaking is 'show, don't tell', which highlights the core difference between literary and film narratives. However, if we attempt to replicate the film narrative approach to VR we see that although they share strong audiovisual moving-image connection, they are structurally different in their modalities. In film, the frame produced by the camera's POV gives direct control of interpretation to the creator of the film narrative. This control assists the creator who now has the tools to apply the medium specific storytelling principles. Skillful audiovisual storytellers rely on this power to focus on the information that is relevant for the story by removing the unnecessary details. This power of interpretation possessed by the screen is observed by Manovich, in his stance that the screen is not a "neutral medium of presenting information".[88] The deconstruction of the screen in VR takes away one of the key modalities in film narration out of the storyteller's toolbox. Regardless of the production process, the

[87] McKee, Robert. "Story". Regan Books, 1997. pg.6
[88] Manovich, Lev. "The Language of New Media". MIT Press, 2001. pg. 96

viewing experience takes place through technologies in a way that the "images completely fill the viewer's visual field".[89] The aggressive frame, the interpreter of reality, is no longer present. In VR, additionally to the audiovisual modalities, there are modalities arising from the affordance of agency given to the user.

This highlights the difference between film and VR narrative, as displayed through the format specific narrative modalities that do not translate from one to the other. Other similarities and differences are clearly revealed when analyzing how dramatic forms are constituted in VR experiences. This is visible in Laurel's reflection on Aristotle's distinction between narrative and drama forms.

> "In narrative works, agents and actions are reported or described rather than acted out, and that description may take a third-person ("narrative") or first-person (in the person of a character in the story) voice. In a drama, the agents and actions are acted out; that is "the imitators…represent the whole story dramatically, as though they were actually doing the things described.""[90]

Here I want to point out that the use of 'narrative' and 'drama' by Laurel reflecting on Aristotle, is in the sense of different forms of storytelling, where 'drama' is understood as 'theatre'. This should not be mixed with the broader use of 'narrative' which I observed earlier in this section. Drama in that context arises out of the narrative structure as a chain of events that include peripety (change) or conflict of some kind. It can be present in any form of narrative - literary, film, theater, VR, etc. Laurel's use of the differences between narration and drama is in the context of structural differences between the story which is conveyed through a finite form (e.g. literary forms or film) and story which is conveyed when acted out in real time (such as in theatre). For clarity I will be referring to 'drama' as 'theater', and I will be using 'narrative' in the broader way as observed earlier in this section. When I will be discussing finite, non-interactive narrative forms, I will make that specific distinction from the general use of narrative.

[89] Ibid. 97
[90] Laurel, Brenda. "Towards the Design of a Computer-Based Interactive Fantasy System". PhD. Ohio State University, 1986. pg. 36

Laurel uses Aristotle's six qualitative elements in drama (theatre) which include plot, character, thought, diction, music and spectacle,[91] to compare them to the elements of interactive works, including VR. They are shown in the table below.[92]

ELEMENT	IN DRAMA	INTERACTIVE WORKS
PLOT	The whole action being imitated. The outcome of the action will be the same in each performance.	The whole action, which is interactively shaped by both system and user. The outcome may vary with each interactive session.
CHARACTER	Bundles of predispositions and traits, inferred from agents' patterns of choice.	The same as in drama but including the user as well as fictious agents.
THOUGHT	Inferred internal processes leading to choice: cognition, emotion and reason.	The same as in drama but including the user.
DICTION	The selection and arrangement of words; the use of language.	The selection and arrangement of discursive signs, including visual, auditory, and other non-verbal signs, when used linguistically.
MUSIC	Everything that is heard.	(same)
SPECTACLE	Everything that is seen.	(same)

In the distinction offered by Laurel we see that the dominant change arises with the inclusion of the audience as a participant in the narrative structure. Here I

[91] Aristotle. "Poetics". Translated by S.H. Butcher. A Universal Download Edition. pg. 5
[92] Laurel, Brenda. "Towards the Design of a Computer-Based Interactive Fantasy System". PhD. Ohio State University, 1986. pg. 36

will be focusing on the differences in plot and character. Laurel notes they retain their qualities as in standard theater enactment but include an active user. The plot defined as a "combination of incidents which make up that whole action"[93] can be located in the interactive works as well, since it includes beginning, middle and end. As Laurel observes, in interactive works such as computer games the end comes from the actions of the user – winning or losing the game or after specified time has lapsed. In traditional non-interactive narratives, characters are fixed in relation to the story. In interactive works however, Laurel states that there are two possible changes. First, characters can be controllable avatars and their decisions can depend on the user. Second, the user can be included as a user-character in the work itself, which strongly resonates with first-person interactive works.[94]

Here I observe that contemporary computer games make the first option very clear. One of the most successful examples in recent years with a strong dynamic story is the *Witcher* series.[95] The player controls a witcher, a hunter of various creatures in a fantasy land, while being drawn into a complex political and personal storyscape. Depending on the decisions of the player, the world changes the attitude towards the witcher, opening and closing storylines accordingly. This responsiveness of the game world and the story, today is considered standard for most role-playing games (RPG). The second one, where the user becomes a character in the story in more immediate way, can be related to the way embodiment occurs in VR. In VR the FPP is reinforced by proprioceptive and kinesthetic sensations as analyzed in 1.6. and 1.7. This in turn equalizes the locality of the avatar and the locality of user's body, making the user and not the avatar character in the interactive story.

From the discussion in this section, I observe two main areas that are relevant in the general exploration of the VR narrative. First, it is the format specific language that affects the quality of conveying the story. The VR format is dominantly (but non-exclusively) visual. As such, it is shares some similarities with film and multimedia and the audiovisual modalities they use to convey information.

[93] Ibid. pg. 37
[94] Ibid. pg. 42
[95] Witcher game series. CD Projekt, 2007.

However, VR is also FPP oriented and interactive to various degrees, thus placing the user as a central figure in the experience. Here, VR shares some similarities to computer games and the position of the player in the narrative.

Second, the embodiment of the user in the VR narrative opens issues with maintaining satisfactory narrative structure which follows some storytelling premises. As demonstrated earlier in this section, non-interactive narratives have a structure that ensures the quality of the story. Interactive works, such as VR and video games, function as emergent narratives – the narrative is finalized during its enactment. This is a question of difference in time of happening of the narrative. As already observed in this section, narratives are built out of events in time. However, there are different 'times' – the time of the story and the time of the story being told or enacted. This real-time is present in theatre enactment as well as computer games. Additionally, in section 1.5. I have noted Dourish's position that embodied phenomena happen in real-time and space. This supports the view that interactive works happening in real-time have effect on the embodiment of the audience. In the context of VR, I argue that the technologically mediated real-time aspect and the degree of interactivity with the narrative in computer games, may offer some insights on the interactive VR narrative.

2.2. WHAT TIME IS IT?

In section 1.1. I have argued why the technologically mediated interaction with an environment that possesses virtuality is considered categorically different than the interaction with a finite artistic object. The property of the virtual environments and computer games to respond in real-time to the actions of the user, creates a space in which specific rules of engagement apply. This interactive space in ludology is known as the magic circle. The author of the phrase, Jan Huizinga, explains that "to play is to step out of real life into a temporary sphere of activity with a disposition all of its own".[96] This sphere of activity or a magic circle is a space where different rules take place. Huizinga explains that this applies to courts of justice, the social, the cultural and the

[96] Huizinga, Johan. "Homo Ludens". Routledge & Kegan Paul Ltd. 1949. pg.8

religious spaces, since they are "temporary worlds within the ordinary world"[97]. These spaces are conjured to enable special interactions and are dissolved after they fulfill their role. The magic circle is a pivotal concept in ludology which can be understood as a conceptual time and space, where the rules and the meaning of the actions are reinterpreted. The magic circle can be any physical, virtual or imaginary space on which the involved parties agree upon. It can be the playing tables, juridical courts, the relationship between items or in this case, computer games and VR environments Salen and Zimmerman define the magic circle as a boundary in which a person enters. This boundary is a temporary world where a person maintains lusory attitude.[98] The lusory attitude means that the people that enter into the magic circle recognize the magic circle as such and maintain the seriousness about achieving the lusory goal. Bernard Suits defines the lusory goal as a victory condition achieved through the allowed means of the specific game that is being played.[99]

VR experiences, even in their least interactive form, demonstrate such reinterpretation of the user's embodiment and agency. In one experience, moving the hand may be moving a tree branch. In another, the affordance for such movement may be lacking completely if the character is bedridden as in the work *Separate Silences* discussed in Chapter 1. The VR environment sets the rules of engagement with the objects and characters present in it. However, as shown by Salen and Zimmerman there may be a tendency to limit what is discussed in the magic circle only as a game, since they argue that a lusory goal is always present. In the context of VR experiences such approach is limiting, especially if we discuss broader uses of VR. However, I argue that the interactive nature and power of reinterpretation of the actions of the magic circle, show that there is some overlapping between VR experiences and the magic circle. Consequently, this overlapping extends to VR experiences and computer games, which also share virtuality.

There are two main conflicting views regarding narratives in games. Janet Murray proposes that games are narratives due to structural similarities between the two.

[97] Ibid. pg. 10
[98] Salen & Zimmerman. "Rules of Play: Game Design Fundamentals". *MIT Press.* 2004. Chapter 9: The Magic Circle
[99] Suits, Bernard. "The Grasshopper: Games, Life and Utopia". University of Toronto Press. 1978. pg.37

> "The first structure is the contest, the meeting of opponents in pursuit of mutually exclusive aims…Games take this form, enacting this core experience; stories dramatize and narrate this experience. Most stories and most games include some element of the contest between protagonist and antagonist… The second structure is the puzzle, which can also be seen as a contest between the reader/player and the author/game-designer. In a puzzle story, the challenge is to the mind, and the pacing is often one of open-ended rearranging rather than turn-based moves."[100]

Murray understands narrative in the broader sense, similar to what I observed in the beginning of section 2.1. The view of narrative as events in time that include some form of peripety, is present in her proposal that there is always a conflict either between the players or between the player and the designer (through the mechanics of the gameplay). That conflict is resolved, thus bringing the narrative to a satisfactory end.

Another view analyzes games as separate form from traditional narratives due to structural differences. Most prominent voice in this direction is Jesper Juul who compares the similarities and the differences between narratives and games by translating notions from one format to the other. His findings demonstrate issues with Murray's position. As Juul explains, "we can never see the story itself; we can only see it through another medium like oral storytelling, novels, and movies."[101] In this view, the question if games can become narratives, becomes a question if the story can be translated from one narrative medium to another narrative medium? The issue with this translation is that there are two types of time in a given narrative. Juul refers to the positions of narratologists such as Metz and Genette that "a narrative has two distinct kinds of time, the *story time*, denoting the time of the events told, in their chronological order, and the *discourse time*, denoting the time of the telling of events (in the order in which they are told)".[102] When an attempt is made to translate a narrative into a game, there is a conflict between these two times. Juul argues that events in games must be synchronous with the actions of the players. Any event that happens before or after the now of the playthrough becomes inaccessible to the time of the game. He considers this temporal difference between game and narrative to be irreconcilable. Interaction, which

[100] Murray, Janet. "From game-story to cyberdrama". www.electronicbookreview.com/thread/firstperson/autodramatic
[101] Juul, Jasper. "Games telling stories? - A brief note on games and narratives". www.gamestudies.org/0101/juul-gts
[102] Ibid.

is crucial for a game to be played, happens in the present, and narrative, which although presented in the discursive time of the moment of listening, reading or viewing, still refers to the time of the events it conveys. He recognizes that games and stories share some structural elements and games may have narrative elements. However, Juul insists that "you cannot have narration and interactivity at the same time; there is no such thing as a continuously interactive story".[103]

The third position, which tries to reconcile the previous two, is held by Espen Aarseth. His main point is the difference between two types of spaces in games - the ludic and the extra-ludic. The ludic space, allows the player to engage with the world through the game mechanics, whereas the extra-ludic has more decorative, aesthetical or narrative component that cannot be engaged with.[104] Aarseth also notes that this distinction may vary from case to case. Some games are mostly consisted of extra-ludic spaces with limited ludic elements. In other games, like chess, the ludic playable space takes the entire board, the entire game world. Depending on the game deign, ludic space may be somewhat malleable, expanding or constricting by the player's interactions with it. I note that completely extra-ludic environments would render the game unplayable, leaving no room for the player to interact with the game world. The distinction is visible in Aarseth's four-dimensional model for games.[105]

<table>
<tr><th>Ontic level:</th><th>World:</th><th>Objects:</th><th>Agents:</th><th>Events:</th></tr>
<tr><td>Pure Story
(War & Peace)</td><td>Inaccessible</td><td>Noninheritable</td><td rowspan="2">Deep, rich, sound character</td><td rowspan="2">Fully plotted</td></tr>
<tr><td rowspan="3">Farenheit
Half-Life 2</td><td>Single room</td><td>Static, usable</td></tr>
<tr><td>Linear Corridor</td><td>Modifiable</td><td rowspan="3">Flat Characters</td><td rowspan="3">Dynamic Kernels</td></tr>
<tr><td>Multicursal Labyrinth</td><td>Destructible</td></tr>
<tr><td>KOTOR
Oblivion</td><td>Hubshaped Quest Landscape</td><td>Creatable</td></tr>
<tr><td>Pure Game
(Mintecraft)</td><td>Open Landscape</td><td>Inventible</td><td>Bots, no individuality</td><td>No Kernels
(pure game)</td></tr>
</table>

[103] Ibid.
[104] Aarseth, Espen. "A narrative theory of games". Conference: FDG'12. pg.131
[105] Ibid. pg. 132

Focusing on the attributes assigned to the World category, there is a spectrum of Inaccessible, Single Room, Linear Corridor, Multicursal Labyrinth, Hubshaped Quest Landscape and Open Landscape, which reflect on different levels of accessibility of the game world. Inaccessible worlds are entirely consisted of extra-ludic space, meaning that they are pure narrative form. All of the other types of worlds offer at least some minimal interactivity. Looking at the category of Events in Inaccessible Worlds, Aarseth notes that the events in such case are fully plotted. Novels and films share this inaccessibility. The other attributes of the World category demonstrate a varying degree of ludic space which is made available for the player. This in turn affects the narrative kernels of the game world. These kernels are scripted points in the narrative to which the player arrives or triggers with his actions. As Aarseth notes, in Pure Games, there are no kernels (scripted points), which means that there is no inherent dramatic structure to the game played in the traditional sense of drama. Here I note that these types of games, popularly known as sandbox games, can have a dramatic narrative that arises from the style of playing. For example, in *Minecraft*[106] the player has to gather resources from the environment and build different types of tools and objects in order to survive. The survival has no intrinsic point and the player may set the goal of his playthrough by himself. Some players have decided to build 1:1 ratio replicas of Hogwarts, while others just roam the world and try to survive. With higher difficulty settings, the environment becomes more hostile and survival depends on quick actions and careful planning. Finding the right resources to build the walls or weapons that will protect the player from the creatures of the night becomes a dramatic tension. This is close to Murrey's stance that even if there is no scripted narrative, or using Aarseth's terminology, the game has no kernels, there is a dramatic tension imposed through the mechanics of the game and the set goal.

Aarseth's model to some extent reconciles the extremes of both views. One of them stated that everything in a game is a narrative. The other stated that games are structurally different from the narrative forms due to difference in the time of happening. What I observe here is that the level of accessibility to the world may allow for different degrees of interactivity with the narrative. This is due to Juul's observation from earlier

[106] Minecraft. Mojang, 2011.

that traditional views on narratives happen in different time than the moment of interaction. Interaction and play happen in the present, whereas the traditional narrative happens in the past. Additionally, with Aarseth's model games and other interactive experiences can have various relationships with the narrative structure which is dependent on the degree of accessibility of the game world. This effect on the extent to which players and VR users have influence over what happens in the experience.

In a similar context but focusing on characters in games, Klevjer refers to Newman's conceptualization of 'offline' sequences in the game and 'online' actions as fundamentally different. For example, cutscenes which are prominent element in computer game narration, are considered to be off-line sequences. Klevjer defines cutscenes as "a cinematic sequence that suspends regular gameplay in order to convey plot, characterization, and spectacle. In broad gameplay terms, cut-scenes contribute to structure and pacing in story-based single-player games."[107] Consequently, Klevjer observes that the players (I will add any users of interactive narratives) must have a dynamic role in these types of ludonarrative structures. An offline character becomes an object in the story space, whereas the online character is considered to be a *"vehicular embodiment"*.[108] This vehicular embodiment means that the character has gained agency to progress the playable and the narrative structure of the experience.

To simplify the overall conclusion in the examination of time in relationship to narratives and interactivity, I propose that looking at the role of the user/player in both cases will give clear distinctions. The inaccessible world has fully plotted events which happen in the past time, thus giving no agency to the user which in turn makes it an offline character that is an object to the story. In accessible worlds users can have various degrees of influence over the narrative structure, which turns them into online characters that interact with the experience in present, real-time. The user's position is binary, either online or offline. When the user is online, the world is automatically accessible to some degree and this can have different effects on the narrative structure depending on the design of the game/experience.

[107] Klevjer, Rune (2014). "Cut-scenes". In M. J. P. Wolf & B. Perron (Eds.), The Routledge Companion to Video Game Studies (pp. 301-309). New York: Routledge. pg.2
[108] Klevjer, Rune. "What is the avatar?". University of Bergen, 2006. pg.62

My proposal is that this framework of online/offline characters, accessible/inaccessible worlds and unplotted/plotted narratives, can be equally applied when analyzing the broad spectrum of contemporary VR experiences. It can serve as a framework that gives a specific answer when analyzing how narratives and interaction play out. I believe that this is crucial for design purposes as well, since accessible and inaccessible (interactive and non-interactive) worlds have different modalities through which they convey the narrative. I have observed this in sections 1.7., 1.8. and 2.1. Adding to this the specific modalities of the FPP, the complexity of the narrative and the interactive possibilities expands further.

2.3. CASE STUDY ON DIFFERENCES IN VR NARRATIVE FORMS

In order to observe these differences, I will analyze the structure of the interactive VR installation *Anthropia* (Fig. 4) created by the art group MAKROPOL.[109] The work was presented in Copenhagen Contemporary, Denmark in 2017 and incorporates several different applications of VR in one unified experience. I have discussed with MAKROPOL's producer Mads Damsbo on the processes of creating such work.

The core concept behind *Anthropia* arises from the mixture of the age of humans, the Anthropocene, and utopia.[110] Creating a new, human space, the authors want to produce an experience that explores the human nature and the rules of a reality that is slightly different than the everyday world. The overall VR experience is constituted of several different stages that involve different use of the VR narrative. The experience begins in the waiting room. One member of the audience is taken by a performer to the preparation space where he transitions into the virtual world. The user is placed on a podium facing a mannequin. The performer explains the experience and makes a pact with the user that he is willing to go into this new reality. Then the performer places a backpack laptop and HMD on the user so he will have the ability to move freely in the physical and the virtual space. This stage has a ritualistic and dramatic aesthetics that give the aesthetics of the overall experience. In the virtual environment, the user

[109] Anthropia. MAKROPOL, 2017.
[110] Damsbo, Mads. Interview with Stefan Palitov. Audio. Denmark, 2018.

observes the mannequin and the walls. They are modeled in the virtual space exactly over their physical counterparts in 1:1 ratio. The user is instructed to adjust to the virtual environment by touching the mannequin which is present both in the virtual and the physical environment.

Then the user goes into the main space. In 400 square meters he sees five different mini-golf courses, each marked by a number. When he approaches the first course, a floating golf club appears. If the user steps on the golf course he can reach out to the golf club and take it. The golf club and the golf course are also virtual and physical objects modeled in 1:1 ratio (Fig. 5). Holding the physical golf club and standing on a physical mini-golf course, the user can hit a virtual ball into a virtual hole. If this puzzle is completed, the user is transported into a new virtual environment of a 360-degree movie. When the movie is finished the user is transported back into the initial VR environment and he proceeds to the other courses where the same principle of engagement applies. The mini-golf puzzles are progressively more difficult. Completing each course awards one five minute 360-degree movie that artistically explores different facets of the human reality. When all of the courses are completed and the five movies are watched, the user goes to the final position. There, he hits the ball into nothingness. The walls and the floor disappear, the roof goes up and everything becomes white. The objects from the movies show up, grow in size and float around. The user takes off the HMD and finds himself in the center of the big room. Other people around him playi different parts of the experience he just went through.

Analyzing when the user is in ludic and extra-ludic space reveals the difference of the interactivity within the VR narrative. The space where the user interacts with the mannequin is the first encounter with a virtual environment. This part is an entry point into the experience and serves as a tutorial for the basic modalities that are used in the overall experience. Damsbo refers to this part as a "synchronization time and space"[111] where the audience adjusts itself to the new world and the rules that govern there. In this instance, similarly to the multi-sensory experiments described in section 1.7. the user has a haptic feedback to the visual mannequin. Applying multi-sensory stimuli was a proven way to increase presence. Additionally, the creators train the user to expect

[111] Ibid.

that in this experience he will encounter visual objects that will also have physical presence. Is this part of the experience ludic or extra-ludic? The user can interact with the environment freely through the faculties of the body which would place this experience in the ludic category. However, the ludic spaces in games have to progress the gameplay. There are no obvious game elements or puzzles to be found around the mannequin, so it is questionable if this is a ludic experience. I would argue that this is a ludic space in the same way as any tutorial level in a game is. These levels teach you the basic mechanics of interactivity you have within the game world. In this part of *Anthropia*, the user is taught of the modalities which constitute the interactive part of the VR experience – the visuals and the haptics. The user tests out the multi-sensory pairing which creates understanding of the rules of the world.

Entering into the main area, the user encounters a mini-golf course that he can interact with. These golf courses are the core of the gameplay of the overall experience. The puzzles have different difficulties, but require at least minimal amount of participation by the user to be completed. The golf courses as puzzle elements are ludic spaces in the VR environment. Even though in the first course once you hit the ball it goes into the hole from the first try, I argue that this is another part of the tutorial. The user already knows what are the sensory modalities of the experience and now he is learning about the interactive modalities. Here the play is used to get acquainted with your capabilities as a user, even through a simple action like hitting the virtual ball. The other courses require for more skill in order to be completed, thus making the gameplay element and the ludic space much more visible.

Once the course is completed, a 360-degree movie is triggered. Analyzing if this part of the VR experience is ludic or extra-ludic brings back the general discussion of the nature of 360-degree videos. The points against the 360-degree video being VR was addressed earlier in Chapter 1. Recalling Laurel's demands in the purist VR approach observed in 1.2. clearly demonstrates that the user has extremely limited affordances of agency in this part of the experience. In these movies there is no way to influence the narrative structure. However, what I have observed from section 1.5. to 1.7. is that the ability to control the POV can be essential for establishing FPP. Although this gives minimal agency it is some ability given to the user to choose how to engage

with the VR narrative. In the case of visually established FPP like in 360-degree videos, the user is given the kinesthetic sensation and ability to move the head. This may not have any effect on the narrative but may affect how the narrative is being perceived.

However, I would not propose to go to the extent to describe 360-degree videos as ludic spaces simply because the user may fail to observe the narrative. My stance can be contested if we argue that the goal for some VR experience may be to successfully observe the 360-degree space and uncover information crucial to the narrative. However, it is very difficult to defend that there is a play occurring when there is no reciprocal reaction to the actions by both the user and the environment. In this case there are no mechanics for the VR environment to respond to the user looking in any particular direction. Without this response play cannot occur.

However, there are 360-degree videos that may be closer to play than other similar experiences. The work *There is Still Time…Brother*[112] by the Wooster Group is a panoramic movie which allows the user to observe different parts of the narrative depending on the direction he faces. In this experience the user is seated on a swiveling chair in the center of a panoramic room. The movie is consisted of several different storylines that overlap from time to time. They are presented simultaneously on the panoramic screen in their own specific area. However, everything is blurry except for the section of the screen which is directly in front of the user. Only the sound of what is visible is audible as well. As the user swivels the chair, he reveals different parts of the other narratives. The user can decide to move at any time thus following different sections of the stories. Cumulatively, in the end they come out as a unique narrative. Although the user has no direct influence over the narrative structure of the videos played, he has influence of the overall narrative through the action of observation. Potentially, the overall narrative can be reshuffled indefinitely, meaning that the user creates a unique narrative through the interaction with the 360-degree movie. In this case, the entire installation is a ludic space. Why is *There is Still Time…Brother* a ludic experience? The chair and the HMD are giving essentially the same affordance – to control the POV. However, most 360-degree videos have only one narrative line playing out in the space. There is no freedom to play with the narrative structure of the overall

[112] There Is Still Time… Brother. Wooster Group, 2007.

experience in a sandbox manner similar to setting a goal in *Minecraft*. This shows that 360-degree videos can be both ludic and extra-ludic. In the case of the extra-ludic 360-degree videos this is a paradoxical situation. Due to the embodiment of the user through the FPP, the presence in VR format is always in the present time. There is no objective distance to a finite artistic object with different narrative and discursive time. However, the content cannot be influenced since it is in the fixed past time. In the case when the user is given the affordance to control the overall final narrative, even by picking up which extra-ludic parts of the video he is going to include, the experience becomes ludic and influences the narrative which is fixed in the past.

Finding a comparison with the computer game narrative devices, I point out to the difference between a cutscene and a playable cinematic. The cutscenes suspend the gameplay and make the user an offline character. The playable cinematic on the other hand, combines cinematic and interactive elements, making the user an active participant. In the *Witcher* games mentioned earlier, as well as in many other plot driven games, such narrative device is common. The player participates in the cinematic through dialogue choices that can completely reshape the narrative of the entire playthrough. Some games, such as *Tales From the Borderlands*[113] are made almost entirely out of such narrative devices. Cutscenes and playable cinematics are distinctively non-interactive and interactive. The cutscene is an extra-ludic space and delivers the narrative through movie modalities. The playable cinematic is a ludic space and delivers the narrative through some interactive modalities. In this parallel I would argue that *There Is Still Time…Brother* is close to playable cinematic, whereas the dominant style of contemporary 360-degree movies are close to the cutscenes.

Returning to the five 360-degree movies that are part of *Anthropia*, I observe that in that case there is no affordance of agency. The user goes from active state of playing into semi-passive state of observing. He is trapped into the movie since it is everywhere he looks, but there is no way to make the narrative happening in the present time through his agency. This reflects the view of Klevjer and Newman on cutscenes in computer games which was analyzed in section 2.2. The 360-degree movies in *Anthropia* suspend the gameplay to deliver narratives that shape the overall experience,

[113] Tales From The Borderland. Telltale Games, 2014.

in the same manner as cutscenes do in computer games. The user turns from online to offline character. After the movie is done, the user becomes an online character again and continues to the next golf course where he engages in play with the next puzzle.

In this section I analyzed *Anthropia* because it offers several layers of analysis. First, the opening initiation stage where the audience was prepared to be a user/player was modeled as a participatory drama. Then, in the virtual environment there were two narrative structures. One was the ludic space of the mini-golf gameplay and the other was the extra-ludic space of the 360-degree movies. The suspension of gameplay creates a dynamic in the overall narrative experience that is very similar to how cutscenes suspend gameplay in computer games. Also, I observed that 360-degree movies may be of ludic nature as well, when designed as *There is Still Time…Brother.*

Second, the narrative experience of *Anthropia* is linear. Damsbo stresses that their goal was to create linearity from the start, since the power of linear storytelling enhanced the overall experience.[114] If we look at the overall experience using Aarseth's language, there were no dynamic kernels, meaning that the user could not influence the scripted plot point. The courses where played from number 1 to 5 and the experience would not progress if the user would decide to jump one course. This linearity and dynamic change from ludic to extra-ludic space and back, shows that in this particular experience the VR narrative as a format may adopt different forms.

The success of the linearity also demonstrates that the extreme demands of the purist VR approach to give affordance of agency over the narrative or the ability to move freely in the virtual environment is not be critical in every case. In *Anthropia*, the audience has the freedom to go where they want. This was an intention of the creators in order to create believability of the space. However, the audience followed the design of the experience and of the game mechanics, choosing not to take that freedom.

I observe that in VR experiences, similar to computer games, there are two different themes regarding the narrative's nature. First, they can be accessible or inaccessible worlds, which means that they can be ludic or extra-ludic. Second, if they are ludic, the narrative can take various forms, from linear to sandbox and everything in between.

[114] Damsbo, Mads. Interview with Stefan Palitov. Audio. Denmark, 2018.

I argue that this diversity of the narrative structure in the VR experience demonstrates that the VR narrative format is not tied to a single time of happening and a ludic or extra-ludic space. Similar to contemporary plot-driven computer games, the VR narrative may consist of different narrative devices. In this context, the classification that one VR narrative device is VR where another one is not, may not be easy case to make. Furthermore, I observe that these differences should be classified in the design context, so creators would know which narrative device is delivered through which modalities. Then the creators would decide to use the VR narrative device that works best for their intention. Consequently, 360-degree video can be seen as another manifestation of the audiovisual modalities. Remembering Slater's position from 1.6. that VR can be built only on one modality, this can be seen as a justification of the position that 360-degree videos are VR experience. They are simple and minimal in the modalities used but belong in the category nevertheless. Further pairing with other modalities such as haptics, smell or heat, similar to what was analyzed in *Separate Silences*, expands the narrative devices that the creators have. The complexity of making these distinctions is also promoted by the exclusively FPP of the VR experience. As analyzed in Chapter 1, the FPP embodiment carries the inherent intentionality to act. This can range from simple head movements to complete freedom to navigate the space and influence the narrative structure. However, as observed through the example of *Anthropia,* different modalities afford for different agencies and stimuli. In case when the agency of the user is limited, such as in the 360-degree movies, the narrative justification of why that is so may be a critical point to suspend the disbelief. Regardless of which modalities the creators choose to be dominant in the specific VR experience, they enter into a form of negotiation with the users regarding the reality of the virtual space. The creators present a reality with its own rules and similarly to a computer game, must be consistent with the nature of interaction that is offered to the users. If the narrative is not supported by the modalities and vice versa, a dissonance occurs. In the following sections I will analyze how this tension between the interactive and the narrative element is implemented in various contemporary VR works.

2.4. THE LUDONARRATIVE DISSONANCE

My approach to observe VR narratives through the lens of computer games revealed some concepts which are applicable to both ludic and VR experiences. The most prominent elements were the similarities with the magic circle and the accessible/inaccessible world structures which reflect on the level of interactivity. Using computer games as a comparison opens up the question of the possible similarities between the goals of both experiences. Computer games are usually charged with the expectation that there has to be a winner – either by beating the game or by beating other players. This is mostly evident in Suits' position observed in 2.2 that the lusory goal is ever-present inside the magic circle. But what is the end goal in a game when there is no explicit narrative purpose or game mechanics to beat the game? In the case of *Minecraft*, given as a sandbox game example, there is no explicit way to win. There is the most difficult challenge of beating the dragon, but that is not the narrative goal of the game and it doesn't end the playthrough. However, there is a way to lose the game and that is to die. Therefore, regardless of what is the narrative goal that the player may impose on himself - killing the dragon or making a Hogwarts replica - in the broadest sense 'winning' means to survive. Other forms of non-competitive games consider different goals. For example, Caillois observes that in games of mimicry the player's goal is to stay in character.[115] Playing successfully means that at no circumstances the player breaks out of character. If the player stays in character - he wins. I argue that this diversity of goals occurs because the existence of the magic circle and its seriousness. As Huizinga observes, there is a sanctity of the magic circle in the necessity to abide to its rules. When the rules are broken the magic circle is broken.[116] The basic goal of the magic circle is not to break it. I argue that the baseline of the VR format has similar expectation as the mimicry games. Regardless of the level of interactivity, the existence of game mechanics or their omission, the goal is not to break the sense of presence in the virtual environment. All of the possible narrative devises and game mechanics are built on this presence. This relationship is mutual, in the sense that after basic

[115] Caillois, Roger. "Man, Play and Games". University of Illinois Press, 2001. pg. 21
[116] Huizinga, Johan. "Homo Ludens". Routledge & Kegan Paul Ltd. 1949.

technological requirements for immersion are established, the presence can be influenced by the game mechanics and the narrative devices. From this I conclude that there are two aspects of VR to which the principles of the magic circle may apply. One is the content of the specific experience, the game, the movie. The other is the medium itself, with the embodiment it promotes and the sensorial stimulation that it uses. This means that any friction between the narrative and the interactive elements of the experience can occur on both levels. As I observed in section 2.2, the interplay between the game mechanics and the narrative can be difficult to synchronize. This tension arises from the difference of what the experience is about (narrative) and what the experience affords the user to do (mechanics). In ludology this is known as the ludonarrative dissonance. I analyze this concept and see if it applies to the VR as well.

The ludonarrative dissonance was coined by Clint Hawking in 2007 in a blogpost that analyzed the computer game *Bioshock.*[117] Hawking observed that the game had a conflict between "what it is about as a game, and what it is about as a story".[118] The game places the player in an underwater society built by rich people that were conducting experiments to extend their human powers. After the experiments fail the entire city goes insane. Hawking observes that there are two contracts the game makes with the player. The ludic contract is 'seek power and you will progress'. This progress is facilitated through acquiring a substance called Adam, which is used to gain powers. The player can harvest Adam by absorbing reoccurring characters in the game called Little Sisters. Hawking notes that here the game ties the game mechanic to a narrative structure that supports the theme of the game. The player does what is best to succeed without consideration for the others. The second contract is a narrative one. In order to progress the game, the player must help Atlas who is opposed to Ryan. Hawking sees a problem with this contract since "helping someone else is presented as the right thing to do by the story yet opposite proposition appears to be true under the mechanics".[119] Furthermore, this contract does not allow the player to choose sides in the conflict between the characters. Makedonski formulates this issue in the following manner:

[117] Hawking, Clint. "Ludonarrative Dissonance in Bioshock". Blog. *Click Nothing*, 2007. I
[118] Ibid.
[119] Ibid.

> "At its core, the ludonarrative dissonance is the idea that when a game tells the player one thing though its story and environment and then contradicts it through the gameplay, the player becomes unimmersed and disconnected from the experience to a degree."[120]

Similar to the previous two positions, Ballantyne elaborates that "games construct a set of beliefs through the mechanics and the story by reinforcing actions in line with intended behavior".[121] As Ballantyne elaborates, following the game mechanics completes the objective, which progresses the game and awards the player. He exemplifies this with a zombie game in which the narrative tells the player that eating the zombies is bad but doing so gives the player powers through which he progresses the game. This conflict can create the ludonarrative dissonance. Comparing it to cognitive dissonance, Ballantyne states that "ludonarrative dissonance isn't about your beliefs, it is about the system's imposed beliefs".[122]

I propose that the ludonarrative dissonance can occur in VR experiences as well, in the same way it may occur in computer games. Additionally, I also propose that the ludonarrative dissonance may be present in a broader context. Because of the FPP embodiment there can be a conflict between the inherent intentionality to act and the VR format itself. As I observed from section 1.4. to 1.7. and in section 2.2. the embodiment in the virtual environment is established through FPP modalities that have inherent qualities on their own. Furthermore, even a simple visual modality does not encompass only visual sensations, but also kinesthetic sensation – the ability to move the head. Observing embodiment in 1.5. I concluded that the FPP has the intentionality to act attached to it. This occurred because of how we observe our bodies, how we interact with the environment through touch and the ability to move around. However, quite often VR experiences and especially 360-degree videos do not allow for movement or use of the hands. This may cause a ludonarrative dissonance between the above-mentioned principles of embodiment and the lack of their full manifestation in the narrative and the mechanics of the experience. In such situations the users are in conflict with the experience. This is why I argue that if the VR experience to some extent

[120] Makedonski, Brett. "Ludonarrative Dissonance: The roadblock to realis" Blog. Destructoid, 2012.
[121] Ballantyne, Nick "The What, Why & WTF: Ludonarrative Dissonance" Blog. GameCloud, 2015
[122] Ibid.

is seen as a magic circle. Thus, its defining rules will be concerned with the fidelity constructed by the modalities which are included.

Therefore, I propose that the concept of the ludonarrative dissonance occurs on both levels in the VR experience. First, as defined by ludology, it is a conflict between the game mechanics and the narrative. Second, in VR it is also a conflict between the embodiment and affordance of the design. To use the parallel with Caillois and mimicry games, the VR user may accept the mimicry of the embodiment in the virtual environment and is willing to stay in character, but the environment may not allow for him to play out the embodiment of that character. This is why I am making a distinction between traditional ludonarrative dissonance and VR ludonarrative dissonance.

This is an issue that arises from the relationship between the VR creator (game designer) and the user (player) through the VR experience (computer game). Furthermore, the level of agency allowed to the user makes the world accessible/ inaccessible (ludic/extra-ludic). This creates the spectrum of VR experiences for which the creator must have different expectations of the user's actions. To better illustrate this relationship, Joseph Bates gives the analogy with chess:

> "One approach is to see them in a kind of two-player game, such as chess. The director and user are taking turns, the user acting as a free agent in the world, the director looking down from above and very gently pushing the elements of the world in various ways. The director is constantly trying to maximize the chances of a pleasing overall experience, no matter what the user does along the way. If we elaborate on the chess analogy, the pushes of the director and the actions of the user are the moves of the game. The director wins if the complete history of the world is consistent with the creator's aesthetic goals, thereby presumably pleasing the user."[123]

According to Bates, the creator should develop a proper response to the actions of the player that will progress the experience in a satisfactory way. In a sense, the creator should make a contingency plan for any action by the user in order to manage the experience. Here I note that the extent of this contingency depends on the level of freedom that the user has. In other words, to the extent of which the world is accessible. The bigger the freedom, the greater the options, the more complex the contingency

[123] Bates, Joseph. "Virtual Reality, Art and Entertainment" in Presence: Teleoperators and Virtual Environments. Vol. 1, 1991. pg. 133-138

plan. As Meyer observes, increased freedom given to the user to interact and change the narrative poses an issue with the carefully intertwined elements required for a traditional dramatic structure.[124] One of the solutions that Makedonski gives to the issue of the ludonarartive consistency, is that game designers should create an ever-evolving games that are responsive to any action by the player.[125] Instead of "focusing on telling a particular story, the developers would have to give the player the means to make a story" or more explicitly phrased "the developers would need to surrender the power that they have over the story and put it in the players' hands".[126] This resonates with Ascott's view on telepresence experiences in 1.3. of which VR is part of. He argued for decentralization of the storytelling power, similar to Makedonski's position.

However, there are several issues of giving a full freedom to the player. In one of the seminal game design books *The Art of Game Design,* Jesse Schell analyzes the idea of computer games as story machines that would allow the player to craft his own story. However, in the same line with Mayer and the narratology views in section 2.1. Schell observes that good stories have unity in which the parts can not be removed. Additionally, the combinatorics behind storylines that are completely alterable to accommodate any possible decision by the player are too advanced to be replicated by a human and the current technological level.[127] He mentions games like *SimCity*[128] and *RollerCoaster Tycoon*[129], both sandbox simulators, as games that do function as story machines, even though they are not interactive stories in the sense that we would expect from a drama structure to be interactive.[130] For me this resonates with both Bates' and Laurel's view on VR as a 'fantasy machine' which can create an experience the user would desire. However, they note that these experiences are tied to specific constitutive elements such as cognitive/emotional agents, dramatic structure and

[124] Meyer, Keneth. " Dramatic Narrative in VR " in Biocca & Levy. "Communication in the Age of Virtual Reality". 1995. pg. 230
[125] Makedonski, Brett. "Ludonarrative Dissonance: The roadblock to realis" Blog. Destructoid, 2012.
[126] Ibid.
[127] Schell, Jessie. "The Art of Game Design". Elsavier, 2008. pg. 266
[128] SimCity 3000. Maxis, 1999.
[129] RollerCoaster Taycoon. Chris Sawyer Production, 1999.
[130] Schell, Jessie. "The Art of Game Design". Elsavier, 2008. pg. 265

presentation style.[131] [132] This means that the experience is not "go-wherever-do-whatever" in its nature, but it is tied to a specific framework. This shows that depending on the design approach of the creator, similarly to computer games, the experience will incline between the extremes of sandbox and linear structures. As I have observed earlier with the example of *Minecraft*, sandbox experiences give both narrative setting and freedom to the player to develop their own story through the playthrough. Makedonski saw this transmission of the storytelling power from the creator to the player as a possible solution of the ludonarrative dissonance. Reflecting on Schell's positions on the issues for fully interactive storyline, I note that sandbox games are not completely free – they are bound to the rules and the narrative setup of the game. In *SimCity* the players may decide to build the city anyway they want, but they are not building a space colony. The framing through narrative and game mechanics in sandbox games is present in the name 'sandbox'. The player is in a box - framework where he is allowed to take certain actions while not allowed to take others. Comparing both VR and computer game experiences, I note that these elements overlap. In more accessible worlds the VR creator and the game designer become a guide of the narrative frame of the experience.

In similar spirit Aylett & Louchart propose the relationship between the VR creator and the audience to be similar to the one of the actor and the audience in interactive theatre.[133] The audience has the power to pause and progress the story while the actor has to be responsive to their actions. This reflects Bates' metaphor of VR as a game of chess where the progression of the game is done in response to the action undertaken by the opponent. Aylett & Louchart proceed:

> "The consideration of the user and his or her behavior as a primary resource for the storytelling system, brings a different perspective to the role of the user within the story, a character based interactive storytelling system. User and character together should provide, under the supervision of a "Drama manager", the material needed for the formation, development and unfolding of the narrative."[134]

[131] Bates, Joseph. "Virtual Reality, Art and Entertainment" in Presence: Teleoperators and Virtual Environments. Vol. 1, 1991. pg. 133-138
[132] Laurel, Brenda. "Towards the Design of a Computer-Based Interactive Fantasy System". PhD. Ohio State University, 1986.
[133] Aylett, R. & Louchart, "Towards a narrative theory of Virtual Reality ". S. Virtual Reality, 2003. 7: 2. pg. 13
[134] Ibid. pg. 17

This role of the creator as a drama manager proposes a careful balance between control and freedom. They further clarify that this interaction is similar to the drama manager in live role-playing games (LRPG). The most prominent example here is the dungeon master in the table-top *Dungeons & Dragons*. The players have the freedom of action while the dungeon master keeps the narrative setup under control by triggering plot points and external events. The goal of this type of drama manager is "only to intervene in order to regulate the dramatic interest of the narrative, directing the narrative flow for this purpose but not imposing it upon the users".[135] On a smaller scale, similar mechanics are already present in the VR experiences I analyzed in this thesis. In *Anthropia,* the user encounters a floating virtual golf club at the first golf course. The user can go anywhere, but since this is the closest active object they decide to interact with it. If they decide to grab it while standing outside of the course the golf club floats away. If they step on the golf course they can successfully take it in their hand, thus progressing the narrative in the desired direction. The golf club is both virtual and physical, meaning that there is a person moving the golf club in the physical world with a tracking sensor on it, responding to the actions of the user. The person is invisible in the virtual world, making the golf club to have an independent presence in the narrative. Damsbo notes that the way they lure in the user on the golf course is intended design element to keep the narrative under control (Fig. 6).[136] This is the core role of the drama manager. In computer games such as *Witcher,* the drama management occurs through the choices given to the player in the playable cutscenes and through the events triggered at different locations in the game world. However, the management through the playable cinematic is less integrated with the player due to the nature of interaction. By clicking on dialogue lines this mechanism is more visible, whereas a seamlessly responsive environment such as a sentient golf club hides the dramatic management from the user.

[135] Ibid. pg. 18
[136] Damsbo, Mads. Interview with Stefan Palitov. Audio. Denmark, 2018.

2.5. THE LUDONARRATIVE DISSONANCE IN VR EXPERIENCES (CASES)

The different techniques for progressing the storyline in VR experiences and games alike, can be connected to the level of freedom given to the users to interact with the virtual environment and the narrative structure. In freer formats the initial reaction of the creator is to promote an interaction where the audience feels that they have chosen to take the actions they did. Damsbo notes that in *Anthropia* the design of the space and its narrative elements promote a desired behavior. The audience is given the affordance to walk freely but chooses not to. This is nothing else but "the illusion of free will".[137] The only freedom that was given to the audience is regarding the time they will take to get from one golf course to the other and to some extent how they will play the holes. However, Damsbo notes that the users reported strong sense of agency regardless of any limiting factor that the linearity of the experience imposed on them.

Similar approach in dealing with the ludonarrative dissonance is also proposed by Makedonski. This position, in contrast to the freedom-oriented approach he already offered, states that the linearity of the experience should be preserved.[138] Many contemporary plot-driven games are linear and that has no effect on their quality and popularity. I argue that this resonates the view of the narrative demands of the dramatic structure which is preserved in linear stories. This gives most of the narrative control to the game designer. The designer is able to craft the possible interactions to support the story structure as intended. Here I find the reason why many VR creators insist on 360-degree videos as VR – it is easier to control the audience and still create an immersive experience. The possible tension between the freedom and the restriction in the VR experience can be controlled in this manner to some extent. However, as observed by Hawking, just like in the case of *Bioshock* this linearity can be in clash with the freedoms that the player desires. I see this position as an observation that the freedom and the restrictions that are in play must be in synch and mutually justified.

As I have already proposed, a broader version of the ludonarrative dissonance may happen in VR on two levels. The traditional one in a standard game context,

[137] Ibid.
[138] Makedonski, Brett. "Ludonarrative Dissonance: The roadblock to realis" Blog. Destructoid, 2012.

between the game mechanics and the narrative. The VR one, between the embodiment and the affordance of the design. These affordances are interacting with the narrative. In *Anthropia* this is visible in the switch between the interactive and cinematic part of the VR experience. When the 360-degree movie suspends the gameplay there is no narrative justification for such suspension. The user is transported from ludic to extra-ludic space. The user that could walk freely and engage with the golf course, now has to stand and do nothing except to look around in an immersive story which does not allow him any agency. However, the dissonance between the ludic and the extra-ludic space in this particular work is to some extent balanced since it is established early on that completing a golf course transports the player to another world with different rules.

Looking at 360-degree cinematic experiences such as *Separate Silences*, I observe that the narrative justification of the restriction of movement and agency that the user has, makes the initial embodiment successful. The user is given some modalities of the visual FPP, kinesthetic sensation of moving the head and visuals of a body, but he is not given the modalities to move the body or to interact with the environment. This initially causes the VR ludonarrative dissonance to occur, since it contradicts with the inherent intentionality to act. However, the creators use the narrative to justify these restrictions. The user is in sleep paralysis. MANND also used multisensory stimuli by paring visuals with haptics and smell, which in section 1.6. was shown to have a positive effect on presence. This also has an effect of a justifier of the position of the user. It demonstrates that the virtual body belongs to the user, but it cannot be moved for the reasons explained by the narrative. MANND's main idea is to create horror experience out of suspense.[139] Unlike experiences where the user can interact with the environment and possibly uncover a scary situation, the suspense and horror in this experience is tied to cinematic suspense heightened by the vulnerable presence in the virtual environment. This allowed MANND to keep the linearity of the story which gave them access to cinematic modalities to create tension. Additionally, it gave them narrative justification of why the position of the user is restricted. Here the VR ludonarrative dissonance has been used in a constructive manner through the narrative justification. Similarly to this, Ballantyne observes that the ludonnarative

[139] Ungermand, Signe and Engermann, Maria H. Interview with Stefan Palitov. Writing. Denmark, 2018

dissonance can be used as a narrative devise. As he argues, this devise can be used to influence the players to think or act (or don't act) in a desired way, if the intention of the designer is to create such conflict in the perception of the player.[140] Similarly to this, in *Separate Silences* the expected affordance of the embodiment and the given affordance by the narrative, create a VR ludonarrative dissonance that imposes a state of being over the user. This state of being functions for the intentions of the creators. Situations such as these promote the idea that the ludonarrative dissonance can be avoided or used as a storytelling tool in an interactive experience according to the needs.

Analyzing similar VR narrative experiences that have different level of interactivity and modalities used, I can observe how the use of the restrictive nature of the ludonarrative dissonance varies. Other VR experiences, including linear 360-degree movies, use similar bed or chair-ridden user position to narratively justify the restrictions. In the VR arcade *VR ZONE Shinjuku* in Tokyo, I tried a VR experience called *Hospital Escape Terror.*[141] In the experience, two people enter a booth and sit next to each other. They are given HMD and a controller. The users are embodied into a wheelchair into a decaying CGI hospital where they are trapped by a madman. The users are separated and have to find each other before a time runs out. Using the controller, they navigate by choosing the direction where the wheelchair goes. The users experience various standard cinematic jump-scares and may get lost in the hospital or encounter someone that can kill them. If they both survive and meet each at a designated location before the clock runs out they are free. Otherwise they are gruesomely executed. In this experience the user is given some affordance of movement with the wheelchair, while simultaneously being placed in a vulnerable position. The entire embodiment is justified by the narrative and to some extent supported by the navigation mechanics. In the similar 360-degree movie *Catatonic,*[142] the user is placed in a wheelchair with bound hands and is pushed by a male nurse through a decaying mental asylum which displays scenes of madness, gore and torture. The user is given the ability to move the head in 360 degrees. Also he is given a

[140] Ballantyne, Nick "The What, Why & WTF: Ludonarrative Dissonance" Blog. GameCloud, 2015.
[141] Hospital Escape Terror. BANDAI NAMCO Entertainment Inc.
[142] Catatonic. Catatonic Co, 2015.

justification why he is bound while his position (the camera's position) is moving. The user has the freedom to observe his body and turn around to see who is pushing the wheelchair. Behind him, the user sees a big, male nurse with soothing fatherly voice that convinces him that everything is going to be alright. Although in sharp contrast with the progressively more bizarre environment, the user is certain that as long as there is someone behind him there are no events that he has to pay attention to in that direction. The soothing voice is constantly present rendering any further examinations in the back unnecessary. This means that the creators successfully have established trust between the user and the virtual character. The trust confines the story in the frontal 180-degrees which already significantly directs the attention. Eventually, this trust is betrayed as the nurse leaves and the user is attacked by a madman from the behind.

I argue that this is a use of the dissonance in a minor, but successful way. The user is given the modality to look wherever he wants, be he chooses not to, because a significant part of the 360-degree narrative space is constant in the information it provides. Then that trust is betrayed, allowing for the horror to come from every direction. The user suddenly possesses the full potential of the modality, but that only increases the feeling of distress. Since this is a horror experience, I would argue that this is the intended goal of the creators. The creators of *Catatonic* understood the possibility of having the tension between the rules of the world and the embodiment and agency they have allowed. When the narrative happens only in one section of the 360-degree environment, the space that is not involved becomes a dead space. This is why applying certain restrictions to the modalities and ways the user interacts with the environment, is a good way to control the VR experience as a drama manager.

The power of justified restrictions to establish a desired relationship with the audience is also noted by user experience designer Lucas Rizzotto. He states that in VR the consistency of the experience gives a feeling of comfort and trust to the user.[143] Additionally, the creator can change the nature of the relationship in order to achieve a specific narrative goal. As Rizzotto frames it, the "freedom and lack thereof is a

[143] Rizzotto, Lucas. Interview with Stefan Palitov. Audio. Denmark, 2018.

narrative device".[144] I note that this relationship, is equally present in interactive and non-interactive VR works.

Here I want to argue that the success of the VR experience is not necessarily correlated with simulating all of the body faculties or having complete freedom over the narrative. I have observed that multisensory experiences produce increased sense of presence. However, if there are any restrictions to any of the modalities, this can be justified by the narrative. The possible occurrence of the ludonarrative dissonance can be used to impose intended narrative interpretation over the embodiment of the user. When creating a VR experience I propose simulating only what is important for the specific embodiment in relation to the content of the experience. In the example of *Touching Masterpieces* I gave earlier, the modality of touch with the haptic glove was sufficient. Since the users were blind and the intention was to give them the ability to "touch" the sculptures, there was no narrative need for any other modality to be included. If in a hypothetical visual VR experience, the user is suddenly "blinded" and has to interact only through the haptics, this would be an effective use of the VR ludonarrative dissonance as a storytelling device. In this specific instance, the VR ludonarrative dissonance happens in relation to the modalities of embodiment, which I proposed as a possible extension of the use of the term. The creator may change any of the established modalities to simulate a change in the narrative.

This means that the concept of simulation in the context of computer games may be applied to VR as well. Frasca have argued that computer games and ludic spaces are simulations because "unlike narrative, simulations are not just made of sequences of events but they also incorporate behavioral rules".[145] This resonates with the observations in section 2.1. and 2.2. regarding the differences between the traditional narrative and the game mechanics as a behavior imposing tools. Furthermore, it resonates with the demand for behavioral rules when someone is present in the magic circle. Even more, it resonates with the idea that modalities have behavioral effects over the user in the VR experience. Frasca elaborates that "to simulate is to model a (source) system through a different system which maintains to somebody some of the

[144] Ibid.
[145] Frasca, Gonzalo. "Simulation versus Narrative: Introduction to Ludology". in Video Game Theory edited by Mark J.P. et al. Routledge, 2003.

behaviors of the original system".[146] He continues that since simulations are reductions by nature there is an ideological component attached to it. This occurs when deciding which factors will be included in the system and which will be left out. The example he gives is that in *Sim City* the player may decide to impose his ideology on how the city is run by omitting plumbing, focusing only on agriculture, etc. I argue that imposing this ideology through simulation also happens from the designer to the user. For example, in the game *Truck Simulator*[147] the player can drive a truck and deliver the goods to a designated location. However, the player cannot decide to get out of the truck and walk home to his family. In *Sim City* the simulation allows the player to take the role of the mayor, but is not allowed to interact with the world outside of that role. Additionally, even the role itself is ideologically restricted. The player cannot play a criminally inclined mayor for e.g. The player does not get to experience the totality of being that character, but a simulation, a reduction, which focuses only on a specific part of that role. Applying this view to VR, I observe that the creator simulates only the relevant part of the experience. From this I conclude that simulating a VR experience is reductionistic, not only in the narrative but also in the modalities. However, since there is a simulation of embodiment, the inherent demands of that embodiment have to be addressed. This is done either by giving the user full access to them, such as movement and interaction with the environment, or they are restricted and justified by the narrative.

In the comparison between the three horror VR experiences with a similar immobile embodiment I analyzed how simulating only some modalities will differ depending on the level of interaction with the virtual world. In VR ZONE Shinjuku, there are various device-specific VR experiences that can be analyzed comparatively in this context. The following analysis is based on my personal experience with each of them. Significant part of the VR experiences available there involve some form of cockpit or vehicle that is operated by the user. In *Mario Kart Arcade GP VR* the users play a VR version of the famous *Mario Kart*[148] console game. The users sit in go-karts, wear HMD, headphones and have trackers on their hands. In the virtual environment they are embodied as one of the drivers and get to race their friends. In addition to the simulation

[146] Ibid.
[147] Truck Simulator. SCS Software, 2008.
[148] Mario Kart Arcade GP VR. BANDAI NAMCO Entertainment Inc.

of driving the go-kart, the users can pick up power-ups from the road and attack other players with their hands which are present in the virtual environment as well. The go-kart also shakes and vibrates according to what it encounters in the virtual world. All of these elements create a multisensory experience that combines different modalities. First, the user drives the go-kart which is a major modality regarding motion. Second, the go-kart responds to the obstacles in the virtual environment which serves as synchronous haptic modality to the visual stimulations and the agency. Third the sound supports the environment adding an extra layer of fidelity. Fourth, the user can use his hands and directly influence the environment. Finally, the HMD gives access to a 360-narrative space in which the user can look back and see how close the opponents are.

In this experience there are three modalities which are not simulated and may cause a ludonarrative dissonance. First, the user is given a vehicle he can control which simulate the modality of movement. However, he is restricted to the ludic space of the racing track. This may cause traditional ludonarrative dissonance. Still, that is avoided since the narrative justification for the restriction is set by the fact that the experience is a race. There are no indications that the user can interact with the world in any other way but to drive the go-kart on the racing track. The second modality which is not simulated is the haptics of the items the user can pick up from the racing track. This may cause VR ludonarrative dissonance, between the embodiment and the design. Naturally, the user would expect for the objects to have some weight, which they lack in the virtual environment (Fig. 10). However, the intensity that the other modalities offer, overrides any thoughts regarding the dissonance of weightless objects. The third modality is the lack of a complete virtual body. Many of the contemporary VR experiences that allow agency in the virtual world, do so through the hands. Using trackers or controllers, the virtual hands serve as a substitute for the whole body. I argue that this is sufficient, since it gives the affordance of agency in the space. As analyzed in section 1.5. the intentionality to act is inherently included with the embodiment, so simulating the hands which are the main tool for interaction with the environment is sufficient way to avoid the VR ludonnarative dissonance. In section 1.7. I observed how the experiments in virtual body ownership reinforce the sense of presence through multisensory sensations. In this experience, the kinesthetic sensation,

the agency afforded by the hands and operating the go-kart, the vibrations synchronous to the events in the virtual world and the sound, create a level of simulation of the experience with high degree of presence and avoid any manifestation of the ludonarrative dissonance.

Another vehicle-based experience is *Mobile Suit Gundam: Bonds of the Battlefield.* In this experience users are divided in two team of 4 vs 4 players (Fig. 7). Each player operates a giant fighting robot in space. One team has a goal to destroy a spaceship that is preparing to get into an attacking position and destroy their own vessel. The other team has to defend it from the attackers. In this experience, similarly to the go-kart experience, the user is seated into a cockpit and is given HMD and headphones with microphone. The cockpits shake if the user's robot is hit in the virtual environment. In this experience there no modalities that may cause the VR ludonarrative dissonance. This is because the user controls the flight of the robot in every direction on the x,y,z axis through the cockpit, in which he is present both virtually and physically. The user can look around in space from different windows of the cockpit to get a better view on the surrounding. Since the sense of operating heavy machinery is replicated through the cockpit itself there is no conflict for the way the user navigates the space. However, the possibility of a traditional ludonarrative dissonance is present. The space is big and riddled with asteroids and space debris. Using the microphone, the user can use the environment to develop tactics with his teammates. He may also decide to explore elsewhere and not engage the fight. However, a design hook is employed that pushes the narrative into the conflict. If the attacking team decides not to attack the spaceship they will lose. If the defending team decides not to defend the spaceship they may lose. There is also a ticking clock, the spaceship must be destroyed in a specific time. Although the user is given the freedom to choose to do whatever he wants, he adopts the role the team has and does not wonder off. This may be analyzed as a recognition of the lusory goal in the magic circle that Salen & Zimmerman observed in section 2.2. The design of the engagement promotes that recognition and thus the fight happens. Similarly, Damsbo noted that the choice of the audience is in fact illusion of freedom. In this experience there is no traditional ludonarrative dissonance since the users 'make choice' to engage with the environment as their role demands.

The experiences analyzed above share a similar way of controlling the movement of the user. In addition to the narrative justification, in interactive works such as *Mobile Suit Gundam: Bonds of the Battlefield,* this is also done through the lusory goal (the design of the game mechanics). The users choose to maintain the magic circle because they are playing, thus they do not explore the borders of the virtual environment. Using the lusory goal to avoid the traditional ludonarrative dissonance is also seen in free-roam, location-based VR experiences. One such experience is the multiplayer VR shooter game *Ghost in the Shell: Arise Stealth Hounds.*[149] The users are inside a large empty space and have HMD, a gun and trackers all over their bodies (Fig. 8). The users are divided into two teams and they fight each other. The goal of one team is to capture a briefcase in the allocated time. As seen in Fig. 9 the users are in a virtual environment which is a space with many different rooms and doors. This allows the players to hide and ambush each other. The gameplay is designed as a standard "capture the flag" style multiplayer experience. Since this is player vs. player multiplayer game, the lusory goal keeps the users in the virtual environment.

The game design plays a big part in how the users navigate the space and play the game, thus lowering the risk for a both types of ludonarrative dissonance to occur. The player's actions can produce sounds which are then visualized in the virtual world over the exact position where their body is. This is visible through the virtual walls as well. Parts of the virtual walls are destructible, which means that one player can see another player's sound through the wall and attack. This promotes minimal and careful movement. In this case, the players have the freedom to roam but they don't since that diminishes their tactical advantage.

Another important element of the experience is the increased kinesthetic modality. The trackers allow for free movement into the environment and replicate any movement of the body parts, ducking and leaning in the virtual space. This make the users focused on their presence through intuitive body movement. This further promotes an intuitive behavior with the visual obstacles in the experience. Although there are no physical walls, the users behave as if they are around real walls, peaking from behind the corners. This suggest that successful simulation of various modalities

[149] Ghost in the Shell: Arise Stealth Hounds. BANDAI NAMCO Entertainment Inc.

promotes an intuitive behavior in the virtual environment. Additionally, this demonstrates high presence through Sheridan's related behavioral measure methodology presented in 1.6. Instead of roaming wherever they please, through the successful use of narrative, lusory goal and physical modalities the users are primed to behave in a controlled way.

However, there is the possibility for the VR ludonarrative dissonance to occur if the user tries to touch the virtual walls. Such action creates conflict between the visual information and the lack of the haptic stimuli. In order to create multisensory sensation, some location-based VR companies include the haptic feedback through modular wall setups. Companies such as Asterion VR[150] is one of the examples. They predominantly create combat training simulators. The virtual walls are mapped in 1:1 ratio on physical walls that create rooms. These rooms and corridors are modular, meaning that they can be used to give haptic feedback for other arrangement of virtual environments as well.

The examples in this section demonstrate that freedom and restriction, both in the interaction with the narrative and interaction with the environment through the bodily modalities, are in dynamic interplay that evolves from one case to the other. This case specific interplay can make the dissonance to occur. As I have proposed, the VR ludonarrative dissonance arises from the embodiment into the virtual environment which can be understood as a form of mimicry play. Avoiding this dissonance can be achieved through different techniques, out of which the narrative justification and game mechanics offer many possibilities. I defend this position because the simulation is a reduction of one model of reality into another. The complexity of our everyday reality is impossible to simulate with the current level of technologies. On the other hand, such full simulation is not necessarily required. Simulating the desired modalities, narratives and game mechanics is akin of creating a magic circle. This allows for the creator to develop a space in which the users interact with his version of the reality. The goal becomes for the ludonarrative dissonance to be avoided or in some instances carefully used to create the experiences desirable by both users and creators.

[150] Asterion VR. www.asterionvr.com

CONCLUSION

In this thesis I set to explore the nature of the contemporary VR experience. More specifically, I proposed two hypotheses. First, that the embodiment in virtual environment is what gives the unique quality of the VR format. Second, that the interactive nature of VR is close to the experience of computer games. I proposed that these two views amount to the overall VR experience and should be analyzed together. In order to give a more precise overview on this issue I used theories and findings from many fields. There were also several research questions that were meant to drive the discussion through this complexly interconnected fields.

From sections 1.1. to 1.3. I explored the motivation and the goal of VR experiences. The goal to simulate the mechanics of live experiences is enabled by virtuality – the potential for change of the artifact by the use of a computer. This means that any content or environment that possesses virtuality is able to respond and change according to the behavior of the user and by the design of its creator. The reason for this is to create a telepresence experience – to transport the user into a simulated environment with high fidelity where some interaction occurs. The methods to do so was to give sensory stimulations and some agency to the user through technological means. This opened the question of embodiment and how FPP is created. This was analyzed from section 1.4. to 1.8. Looking at phenomenology, I observed that self-awareness is not established only through the senses, but also through the intentionality to act in the environment which is perceived by these senses. The initial position was that FPP is established through the visual sense, but it was shown that other senses, especially touch, may be used to establish FPP as well. Additionally, it was shown that visual FPP is not only visual – it also brought the kinesthetic sensation of moving the head, thus having some minimal agency attached to it. Touch is related with agency as it is. This was further supported by analyzing experiments of virtual body ownership and sense of presence in VR. The findings showed that multisensory experiences increased the sense of presence. In order to simulate such interaction, different modalities were employed by technological means. At first, these modalities where only sensorial, establishing embodiment and FPP by giving information to the senses. However, it was shown that the VR experiences also encompass the potential of interaction. Therefore, the modalities had to accommodate the ability which affords the user to change the

environment with his actions. This outlined the answer to the question how embodiment is simulated in virtual environments.

Built on the findings from the first eight sections, in section 1.9. I noted that virtual reality is a subcategory of extended reality. Its specific attribute is that it shuts the user from the immediate environment in order to create telepresence experience. Extended reality was defined as a state of technologically mediated first-person embodiment into a narrative. This gave a precise insight of what constitutes the VR experience. However, it also showed that good analysis on what constitutes the VR experience cannot be done without considering its narrative and interactive elements. To simulate the senses and the agency means to simulate them in a certain context or an interpretation. This was further stressed by the fact that the experience varies depending on which senses are simulated and what is the narrative and interactive context.

Therefore, my first hypothesis showed to be partially true. Embodiment indeed gives to VR its unique quality, but that is always done in a narrative and interactive context from which embodiment cannot be separated. Further inspection on embodiment in VR showed that it is not an experience that straightforwardly shuts us down from the immediate environment. Haptics and smell come from outside of the audiovisual FPP. Even more importantly, this asks the question of where is the 'inside' where this audiovisual content exists? It is also an outside environment, relayed to our eyes and ears through HMD in such a way that it becomes the only audiovisual information available. In the case of haptics, if one touches a physical wall that is virtually rendered in 1:1 ratio, is the physical wall the outside reality while the visual wall is the inside reality? This shows that there is a possible inconsistency in thinking that some modalities can be in the virtual environment while others are in the physical environment. My position is that this is solved by approaching VR from the angle of ludology. In the second chapter I argued that the very embodiment in VR can be considered to be a game in a broad sense of the term. These games happen in the magic circle which is a place where different rules to our actions apply. Our actions are reinterpreted. In a similar way the sensorial information and agencies in VR are reinterpreted in the magic circle that creates its own narrative context. The question of 'inside' and 'outside' is not a question of where the perceived information come from. It

is a question if the perceived information is reinterpreted and contextualized in the specific technologically mediated narrative experience – the VR magic circle.

The context of the embodiment given through the narrative and the interaction, was analyzed in Chapter 2. I observed that the traditional narrative story structure has a very specific goal. Its goal is to guide the audience through a well-established process of dramatic conflicts and peripeties and arrive to a satisfactory end of the character and the story arcs. This is done with various narrative devices which the storyteller controls. Regardless of the format specific modalities, any medium that is a finite artifact, such as film or a book, retains the inaccessible structure of the narrative. Compared to film, VR shares some audiovisual representational modalities, but lacks the modality of frame control. Additionally, the VR narrative structure, being interactive in its nature may afford the user to influence its flow. Here I note that there are two separate elements present when discussing the narrative. One is the format specific modalities through which the narrative is conveyed. This is where the embodiment has an effect over the experience as my first hypothesis suggested. The other element is the accessibility that the user has into the flow of the narrative. Any comparison between VR and other narrative formats should be done from both angles simultaneously.

With that in mind, interactive and non-interactive narratives can be seen as accessible and inaccessible narratives. This is where as a computer-generated interactive content, VR demonstrates some similarities with computer games. These similarities may apply both to the accessible nature of the narrative and the mechanics of embodiment. This also applies to the interactive and non-interactive elements that both formats demonstrate. VR can simulate wide range of content with various level of access to the narrative. On one side there is the 360-degree video content with no access to the narrative structure and on the other, the VR games and multiplayer experiences that may allow for the narrative to be changed according to the decisions of the users. However, VR is able to simulate the narrative structures not only of games, but also of books and movies. There is no obstacle for a virtual book, just like the one from *Morrowind* that I mentioned in the introduction, to have the form of a real book with pages, and even smell and weight. Although without some modalities, the simulation of the inaccessible narrative of the book can be simulated in computer games as well. This

means that both accessible and inaccessible narrative forms can be simulated in VR and computer games. However, simulating a game in VR is different from the computer game due to the differences in embodiment. A computer game can create an accessible narrative which simulates the inaccessible narrative of the book or a film. However, the format specific modalities of the computer game are tied to the computer or the game console. In VR, the simulation happens through increased number of modalities related to our senses and ability to interact with the world directly through our bodies. Hypothetically, this means that in VR a game console can be simulated and the user can play a computer game on it. That is not achievable the other way around. This is how VR can share some similarities with other, inaccessible narrative format, while being interactive format in its nature.

Regarding the similarities between VR and computer game narrative structures, my second hypothesis seems to be mostly true. However, as I have just concluded, that is not a straightforward relationship. First, VR has the power to absorb computer games both with their narrative structures and modalities. Second, the ludic nature which is present inside the magic circle is present in both computer games and VR alike, but with different embodiment and format specific modalities. This shows that any possible issues that may arise from the conflict between interactivity and the narrative may also be present in the embodiment in VR as a medium.

This was explored through the issue of the ludonarrative dissonance. The traditional view is that it occurs between the game narrative and the game mechanics. This can be definitely present in computer game interactive narratives and as such it also applies to some of the VR interactive narrative experiences. However, I observed that the VR experience with its format specific modalities and FPP creates ludic elements for the user of the medium. Therefore, I proposed to expand the concept of the ludonarrative dissonance as a conflict between the embodiment and how it is simulated in the virtual environment. For example, embodiment into a virtual body will give a strong expectation that the body can be moved. If that is not allowed by the VR experience a VR ludonarrative dissonance occurs. In all of the VR experiences that where analyzed some version of this dissonance was present as an issue. What was also revealed is that the dissonance will or will not occur depending on the creator. This

is done by successfully employing the restrictions and the freedoms given to the user, which are supported by the game mechanics, the simulation of the embodiment and the narrative justification. If my proposal to expand the concept of the ludonarrative dissonance into a VR ludonarrative dissonance is accepted, then it inevitably becomes part of the experience. This is a direct answer to one of my research questions.

I believe the questions that remain unaddressed in this thesis will further expand the understanding of the VR format. The answers may also show that some findings in this thesis should be expanded or revised. I set a goal to approach the issue of embodiment and narrative in VR through an interdisciplinary angle of preselected fields. This showed to be useful for the most part. It did however open the question of the ludonarrative dissonance which expanded outside of the expected discussion as a conflict between the narrative and the game mechanics. Overall, I note that the exploration of these topics shows a very layered potential of the format. This is due to the constant interplay between the modalities of embodiment in the virtual environment on side, and the narrative and interactive elements on another side. This makes the VR format very diverse and context specific. The way some modalities and mechanics function in one narrative does not mean they automatically function in another narrative. However, there is a base of the VR experience present in the format specific embodiment. From there, the potential for narratives and interactive mechanics is yet to be fully explored.

REFERENCES

1. Aristotle. “Poetics”. Translated by S.H. Butcher. A Universal Download Edition.

2. Aarseth, Espen. "A narrative theory of games". Conference: FDG'12

3. Arijon, Daniel. “Grammar of the Film Language”. Silman-James Press, 2015.

4. Ascott, Roy. “Telematic Embrace: Visionary Theories of Art, Technology and Consciousness”. University of California Press, 2003.

5. Aylett, R. & Louchart, “Towards a narrative theory of Virtual Reality “. S. Virtual Reality, 2003.

6. Ballantyne, Nick “The What, Why & WTF: Ludonarrative Dissonance” Blog. GameCloud, 2015 www.gamecloud.net.au/features/wwwtf/twwwtf-ludonarrative-dissonance

7. Bates, Joseph. “Virtual Reality, Art and Entertainment” in Presence: Teleoperators and Virtual Environments. Vol. 1, 1991.

8. Blanke, Olaf and Metzinger, Thomas. “Full-body Illusions and Minimal Phenomenal Selfhood.” Trends in Cognitive Sciences, 13(1), 2009.

9. Bordwell, David. “Poetics of Cinema”. Routledge. New York, 2008.

10. Caillois, Roger. “Man, Play and Games”. University of Illinois Press, 2001.

11. Derrida, Jacques. “Paper Machines”. Stanford University Press, 2005.

12. Dreyfus, Hubert L. “The Current Relevance of Merleau-Ponty’s Phenomenology of Embodiment.” The Electronic Journal of Analytic Philosophy. 2016.

13. Dourish, Paul. “Where the Action is”. MIT Press, 2011.

14. Ehrsson, Henrik. et al. “Touching a Rubber Hand: Feeling of Body Ownership is Associated With Activity in Multisensory Brain Areas. Journal of Neuroscience, 25(45), 2005.

15. Frasca, Gonzalo. “Simulation versus Narrative: Introduction to Ludology”. in Video Game Theory edited by Mark J.P. et al. Routledge, 2003.

16. Gerry, Lynda Joy. “Subjective Alignment and Audience Entanglement in First-Person Cinema: Defending The Diving Bell and the Butterfly as an Exemplary Case”. University of Copenhagen, 2006.

17. Grau, Oliver. "Virtual Art". MIT Press, 2003

18. Hansen, Mark. "New Philosophy of New Media". MIT Press, 2004.

19. Hawking, Clint. “Ludonarrative Dissonance in Bioshock”. Blog. Click Nothing, 2007.

20. Huizinga, Johan. "Homo Ludens". Routledge & Kegan Paul Ltd. 1949.

21. Ionta, Silvio. et al. “Multisensory Mechanisms in Temporo-parietal Cortex Support Selflocation and First-Person Perspective”. Neuron, 70(2), 2011.

22. Juul, Jasper. "Games telling stories? - A brief note on games and narratives". www.gamestudies.org/0101/juul-gts

23. Jeannerod, Marc. “Motor cognition what actions tell the self”. Oxford: Oxford University Press, 2006.

24. Jerald, Jason. “The VR Book: Human-Centered Design For Virtual Reality”. ACM Books, 2016.

25. Johanson, Mathias. “The Turing Test of Telepresence”. Cornell University Library, 2015.

26. Klevjer, Rune (2014). “Cut-scenes”. In M. J. P. Wolf & B. Perron (Eds.), The Routledge Companion to Video Game Studies (pp. 301-309). New York: Routledge.

27. Klevjer, Rune. "What is the avatar?". University of Bergen, 2006.

28. Lamarque, Peter. “On Not Expecting Too Much from Narrative”. Mind & Language 19, 2004. doi:10.1111/j.0268-1064.2004.00265.x

29. Laurel, Brenda. "What Is Virtual Reality?". Medium, 2016.

30. Laurel, Brenda. “Towards the Design of a Computer-Based Interactive Fantasy System”. PhD. Ohio State University, 1986.

31. Lenggenhager, Bigna. et al. “Video Ergo Sum”. Science, 317(5841), 2007.

32. Lombard, Matthew and Ditton, Theresa. “Measuring Presence”. Presence 2000: The Third International Workshop on Presence.

33. Makedonski, Brett. “Ludonarrative Dissonance: The roadblock to realis” Blog. Destructoid, 2012. www.destructoid.com/ludonarrative-dissonance-the-roadblock-to-realism-235197.phtml

34. Manovich, Lev. "The Language of New Media". MIT Press, 2001.

35. McKee, Robert. “Story”. Regan Books, 1997.

36. Menary, Richard. “Embodied Narratives”. Journal of Consciousness Studies 15, 2008

37. Merleau-Ponty, Maurice. “Phenomenology of Perception”. Routledge Classics, 2002.

38. Minsky, Marvin. “Telepresence”. In Omni Journal, Vol 2 No 9. Omni Publication International Ltd., 1980.

39. Meyer, Keneth. “Dramatic Narrative in VR” in Biocca & Levy. "Communication in the Age of Virtual Reality". 1995.

40. Murray, Janet. "From game-story to cyberdrama". www.electronicbookreview.com/thread/firstperson/autodramatic

41. Petkova, Valeria and Ehrsson, Henrik. “If I Were You: Perceptual Illusion of Body Swapping. PLoS ONE, 3(12), 2008.

42. Petkova, Valeria. et al. “From Part- to Whole-Body Ownership in the Multisensory Brain.” Current Biology, 21(13), 2011.

43. Pimentel, Ken and Teixeira, Kevin. “Virtual Reality: Through the New Looking Glass” NewYork: Intel/Windcrest McGraw Hill, 1993.

44. Salen & Zimmerman. "Rules of Play: Game Design Fundamentals". MIT Press. 2004

45. Serano, Andrea. et al. “Bodily Ownership and Self-location: Components of bodily self-consciousness”. Consciousness and Cognition. ELSEVIER, 2013

46. Shanken, Edward. “From Cybernetics to Telematics”.

47. Schell, Jessie. “The Art of Game Design”. Elsavier, 2008.

48. Slater, Mel “A Note on Presence Terminology”. Researchgate, 2003.

49. Slater, Mel. et al. “Depth of Presence in Virtual Environments”. Presence: Teleoper. Virtual Environ. 3, 2. 1994.

50. Stauer, Jonathan. "Defining Virtual Reality: Dimensions Determining Telepresence" in Biocca & Levy. "Communication in the Age of Virtual Reality". 1995.

51. Suits, Bernard. "The Grasshopper: Games, Life and Utopia". University of Toronto Press. 1978

52. Vella, Daniel. "Who am I in the computer game?". University of Malta, 2016.

53. Youngblood, Gene. “Expanded Cinema”. Clarke, Irwin & Company Limited, 1970.

INTERVIEWS

1. Benayoun, Maurice. Interview with Stefan Palitov. Video. Hong Kong, 2017

2. Damsbo, Mads. Interview with Stefan Palitov. Audio. Denmark, 2018.

3. Rizzotto, Lucas. Interview with Stefan Palitov. Audio. Denmark, 2018._

4. Weibel, Peter. Interview with Stefan Palitov. Video. Karlsruhe, 2017

5. Ungermand, Signe and Engermann, Maria H. Interview with Stefan Palitov. Writing. Denmark, 2018

VR & COMPUTER GAMES

1. Anthropia. MAKROPOL, 2017. www.makropol.dk
2. Asterion VR. www.asterionvr.com
3. Birdly. Somniacs SA, 2018. www.birdlyvr.com
4. Catatonic. Catatonic Co, 2015.
5. Ghost in the Shell: Arise Stealth Hounds. BANDAI NAMCO Entertainment Inc. www.vrzone-pic.com/shinjuku/en/activity/koukaku.html
6. Hospital Escape Terror. BANDAI NAMCO Entertainment Inc. www.vrzone-pic.com/shinjuku/en/activity/omega.html
7. Mario Kart Arcade GP VR. BANDAI NAMCO Entertainment Inc. www.vrzone-pic.com/shinjuku/en/activity/mariocart.html
8. Minecraft. Mojang, 2011.
9. RollerCoaster Taycoon. Chris Sawyer Production, 1999.
10. Separate Silences. MANND, 2017. www.mannd.dk/selected-works/separate-silence/
11. SimCity 3000. Maxis, 1999
12. Tales From The Borderland. Telltale Games, 2014.
13. There Is Still Time… Brother. Wooster Group, 2007. www.jeffreyshawcompendium.com/collaborative-project/there-is-still-time-brother
14. Touching Masterpieces. Neurodigital Technologies, 2018. www.touchingmasterpieces.com
15. Truck Simulator. SCS Software, 2008.
16. Witcher game series. CD Projekt, 2007.

ATTACHMENT – FIGURES

Fig 1.

A blind person "touches" 3D version of *David* by Michelangelo in the experience *Touching Masterpieces*.

(Still from "Touching Masterpieces - Haptic VR for the Blind" by Telegram Lab Films)

https://vimeo.com/261989626

Fig 2.

POV from *Separate Silences* of a creature touching the user's legs.

Fig 3.

The same touch administered on the physical body of the user.

(Stills from "Hver Sin Stilhed // Separate Silences-VR Casevideo 2017")

https://vimeo.com/207125264

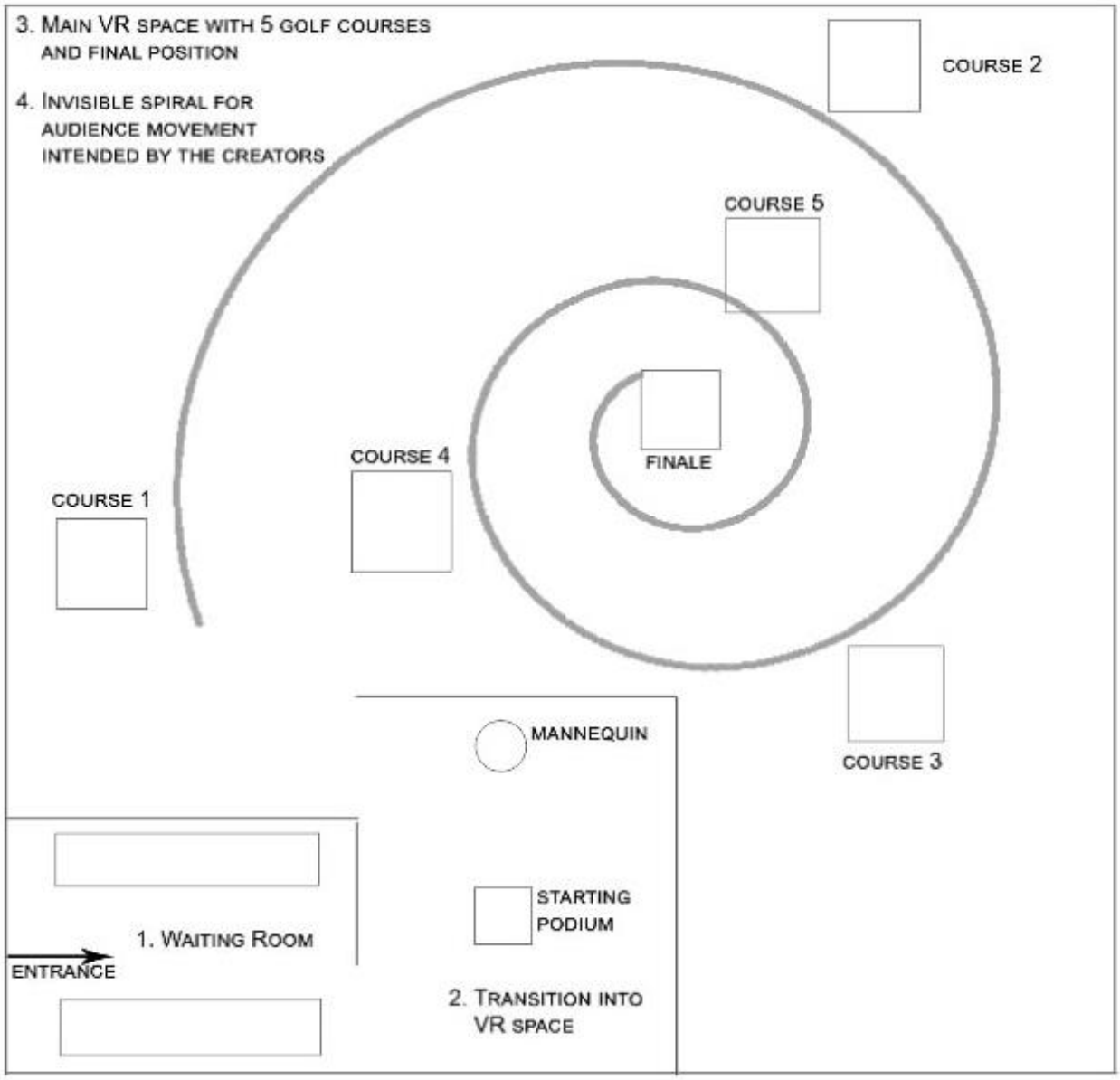

Fig. 4

Sketch of the VR installation Anthropia

Fig. 5

Users standing at different golf courses in *Anthropia*

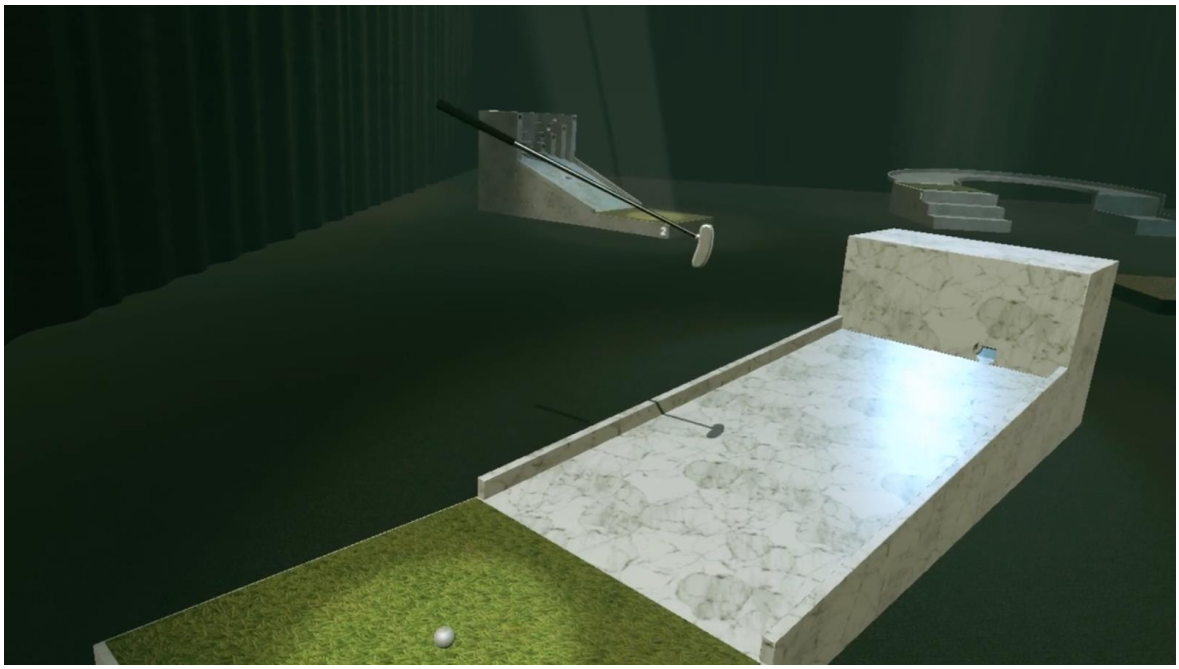

Fig. 6

The golf club lures the user to step on the golf course.

(Stills from “The making of ANTHROPIA”)

https://vimeo.com/246240617

Fig. 7

The writer of this thesis is exited to wage some robot space war with his team.

(Private archive, 2018)

Fig. 8

One player shooting another in *Ghost in the Shell: Arise Stealth Hounds*

(Private archive, 2018)

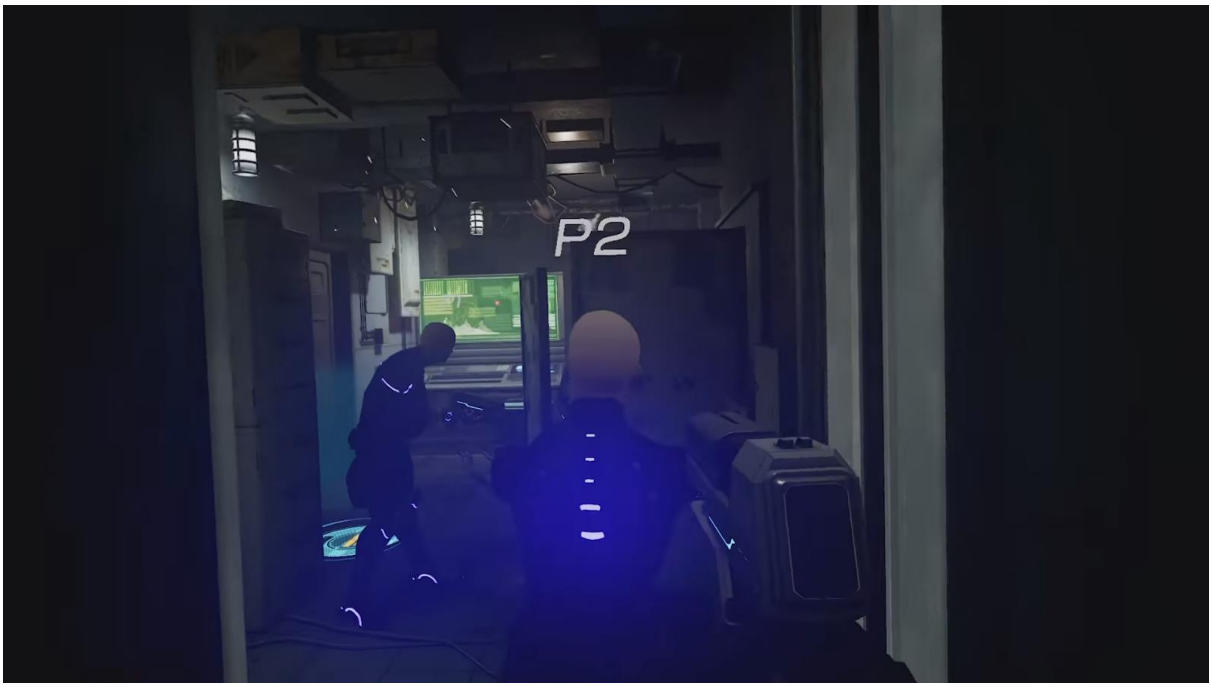

Fig. 9

In-game POV of a player as he and his teammates are ambushing the opponents.
(Still photo from Bandai Namco promotional video)
https://www.youtube.com/watch?time_continue=44&v=p2_io65ndyk)

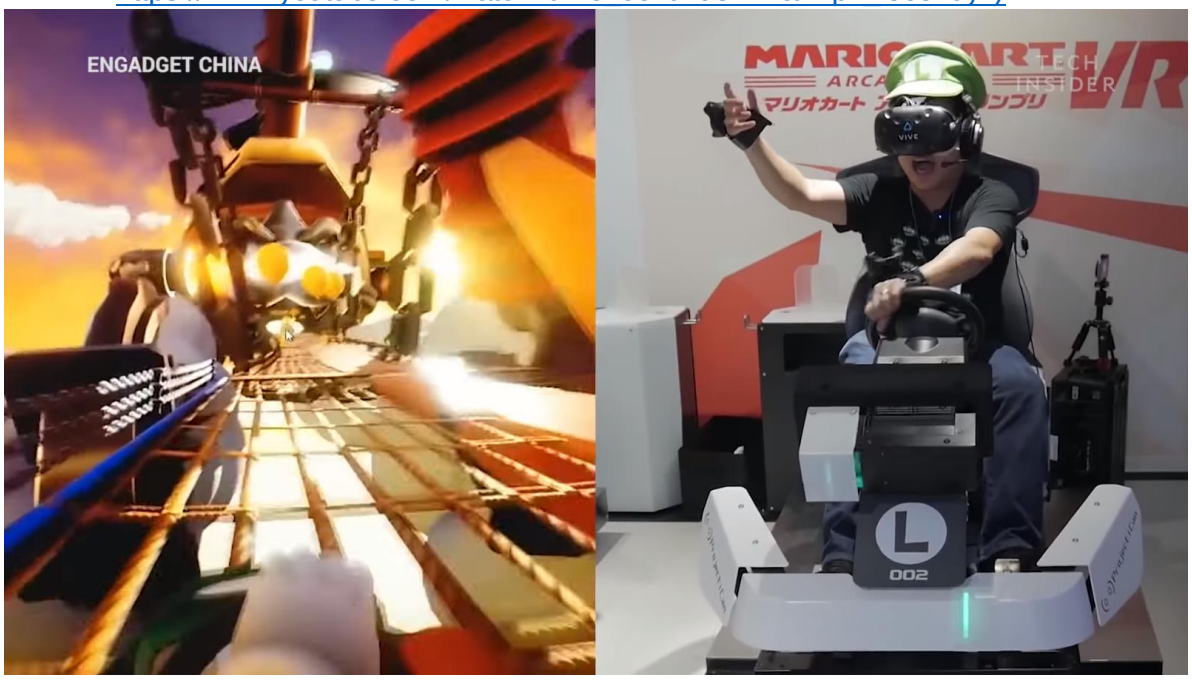

Fig. 10

A player holds a hammer and waits for a victim while speeding down the road.

(Still from "Playing Mario Kart In Virtual Reality" by **Tech Insider)**
https://www.youtube.com/watch?v=Y2n8XYH-rOE