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**Cinematic Virtual Reality:
A Definition and Classification Proposal**

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Català:

Els cineastes s'han interessat també per la Realitat Virtual. Alguns ho veuen com el futur del cinema; d'altres creuen que és una nova manera d'explicar històries. Sigui com sigui, no es pot negar l'existència d'una nova forma d'art: la Realitat Virtual Cinematogràfica és més que una pel·lícula en 360 graus. Hi ha una necessitat de definir-la des de l'àmbit de la comunicació, i no només tecnològicament. En aquest treball es combinen la teoria del cinema i de la telepresència per suggerir una definició i una classificació d'aquest nou art.

Castellà:

Los cineastas se han interesado también por la Realidad Virtual. Algunos lo ven como el futuro del cine; otros creen que es una nueva manera de contar historias. De un modo u otro, no se puede negar la existencia de una nueva forma de arte: la Realidad Virtual Cinematográfica es más que una película en 360 grados. Existe la necesidad de definirlo desde el ámbito de la comunicación, y no solo desde lo tecnológico. En este trabajo se combinan la teoría del cine y de la telepresencia para sugerir una definición y una clasificación de este nuevo arte.

Anglès:

Virtual Reality has finally caught the attention of filmmakers. Some believe it is the future of cinema; others think it is a new way to tell stories. One way or the other, the existence of a new art form cannot be denied: Cinematic Virtual Reality is more than a film in 360 degrees. There is a need to define it from the communication studies field instead of focusing only in its technology. In this research, film theory and film analysis are combined with the theory of telepresence in order to suggest an academic definition and classification for Cinematic Virtual Reality.

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1 Introduction

Virtual Reality (VR) has been increasingly sneaking into almost every communication field of our society for the past five years. Many experts find both entertainment and professional uses in VR every day and it is becoming the star of technology congresses, gaming conventions, teaching conferences and so on: its applications seem infinite. Cinema has not been an exception. Sundance was the first film festival to include a virtual reality film in its New Frontier program in 2012 –and in 2016, the number of virtual experiences grew from one to over 35 (Robertson, 2016). Soon, other major film festivals such as Tribeca and Cannes also joined the virtual reality fever and in 2015 the first Virtual Reality Film Festival was produced by Kaleidoscope –‘a community of virtual reality creators’¹. In 2016, VR completely invaded Comic-Con with several cinematic experiences mainly used as teasers for upcoming movies or series’ seasons (Bishop, 2016). Furthermore, this kind of cinematic experiences are also already being used for marketing purposes as branded content created by an increasing number of companies, such as Nike or Ford (Cassidy, 2015).

But how are these VR experiences related to cinema? It looks like the most obvious link between them is a similar storytelling technique. When filmmakers started to experiment with virtual reality they applied the same cinematic narrative rules, but the recent technological advances are demonstrating that VR can offer significant new possibilities that go beyond “traditional” cinema and that the growing differences between them are calling for new practices. In this context, another question follows: is virtual reality the future of cinema? Most experts believe that VR is just another way to tell stories and that we are witnessing the birth of a new medium (Franklin-Wallis, 2016). In that case we face at least two future scenarios. The first one, cinema as we know it will die and it will be replaced by its virtual reality version. The second one, both mediums will coexist.

¹ Kaleidoscope’s website: www.kaleidovr.com/about/

² About the VR:LAB: www.cphdox.dk/en/more-than-films/vrlab

³ Bombina Bombast’s website: <http://www.bombinabombast.se/>

Regardless of the future possibilities, the fact that a new medium is awakening entails several questions in the communication field that are yet far to be solved. For example, professionals have not agreed on a specific term for this “mix” of cinema and VR, yet the most used ones seem to be “cinematic virtual reality” or “virtual reality cinema”. Similarly, there is not a proper name for the equivalent to a film in VR either, although “VR film” or just “experience” are the ones that are heard the most. At the same time, the contents that have been produced so far are so diverse that it seems a mistake to include them all in the same unique category. Different cameras, filming techniques, platforms and viewing devices are the disadvantages –or advantages– of a medium that is not mature yet and where every day something new and surprising enlarges the spectrum of what we thought that was possible.

These questions are just a glimpse of all the problems that have to be solved within the communication studies field. There has been a huge need for academic research ever since this technology was born. However, the diversity of devices and the lack of an initial theoretical foundation made it difficult for social scientists to study it once the technology was spread (Steuer, 1992). This challenge is a motivation for academics as well as it is VR itself for filmmakers. As the VR expert Chris Milk states: ‘It’s like the beginning of cinema, the potential for storytellers is amazing’ (Franklin-Wallis, 2016). Moreover, recent investments in virtual reality, such as Facebook’s acquisition of Oculus in 2014 for \$2 billion, Disney’s \$65 million founding round on Jaunt’s studio in 2015 or other Hollywood movie studio’s moves are meaningful indicators for the future relevance of this new medium (Vanian, 2015).

2 Purpose of the study

The number of unknowns related to virtual reality is increasing at the same time as its technological advances do. With this fast rate of innovation it is difficult to set a parameter of study in the VR film, since there are no limits established yet in this new medium. However, in this chapter I attempt to define “cinematic virtual reality” as the part of VR that is the object of research of this study. Afterwards, the research objectives and the research question are listed and developed.

2.1 Object of research

The object of research of this study is the art of “cinematic virtual reality”, that is here understood as the category composed by the contents that have certain common elements with cinema, and that have been created for virtual reality. Therefore, the most basic units of research in this study are the commonly named “VR films” or “VR movies”, and also called “cinematic experiences” in this paper. These concepts are further developed later on.

During the entire research, multiple VR films are quoted as examples in order to illustrate and explain specific concepts, techniques and theories. My encounters with cinematic virtual reality began in the 2015 CPH:DOX –the Copenhagen International Documentary Festival– where I had the opportunity to work in the VR:LAB², a production workshop curated by Johan Knattrup Jensen and Mads Damsbo that had the aim to experiment with virtual reality as a new storytelling tool for filmmakers. There I had the unique opportunity to see Jensen and Damsbo’s VR film, *The Dog House* (2014) –that was awarded as the Most Innovative Film at the Festival du Cinema Nouveau in Montreal– as well as other exclusive pieces such as Bombina Bombast’s *Strange Days* (2015). A few months after, I also had the chance to see Penrose Studios’ *Allumette* (2016), a stunning VR film that has only been featured in special events, such as 2016 Sónar+D in Barcelona. Finally, in June 2016, I was able to see

² About the VR:LAB: www.cphdox.dk/en/more-than-films/vrlab

Makropol's latest VR film *Ewa, Out Of Body* (2016) during a meeting with Mads Damsbo.

Unfortunately, this kind of experiences are not available for the general public, since they are only featured in major arts festivals and/or they require specific devices to experience them. However, cinematic virtual reality is starting to reach the public thanks to the recent launches of several VR Head-Mounted Displays (HMD), such as the HTC Vive, the Oculus Rift, the Samsung Gear VR or the Google Carboard (Lamkin, 2016). There are great cinematic experiences that are already available to anybody who owns this kind of HMDs, such as *El Ministerio del Tiempo: El Tiempo en tus Manos* (2016) from Future Lighthouse and the Spanish TV channel RTVE, *Wild: The Experience* (2014) from Fox Searchlight Pictures, and many others.

In this research I have used the knowledge that I have gained through the great number of VR films that I have experienced over this past year. However, the fact that I cannot re-watch some of them is a great limitation for the analysis part. Nevertheless, the following three specific experiences have been chosen as samples for the analysis: *Allumette* (2016), *Ewa, Out Of Body* (2016) and *El Ministerio del Tiempo: El Tiempo en tus Manos* (2016). I have chosen them for three main reasons: first, because I have had the opportunity to discuss each of them with their respective developers, what has given me additional relevant information about them; second, because the three of them have been featured in major arts festivals, a fact that certifies their artistic and representation value for cinematic virtual reality; and, finally, because I believe that the audience's experience is very different in each of them, which means that there is a chance of getting different results in their analysis.

2.2 Research objectives

The aim of this research is to propose a definition for the concept of "cinematic virtual reality" from an experiential approach. Thus, the starting point and the main focus of the analysis is the audience's experience during the consumption of the VR films, since I strongly believe that the audience is a key element to understand them. However, technological characteristics are also taken into account, since they inevitably shape every medium, their contents and their audiences.

On the other hand, the second objective of this research is to suggest a classification of these contents depending on the audience's experience. In order to achieve this second goal, I also propose a specific method of analysis for cinematic VR pieces. Therefore, a third objective is to create a new technique to read and classify VR films.

2.3 Research question and sub-questions

Hypotheses are not formulated in this research for the simple reason of the lack of knowledge in the field of cinematic virtual reality. Therefore, I cannot make any precise prediction about the outcome of the analysis. Instead, I prefer to only use research questions as a guide for the following reason:

A hypothesis is an explicit statement predicting that a state of one variable is associated with a state in another variable. A research question is more tentative, merely asking if such an association exists. (Riff, Lacy, & Fico, 2014, p. 140)

Thus, the main research question is:

1. *What is Cinematic Virtual Reality?*

This question is related to the main objective of this research, and it assumes the existence of cinematic VR experiences, which have already been stated as an increasing form of art in the Introduction chapter.

Furthermore, a following sub-question is:

2. *How can cinematic virtual reality experiences be classified?*

Of course, as well as the research objectives, the research questions are also focused on the audience's experience.

3 Theoretical framework

It is impossible to define the concept of “cinematic virtual reality” without taking a look to virtual reality itself first. However, VR does not have an ultimate definition yet. On one hand, this situation makes sense since it is considered a new medium: it keeps on evolving and adding new features continuously, which makes it very difficult to define it. But, on the other hand, almost every attempt to define VR has been focused on the technology and tends to forget about the audience’s experience. Therefore, in the first part of this chapter an experiential approach will be taken using Jonathan Steuer’s theory of *telepresence*, which is the key concept to describe any virtual reality experience without relying on any technological concept.

Once the concept of virtual reality is clarified from a communication studies perspective, its relation to “cinematic virtual reality” should be easier to define. But since there is no literature about this subject yet, it seems necessary to first describe what “cinematic” means. For this reason, in the second part of this chapter the early *film theory* will be studied in order to discover the foundations of cinema. Moreover, a present-day *film analysis* theory will also be reviewed in pursuance of the most basic cinematic elements.

In addition, some examples from what has been tagged as cinematic VR will be included during the entire chapter in order to finally conclude with satisfactory relation elements between the two mediums –cinema and VR.

3.1 An experiential approach to the definition of virtual reality

Today, there are still many different definitions for virtual reality, but this is not a surprise if we conceive VR as a ‘new’ medium. To provide a final definition for “virtual reality” is not the aim of this research, since it is obvious that the fast rhythm of innovation that we have recently witnessed in this field is not going to stop any time soon. Nevertheless, the following description is given in order to facilitate an academic-focused point of view:

[VR is] a medium composed of interactive computer stimulations that sense the participant's position and actions, providing synthetic feedback to one or more senses, giving the feeling of being immersed or being present in the stimulation. (Craig, Sherman, & Will, 2009, p. 1)

This is a relatively updated definition that summarizes the generalized conception of virtual reality. However, most attempts to describe VR tend to forget about the audience's experience and narrow the definition to technical characteristics. Jonathan Steuer (1992) was the first communication researcher to diagnose a conceptual problem when understanding virtual reality as a new medium: it was being defined in terms of technology instead of using an experimental approach. In his most relevant paper about the subject, Steuer identified three major limitations that followed that inaccuracy. The first one, to limit VR to just a technology results in an irrational definition of the medium itself, since 'a given system is arbitrarily classified as "VR" or "not-VR", depending on whether it includes a minimal corpus of particular machines' (Steuer, 1992, p. 73). The second limitation is the lack of a definition of a unit of content. In other words, there is not an equivalent name for "a video" or "an audio" for virtual reality. And finally, Steuer pointed a related third issue: the absence of 'theoretical dimensions across which virtual reality can vary' (Steuer, 1992, p. 73), which makes impossible the classification and comparison of the different VR technologies.

Steuer claimed that the proposal of an academic term for the VR content would solve these problems, but he assumed that it was too late since the term "virtual reality" was already broadly used for that purpose. In other words, back in the early 90's a specific unit of content was called "a virtual reality". However, in the actual "second wave" of VR this has changed. "A virtual reality" is not used anymore, but there is not a consensus yet about the term for this concept. It seems like the most popular is *experience*, but there are very few academics talking about it. Some of them are Craig, Sherman and Will, who give the following definition to the term:

We use the word *experience* to convey an entire virtual reality participation session. (Craig, Sherman, & Will, 2009, p. 1)

However, in the cinematic virtual reality field it is also common to use the term *VR film*, in the same sense as *VR game* is the most used term in the gaming industry.

“Telepresence” as the key concept to define VR

Despite not using an accurate term for what Craig, Sherman and Will (2009) understand as an *experience*, Steuer (1992) was able to formulate a definition for that concept that did not refer to any technological characteristic. He achieved his goal by introducing the concept *telepresence*:

A “virtual reality” is defined as a real or simulated environment in which a perceiver experiences telepresence. (Steuer, 1992, p. 76)

Telepresence is here understood as ‘the experience of presence in an environment by means of a communication medium’ (Steuer, 1992, p. 75). Therefore, virtual reality is defined by the perception of the audience having the experience, and not by its technological aspects. Consequently, any experience that induces a sense of presence to the audience is considered VR, on the only condition that the experience is mediated –no matter by *what*. Thus, if we revise the definition of VR given by Craig, Sherman and Will (p. 12 in this research), only the second part of the definition –‘giving the feeling of being immersed or being present in the stimulation’– agrees with Steuer’s point of view. The first part of the definition just states that if the experience is not computer generated, is not interactive, does not have position and action tracking and does not give feedback to the senses, it cannot be considered a VR experience. Similarly, Mihelj, Novak and Beguš (2014) also presume that any VR experience has to be computer generated, and they list four essential components: a *virtual environment*, *virtual presence*, *sensory feedback* and *interactivity*. Again, Steuer’s theory only acknowledges the second one, *virtual presence*, if we understand ‘virtual’ as ‘mediated’ in this context.

Other experts, such as Matt Rowell (2015), also claim that any experience that is not stereoscopic is not to be considered virtual reality and that the proper name for them is just “360 videos”. Stereoscopic VR experiences are defined as three-dimensional. In other words, stereoscopic experiences are for VR what 3D movies are

for cinema. It is said that stereoscopic VR is the real VR because it adds more realism to the experience, since there is more depth data between the background and the foreground. However, the author himself admits that “360 videos” also give the feeling that ‘you are inside of the scene’ and he doubts that the general public cares about stereoscopic VR (Rowell, 2015). Furthermore, there is even the opinion that an experience should not be qualified as VR if it does not use full a head-position tracking system –not only ‘nodding’ actions, but also other movements. On the other hand, binaural audio is also considered essential in VR, since ‘hearing is arguably more relevant than vision to a person’s sense of space’ (Jackson, 2015). These kinds of technologies highly decrease the ‘motion sickness’ that can be induced by “360 videos” and they also give a greater sense of immersion (Smith, 2015). The Huawei mLAB (2015) concludes that virtual reality and 360 videos –or “360-degree Panoramic Video”– differ in four aspects: image, experience method, flexibility and timeline (see Table 3.1-1).

	Virtual Reality	360-degree Panoramic Video
<i>Image</i>	A 360-degree panoramic image which is integrated by multiple panoramic images is provided. Interactive elements are included.	Actual view images are provided. These images are only for appreciation, not interaction.
<i>Experience method</i>	A pair of VR glasses is required for immersive experience.	Players that can display 360-degree videos are required, such as YouTube clients on PCs or mobile phones.
<i>Flexibility</i>	Immersive experience is provided. Users can walk around and actively create visual angles. For example, you can walk around or choose to go upstairs or choose which room to enter into as you like.	A 360-degree visual angle can only be obtained by moving the director’s camera. For example, when you shoot a scene for entering into a house, you can only follow the camera to enter the rooms in sequence, but you cannot choose which rooms enter into.
<i>Timeline</i>	The timeline is flexible. It can be extended based on the virtual angle, which is independently explored by users.	A movie can be displayed according to the timeline for the movement of director’s camera.

Table 3.1-1: Differences between Virtual Reality and 360-degree Panoramic Video. Prepared by author based on the analysis of the Huawei mLAB (2015)

However, there are a great number of experiences –included the “cinematic” ones– that have already been tagged as VR even though they do not have all of these characteristics. According to Steuer’s theory, if they induce a sense of telepresence – no matter by which means–, they are true virtual reality experiences. But since virtual reality experiences are essentially individual, it is difficult to measure their degree of telepresence. Steuer (1992) recognizes that the technological characteristics of the medium used to induce telepresence will inevitably influence the experience. Virtual reality is not defined by the characteristics of the medium, but they will affect to the degree of the sense of telepresence. And the more sense of telepresence, the better the experience.

The attributes of “telepresence”

In an attempt to measure telepresence in virtual reality, Steuer defined two basic elements –each one driven by their own variables– that could be found in every VR experience: *vividness* –given by *breath* and *depth* data– and *interactivity* –defined by *speed*, *rage* and *mapping* (see Figure 3.1-1).

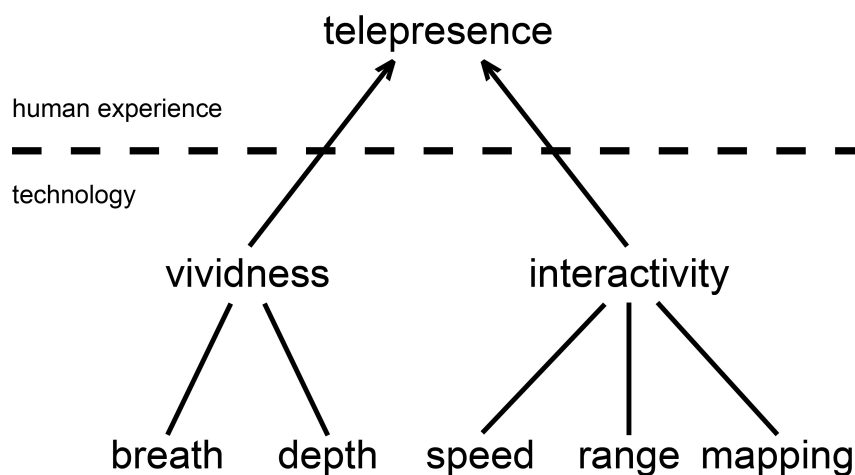


Figure 3.1-1: ‘Technological variables influencing telepresence’. Source: Steuer (1992, p. 80)

Vividness is a synonym for “transparency” or “high quality”. It can be measured by the experience’s sensory *breath* and *depth*. They refer to ‘the number of sensory dimensions simultaneously presented’ and to ‘the resolution within each of these perceptual channels’, respectively (Steuer, 1992, p. 80). Most VR experiences

rely on sight and hearing. However, it is logical to think that, if applied correctly, the stimulation of the other three senses –touch, taste-smell and orientation– increase the quality of the experience. For example, Bombina Bombast³, a Swedish-based performance company, created an experience that not only used “360 video” and binaural audio, but it also used other external inputs given by the authors. The left picture from Figure 3.1-2 shows how the director Stefan Stanišić is blowing to the back of the neck of the person having the experience –haptic system input– and in the picture on the right he changes the orientation of the chair –orientation system input. Since both actions have to be done in a very precise moment in order to match what the audience is seeing and hearing, Stanišić is constantly listening to the same audio as the audience through a pair of headphones connected to the VR kit. Therefore, if done perfectly, ‘the redundancy resulting from simultaneous activation of a number of perceptual systems [...] strengthens the perception of a particular environment’ (Steuer, 1992, p. 81). In other words: the more stimulated senses, the better the experience.

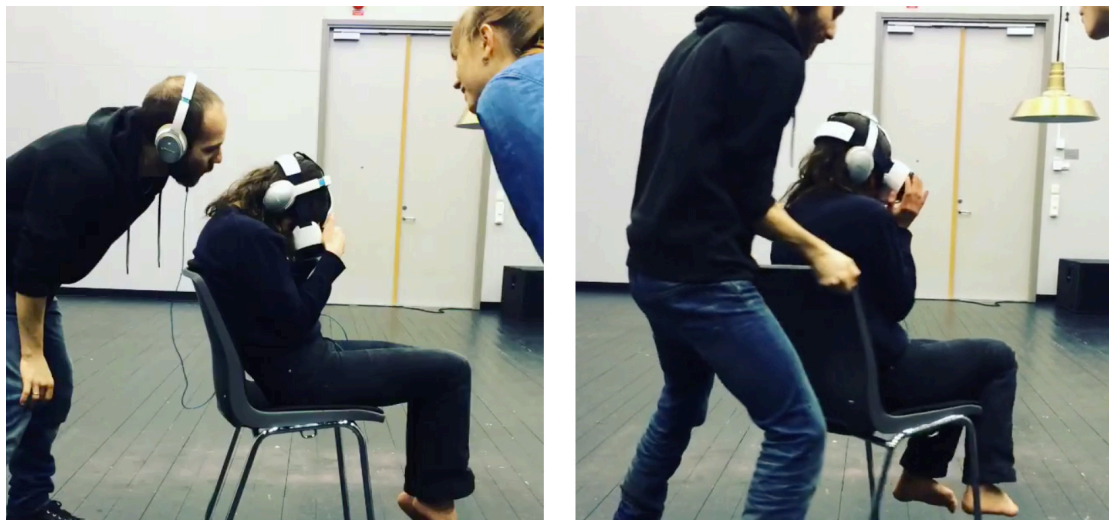


Figure 3.1-2: Screenshots from Bombina Bombast's performance: *Strange days*. Source: www.facebook.com/bombina.bombast

The *depth* –or “quality”– of these sensory inputs also plays an important role to the vividness of an experience. For example, as mentioned before, binaural audio highly improves the virtual reality experience by using two different microphones that will reproduce different audio recordings to each ear. Moreover, binaural audio is

³ Bombina Bombast's website: <http://www.bombinabombast.se/>

taken to another level when it is linked to a head-tracking system in a VR experience, so the audio changes when the head points to different directions –only possible when the person having the experience is wearing headphones. VR pioneer Chris Milk developed an omni-binaural set-up to produce the sound for this kind of experiences (see Figure 3.1-3) because ‘if we were going to let you look in every direction, a one-directional sound source would not work, ... So we needed something that would dynamically change based on where you were looking in the visual.’ (Lalwani, 2015). This technology is also commonly called ambisonics or 3D spatial audio.



Figure 3.1-3: Chris Milk's omni-binaural recording set-up. Source: (Lalwani, 2015)

Another obvious essential for VR is the depth of the visual data, which is enhanced for example by using stereoscopic 3D or by increasing the pixel density. Both characteristics are still being developed. On one side, stereoscopic has been proved essential in animation virtual reality experiences, meanwhile stereoscopic life-action virtual reality is still very difficult to record. On the other side, every VR device that has been launched so far has a higher pixel density than the latest version, and it looks like it will keep on increasing in future technologies.

Many experts believe that *interactivity* is the reason why virtual reality differs from other media, yet sometimes this term can be misunderstood. Steuer defines it as ‘the extent to which users can participate in modifying the form and content of a mediated environment in real time’ (Steuer, 1992, p. 83). Again, the author uses a definition that is not based on any technology but it relies on the human experience. However, as stated before, the degree of interactivity varies depending on technological features. Steuer listed the three most determining elements for interactivity: *speed*, *range* and *mapping* (see Figure 3.1-1). The author defines *speed*

as “immediacy of response” and it definitely was a relevant issue back to the early 90’s, but nowadays a high-speed response is taken for granted in any VR experience.

On the other hand, *range* is defined as the number of “dimensions” that can be altered by the audience. The affected dimensions can be for example time and space, and the simplest interactive action in VR is the possibility to “look around” –or *yaw*. The concept of the 6 Degrees of Freedom (DOF) is often used to explain the possible moves that the audience can make in a VR experience: position moves –X and Y axis– and orientation moves –yaw, roll and pitch (see Figure 3.1-4). On the other hand, a higher degree of interaction could be reached by making the audience choose the between two objects –each of them leading the experience to a different story.

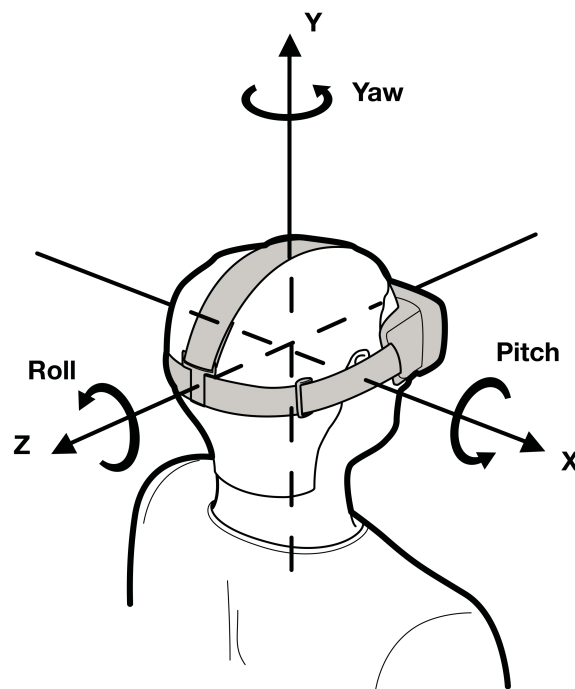


Figure 3.1-4: The 6 Degrees of Freedom (DOF). Source: (Oculus VR, 2016)

And finally *mapping*, that refers to how the audience make these changes. For example, most VR headsets available today use the head-position tracking to make the audience look and “stare” at a certain object as a synonym for “clicking on it”.

The range of interactivity is probably the most discussed issue in the cinematic virtual reality field. Even though nowadays the audience cannot affect the contents of most cinematic experiences, some filmmakers are starting to introduce interactive features that slightly change the storyline. For example, *Wild – The Experience*

(2014), directed by Félix Lajeunesse and Paul Raphaël⁴, is a three-minutes cinematic experience where the head-position tracking technology has been used to change the narrative in real time depending on where the audience is looking (Bishop, 2015). That is, two individuals may have a different experience if they have looked at different directions. However, they cannot now when they are making the “choices”. This kind of “narrative experiments” in cinematic VR usually awake the debate about the separation between gaming and cinema, since it seems impossible to agree from what degree of interactivity the cinematic experience should be considered a game and not a “film” anymore.

If one thing is clear is that to give an exact definition for the concept of “cinematic virtual reality” is impossible when we still have to discover what VR in general has to offer to this new industry. However, Steuer’s approach to virtual reality opened a door in the communication studies field. If *telepresence* is the key concept to define virtual reality, it can also be the basic element that defines the communication uses for this new medium, including cinematic virtual reality.

3.2 Towards a definition of Cinematic Virtual Reality

In order to define the concept of “cinematic virtual reality” it is essential to define the term “cinematic” first. In other words, what characteristics does a VR experience need in order to be tagged as “cinematic”? The following analysis of the basic cinematic elements will be complemented by a parallel comparison to the experiences that have been claimed to be cinematic. This is, the so-called “VR films”, “VR movies” and so on. Due to the lack of literature about cinematic VR, personal experience and knowledge about the subject will need to be applied.

The formative tradition approach to film theory

One way to determine the basic fundamentals of cinema is by studying the early academics from the *film theory* field. According to Dudley Andrew (1976), film theory is not concerned by the technical issues of this medium, but focuses its interest in the “cinematic capability” that affects both filmmakers and the audience. That is,

⁴ Felix & Paul Studios’ website: www.felixandpaul.com

techniques and individual films are secondary: the aim is to define the power of cinema as a whole, as a system composed by all the existing films, that at the same time form several subsystems, which are the film genres and other groups (Andrew, 1976).

Andrew (1976) describes the *formative tradition* as the first stage of film theory. The first papers that were written during that period (1915-1935) tried to defend cinema as a new medium and their authors strongly believed in the future of film as a powerful art form, different from the other existing types of art, especially theatre. Therefore, the aim of most of those essays was to differentiate cinema from theatre until the majority of academics realized that a new medium had been born. The theories that were developed during the formative tradition are an interesting reading today if we compare both cinema's and (cinematic) virtual reality's birth contexts. Either if we talk about cinematic virtual reality or VR as a whole, there are some cues that relate them to the formative tradition of the film theory.

Film director and film theorist Sergei Eisenstein was one of the authors to write the most complete theories from that era (Andrew, 1976). Eisenstein (1949) believed that cinema had two basic elements: 1) the *shot*, or recording of "photo-fragments", and 2) the *montage*, or the combination of these "photo-fragments" in different ways. The author admitted that both elements existed in other art forms, but he argued that cinema is the medium that relied on them the most. Therefore, if this double process is the main characteristic of cinema, it could be as well the main characteristic of cinematic virtual reality.

An analytic approach to film characteristics

Once cinema was accepted as an art form as a whole, the academic focus moved from the general definition to the individual characterization. First, cinema *d'auteur* studies evolved into different movements and trends, then genres were born and finally film analysis theories were established. That is, if film theory studies cinema as a whole, film analysis focuses its interest on the characteristics of individual films. However, this does not mean that film analysts forget the first film theory traditions. Quite the contrary, film theorists like Eisenstein built the grounds that established today's most detailed analytic approaches.

Film analyst Jon Lewis (2014) defines Eisenstein’s basic cinematic elements as follows:

A *shot* is a continuously exposed, uninterrupted, or unedited piece of film of any length; a basic unit of film structure with discernible start and end points. (Lewis, 2014, p. 8)

Movie editing (also known as *montage*) refers to the cutting and joining of shots to assemble a film. (Lewis, 2014, p. 119)

Not only Lewis’ definition is more technical than Eisenstein’s, but also it is way more detailed –not just an abstract concept. Moreover, Lewis (2014) lists the six basic elements that film analysis defines as the essentials to cinema: *narrative*, *mise-en-scène*, *camera work*, *editing* and *sound*.

a) Narrative

The concept of *narrative* is probably the one that links the most cinema and cinematic VR. Since Lewis defines it as ‘the art of constructing a story from a sequence of fictional or nonfictional events’ (Lewis, 2014, p. 21), it is clear that this concept is not subject to a particular medium. If “narrative cinema” has the purpose of making the audience “witness” a story, then it is not a surprise that virtual reality is defined as ‘the ultimate empathy machine’ (Milk, 2015). Is there a better way to witness a story than being *in* the story?

Even though not all films are narrative, the ones that do not follow a story are classified as “experimental”. And those that have a storyline –fiction or non-fiction– usually have a main character (or more than one) who is followed by the audience through a sequence of events, that is, the plot order –not to be confused with the story order, which is chronological. Therefore, the plot order is altered in many films by using the flashback and flash-forward techniques. Lewis (2014) lists the most common formulas to construct a narrative film using not only time alterations but also multiple plots (see Table 3.2-1).

Common narrative structures in film	Description
“Stories in three acts”	1) Expectations are raised. 2) Expectations are confounded. 3) Expectations are resolved.
“The hero’s journey”	1) The hero ventures forth. 2) He faces an obstacle. 3) He returns home smarter.
“A and B stories”	There is a secondary narrative (B) that will somehow intersect with the main story (A).
“Parallel stories”	There is more than one story and none of them are prioritized. They will eventually connect with each other.

Table 3.2-1: List of different narrative formulas in film. Prepared by author based on the reading of Lewis (2014).

However, these storytelling techniques cannot be easily applied when working with virtual reality. The obvious technical differences between cinema and VR strongly influence the way the stories are told. For example, VR films are not usually longer than 20 minutes because of the motion sickness that one may get when experiencing them –but it is being reduced thanks to new technological advances (Lalwani, 2016). Nevertheless, we cannot forget that, in the first years of motion pictures, early films also were around 20 minutes long, until the technological improvements from the early 1900s made it possible to produce ‘longer, multi-shot films’ (Davies, 2010). Therefore, since long VR productions are still not an option – even though it will probably be in a near future–, the time limitation obviously affects the way to tell the story.

As for the characters from the stories, they are ‘the key to our emotional and intellectual investment in the story’ (Lewis, 2014, p. 33). To know their motivations and desires can lead to recognizable types of characters, often related to concrete film genres. In cinematic VR experiences, there is an additional issue when talking about characters: the audience can be one of them. The role of the audience then has to be taken into account, because when one is experiencing a VR film they automatically think ‘Who am I?’. A great number of cinematic experiences place the audience inside the story as just an observer, a floating consciousness without a body not noticed by the other actors from that virtual world. On the other hand, there is a

growing interest in making the audience play a more “active” role. The POV (Point Of View) is an experimental technique borrowed from cinema that tries to place the audience “inside” the film. However, it usually feels ‘less like real life and more like watching somebody else play a video game’ (Jones, 2014). The porn industry was the first to experiment with POV in virtual reality in order to ‘come closer to a genuine interaction’ (Kulager, 2015), but soon filmmakers also became interested in this technique. For example, *The Dog House* (2014), by Johan Knattrup Jensen and Mads Damsbo, is a virtual reality film installation where the audience can experience all the character’s point of view.

Finally, film genres group films that have similar narrative characteristics: westerns, romantic comedies, gangsters, horror films, etc. they can easily be identified as such. The question that follows is if these classifications can be applied to cinematic VR.

b) Mise-en-scène

This French term usually refers to the set and props, the characters’ looks, the dramatic staging and the lighting (Lewis, 2014). The set –either constructed or already existing– provides relevant information about the story to the audience. Thanks to CGI (computer-generated imagery) sets can be entirely computer built or improved in the postproduction. These special effects are usually a characteristic of science fiction and fantasy genres. On the other hand, sets can also be classified as fantastic or realistic, depending on the narrative. Props –or objects ‘placed in the set’– can also give additional clues about the story, as well as the looks of the characters – costumes, makeup and hairstyle. The characters’ position in the set, as well as the cameras’, is commonly called ‘blocking’ and can also be a crucial part of the design.

In cinematic virtual reality, life-action experiences are especially difficult to film in terms of set design. The traditional cinematic rules of blocking radically change in VR, since the field of view is now the whole set. Therefore, there is only one position for the camera –instead of having more than one camera in the set– so anything that is not part of the narrative has to be hidden, including the filming crew. For this reason, Brian Seth Hurst (2016) uses a pie chart diagram where every segment represents a camera, and the lines between these segments represent the stitch areas –sensible zones where the cameras overlap (see Figure 3.2-1).

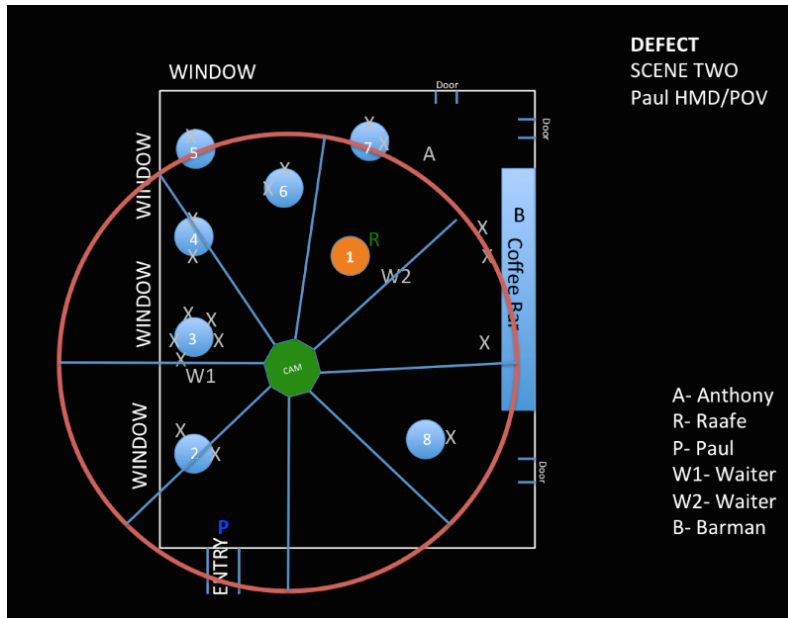


Figure 3.2-1: A circular blocking form for a VR set. Source: (Hurst, 2016)

Finally, lighting is also a key element to be considered when designing a set. The source, direction and intensity of the lights are the main variables that allow the filmmaker to change the “mood” or direct the attention to certain elements. There are some typical light schemes like the “three-point lighting”, which uses three illumination sources that focus on the character’s eyes –key light–, the balance of the shadows –fill light– and the back of the character –backlight– (see Figure 3.2-2).

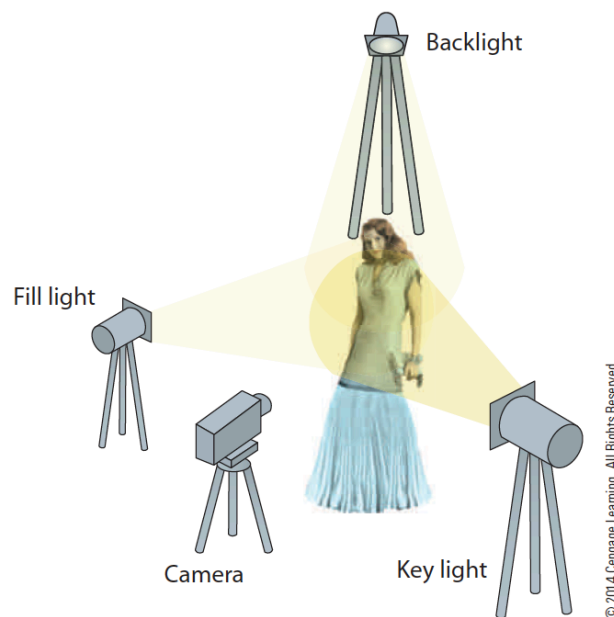


Figure 3.2-2: The three-point lighting scheme. Source: (Lewis, 2014, p. 76)

This lighting technique is obviously impossible in life-action cinematic VR, since the audience would be able to see the spotlights. Therefore, most VR filmmakers just work with natural light, resembling the Dogme 95 manifesto –which abandoned the “artificial” Hollywood practices, included lighting schemes.

c) Camera work

In traditional cinema, the filmmaker uses the camera to dictate what to show to the audience from all the elements of the *mise-en-scène* (Lewis, 2014). However, virtual reality lets the audience look wherever they want. The Oscar-winner Steven Spielberg added on this subject that virtual reality ‘is dangerous because it gives the viewer a lot of latitude not to take direction from the storytellers but make their own choices of where to look’ (Child, 2016).

Therefore, the elements that Lewis (2014) considers essential to the camera work –*camera placement, camera movement, focus and depth and stock, exposure, colour and effects*– need to be reconsidered in cinematic VR. As mentioned before, there’s only one “camera” in virtual reality, so its placement needs to be carefully chosen –since the camera *is* the audience. The use of so different cameras in VR also affects to the traditional concepts of camera angles, distance and, of course, off-screen space –they all disappear. For example, a low-angle shot is often used in a film in order to imply the authority of a character, but in VR this movement is no longer possible since changing the angle of VR cameras induces discomfort or even sickness to the audience (Smith, 2015). VR filmmakers are also struggling to find equivalents to cinema’s distance movements such as close-ups, which are usually used to give intimacy to the shot and also impossible to reproduce with VR cameras.

Similarly, traditional cinematic camera movements are almost impossible to translate to cinematic virtual reality. VR cameras do not usually move during a shot, especially in life-action experiences: the filmmaker just places them in the middle or a corner of the set and lets the action occur around the camera –not the other way around. However, some VR filmmakers are experiencing with camera movements that could be compared to a traditional tracking shot –smooth movement that follows the action– and pan and tilt movements –horizontal and vertical. Chris Milk (2016) discovered –after the filming of more than 15 VR experiences– that this is the best way to move the camera without creating discomfort: following a straight line and

moving in constant speed. On the other hand, virtual reality can take to a next level the traditional cinematic technique of *subjective point-of-view shots*, defined as ‘a shot that simulates what a character sees’ (Lewis, 2014, p. 98). As mentioned before, virtual reality POV does this by placing the audience “inside” of a character.

Finally, regarding the rest of the camera work elements that Lewis takes into account when analysing a film –*focus and depth* and *stock, exposure, colour and effects*–, it is extremely difficult to apply these concepts to VR, since they are very technical and specific for traditional cinema cameras.

d) Editing

As mentioned before, movie editing is the equivalent to Eisenstein’s concept of “montage” and it refers to the assembling of the shots. A cut is ‘the place where one shot ends and another begins; a direct transition from one shot to the next’ (Lewis, 2014, p. 121). In cinema, editing is used as a tool to create a spatial and temporal world in a scene, even though it is usual to assemble shots that were recorded in different moments or even different places. However, in cinematic VR cuts are *unnatural* and they can induce motion sickness. For this reason, some VR filmmakers are trying to use “tricks” when they want to change to another shot. For example, in Jaunt’s experience *Black Mass* (2014), a character puts a hood on “the audience’s head” –followed by a black screen– and when the hood is “removed” the scene has changed. Thus, the cut turns into an “organic transition” fully integrated in the story (Jones, 2014). In the early years of cinema, montage techniques were being developed in order to create an illusion of continuity of the story to the audience. Eisenstein locates the birth of the concept “*mise-en-cadre*” around that era and defines it as follows:

As the *mise-en-scène* is an interrelation of people in action, so the *mise-en-cadre* is the pictorial composition of mutually dependent *cadres* (shots) in a montage sequence. (Eisenstein, 1949, p. 16)

Tonal and graphic relationships between shots were then carefully constructed; it was the art of the *mise-en-cadre*. Until VR filmmakers learn which transitioning techniques work and which do not, and until audiences learn how to

interpret them as they did with cinema’s cuts, cinematic VR is still in the early stage of developing its own mise-en-cadre. However, there are cinematic “alternatives” to the cut that have already been use in VR with great reception, such as fades –‘a shot slowly darkens and disappears (fade-out) or lightens and appears (fade-in)’ (Lewis, 2014, p. 129). Foe example, the Honey VR⁵ production company has developed its own “best practices”, in which they recommend using the fade technique to give to the audience a moment of complete darkness that will help them to process the transition between scenes.

e) Sound

Lewis (2014) classifies sounds in cinema in three main categories: *spoken words*, *music* and *sound effects*. These categories include many other sound classifications, some of which are represented in the following table (see Table 3.2-2).

Sound relationships in cinema	Description
Diegetic	The sound’s source can be located in the film’s world.
Nondiegetic	The sound’s source is external to the film’s world.
On-screen	A diegetic sound which source is visible in the frame.
Off-screen	A sound which source is not visible but it is understood as diegetic.
Simultaneous	A diegetic sound that corresponds in time with the story.
Non-simultaneous	A diegetic off-screen sound that belongs to the past or the future of the story.

Table 3.2-2: A few of the possible relationships between sounds in cinema. Prepared by author based on the reading of Lewis (2014).

Lewis’ first category, *spoken words* or “voice track”, represent all the script lines read by the actors. The spoken words from a film can be classified in three sub-categories: *dialogue*, *direct address* and *voice-over narration*. When a *dialogue* takes

⁵ HoneyVR webpage: www.honeyvr.com/vr-best-practices/

place in a film, two or more characters speak to each other and it can be both scripted or improvised. Scripted dialogue is often dubbed: it is recorded separately and synched with the shots during the post-production. The term *direct address* has its roots in theatre and refers to the situation of a character speaking directly to the audience –in a film, ‘the actor looks directly into the camera and speaks to the viewer’ (Lewis, 2014, p. 156). When this happens, the “fourth wall” is broken: the imaginary barrier between the story world and the audience disappears. Finally, a *voice-over narration* is similar to a direct address, since a narrator speaks directly to the audience, but the difference is that the narrator cannot be seen in the frame –it is an off-screen sound. In cinematic virtual reality, spoken words have a similarly important role than in traditional cinema. However, in virtual reality the fourth wall is always almost inexistent. Some experts, such as the director of Oculus Story Studio, Saschka Unseld, simply believe that the fourth wall completely disappears in VR (Unseld, 2015). This means that all the spoken words in a VR experience feel like direct address to the audience. This feeling is taken to the fullest in POV experiences.

Another type of sound is *music*, which in cinema usually refers to the *background music*. Lewis introduces then the concepts of *score* –‘a nondiegetic musical accompaniment written specifically for a film’ (Lewis, 2014, p. 161)– and *musical motif* –‘a brief and recurring pattern of notes’ (Lewis, 2014, p. 162). On the other hand, filmmakers can also include pre-existing music instead of recording it specifically for the film. Cinematic virtual reality can use music in a similar way. Moreover, VR experts have been experimenting with cinematic VR as a tool for developing a new type of immersive music videos, such as Milk’s *Hello, Again* (2013) experience with the musician Beck (Lalwani, 2015).

Finally, *sound effects* are the last type of cinematic sounds that Lewis takes into account. They play an important role on adding realistic features to the film; even though they are usually added on the post-production and they rarely come from the source that the audience links it to. Sometimes sound effects are not exactly realistic, because they would be annoying or because the “source” does not exist in the real world –such as the sound of space ships in a futuristic film. In this case, the “Foley artist” is the one in charge of deigning these sounds. Sound effects can be crucial for the film’s narrative –for example, horror films usually use them in order to create tension. But in virtual reality, sound effects are always extremely important,

especially when using binaural audio. Adam Somers, from Jaunt, explains it as follows: ‘binaural audio is critical to an immersive experience within the context of VR. We consider audio to be 50 per cent of the immersive experience’ (Lalwani, 2015).

4 Methodology

Both qualitative and quantitative methods have been used in order to answer the research questions of this paper. As mentioned above, the literature about virtual reality –and more concretely, cinematic virtual reality– is really poor in the communication studies field. For this reason, qualitative interviews have been conducted to experts in the cinematic VR field with the aim of complementing the theoretical framework. The data from the qualitative interviews –together with the theoretical framework– will be also used as a basis for the analysis. The object this analysis is a compilation of virtual reality experiences that have been tagged as “cinematic”.

4.1 Expert interviews

The chosen method for these qualitative interviews has three approaches/characteristics: *expert*, *semi-structured* and *directed*.

Flick (2009) recommends the *expert interview* when the interviewee has an extensive knowledge on the object of research and the personal information is secondary for the research purpose. Consequently, the interviewee becomes a representative of the entire universe of experts from the field of the object of research –in this case, cinematic virtual reality. For this reason, the interviews for this research have been conducted to professionals who work with cinematic virtual reality from two different perspectives –production and direction– in order to achieve a greater degree of expert representation. The interviewees have been chosen, mainly, for their closeness to the field of cinematic virtual reality. Of course, their relation to this research and their availability and proximity were also determining factors. Furthermore, Flick (2009) refers to Bogner and Menz’s theory about the three different purposes of the expert interview, all of them valid for this paper (see Table 4.1-1).

Bogner and Menz’s uses for expert interviews	Concrete uses for expert interviews in this research
To study a new field	To study cinematic virtual reality
To complement data from other methods	To complement the data from the quantitative analysis
To elaborate a new theory	To elaborate a new theory about cinematic virtual reality

Table 4.1-1: Uses for expert interviews. Prepared by author based on Bogner and Menz’s theory –referenced by Flick (2009).

Flick (2009) also classifies the expert interview as a descendent of the *semi-structured interview*. Brinkmann (2014) observes that the semi-structured interview – the most used type of qualitative interviews– allows the interviewee to give more unexpected information, since the interviewer uses a guide focused on the research but flexible in means of order and ending point. Therefore, this structure is the most useful when interviewing an expert about a subject that has poor literature –again, this is the case of cinematic virtual reality. The guide that has been used for the four interviews in this research is simple and short. It consists of the four main topics, differently developed in each interview depending on the interviewee’s interest or knowledge on the determined subject (see Table 4.1-2).

Topic	Example questions
Interviewee’s background and motivation to work with cinematic VR	Why VR? How did you end up here? What’s your background?
Definition of cinematic VR	How would you define cinematic VR?
Traditional cinema vs. cinematic VR	What is the main difference between traditional cinema and cinematic VR?
Future of cinematic VR	Which are you thoughts about the future of cinematic VR?

Table 4.1-2: Guide for the qualitative interviews. Prepared by author

However, these are not the only topics that have been discussed in the interviews. Each professional has different approaches to cinematic virtual reality; therefore, each interview turned into different and equally interesting directions. Only

a very few times the conversations had to be redirected to the central point using redirection questions (e.g. ‘Going back to the subject of cinematic VR, [...]’).

Hsieh & Shannon (2005) define the *directed content analysis* method as the most useful method to analyse interviews’ transcripts when the existing literature about the object of research is poor. The authors’ method is based on the coding technique, which can be defined as ‘representing the operations by which data are broken down, conceptualized, and put back together in new ways’ (Flick, 2009, p. 307). The authors describe a six steps process to conduct directed content analysis: ‘1) identify key concepts or variables as initial coding categories, 2) operational definitions for each category are determined using the theory, 3) use “open-ended” questions followed by targeted questions about the predetermined categories and 4) highlight all text relevant to the research question, 5) code all highlighted passages using the determined codes and 6) give a new code to any text that could not be categorized with the initial coding scheme’ (Hsieh & Shannon, 2005, p. 1281).

4.2 VR film analysis

There is no method yet for the analysis of cinematic virtual reality experiences. Other media analysis methods cannot be used for this purpose either, since some virtual reality technological characteristics widely differ from any other media, and as Monaco states, there’s a conditioning relation between any form of art and its technology:

Every art is shaped not only by political, philosophical, and economic factors, but also by its technology. The relationship isn’t clear: sometimes technological development leads to a change in the aesthetic system of the art; sometimes aesthetic requirements call for a new technology; often the development of the technology itself is a result of a confluence of ideological and economic factors. But until artistic impulses can be expressed through technology, there is no artefact. (Monaco, 1981, p. 49)

Therefore, to directly apply film analysis methods to cinematic VR experiences would be not only impossible but also unwise. However, it has been

demonstrated in the second part of the theoretical framework of this research that cinema and VR can share several cinematic values, thus film analysis can be useful when analysing these common characteristics in cinematic VR.

For this reason, I have developed my own method to analyse cinematic VR experiences: the VR film analysis. It is based on Lewis' film analysis method but also in Steuer's telepresence theory. Moreover, the results of the expert interviews have also been taken into account, due to the lack of specific literature about cinematic VR. It is an adaptation of film analysis to the characteristics of virtual reality, specifically focusing on the audience's capacity to immerse themselves in the experience and to interact with it. The method includes the analysis of the cinematic characteristics that have been defined as relevant for cinematic VR in the theoretical framework – *narrative, mise-en-scène, camera work, editing and sound*–, as well as the elements that determine the level of *telepresence*.

The VR film analysis is essentially quantitative: all of these concepts that are analysed are empirically reproduced by variables and, at the same time, these variables can be divided into different categories or values (Gunter, 2012). For example, according to Steuer's theory, the concept of *telepresence* is determined by five variables: *breath* and *depth* –that define the sub-concept of vividness– and *speed*⁶, *range* and *mapping* –that define interactivity. And, for example, *breath* is a continuous variable, since it can be rated from 1 to 5, depending on how many sensory systems are affected by the experience. On the other hand, *depth* is a discrete variable due to the fact the elements that determine it are nominal and infinite, such as the use of stereoscopic images or omni-binaural sound. All the variables that have been taken into account and their values or categories are listed in the Table 4.2-1 (p. 34).

As mentioned in the beginning of the research, hypotheses are not elaborated for the simple reason that the cinematic VR field has not been studied enough from the perspective of communication studies. Therefore, I cannot predict the relations between the variables before they are analysed, thus the main goal of this research is to define Cinematic Virtual Reality and, secondly, to take a first step in the elaboration of a method to analyse its contents.

⁶ However, *speed* is not considered in the analysis since, as stated in the theoretical framework, this variable is usually well implemented in today's devices.

Concept	Variables	Values
Telepresence	Breath	(1-5) Sight/Hearing/Touch/Orientation/Taste-Smell
	Depth	i.e. Stereoscopic, Omni-binaural
	Range	i.e. 6 DOF, Object interaction
	Mapping	i.e. 6 DOF moves, Look&Click
Narrative	Structure	i.e. A&B plot, Parallel stories
	Techniques	i.e. Flashbacks, Flash-forwards
Mise-en-scène	CGI	Yes/No
	Props	i.e. Matches
	Blocking	i.e. Action around the cameras
	Lighting	Natural/Artificial
Camera work	Camera placement	In a character/No (i.e. in a corner)
	Camera movement	Static/No (i.e. tilt, pan)
Editing	Cuts	0/(1-5)/(5-10)/+10
	Mise-en-cadre	i.e. Fade, Dissolve
Sound	Spoken words	Dialogue/Direct Address/Narrator
	Music	Background/musical motif
	Sound effects	i.e. Heart beat

Table 4.2-1: Characteristics studied in the VR film analysis. Prepared by author.

The relations between the concepts and their respective variables and values have been polished after the first two trial analyses. *Allumette* (2016) and *Ewa, Out Of Body* (2016) have been studied profoundly in the Analysis chapter, meanwhile the rest of the VR films have been quantitatively analysed using a table of variables.

Analytic diagram

During both the expert interviews and the VR film analysis, I discovered that the best way to understand an experience from the audience's perspective was to draw

a scheme, in a similar way as Hurst (2016) does in his circular blocking forms (see Figure 3.2-1 in p. 24). The idea first came to me when Damsbo was explaining one of his films during his interview: he took a paper and he draw a simple diagram where each character was designed a letter and arrows defined the relation between them (see Figure 4.2-1). I realised that this scheme had helped me to understand the VR film much better, so I decided to separate each element of Damsbo's drawing (letters, circles and arrows), define what they represented, and add a few elements of my own (see Table 4.2-2).

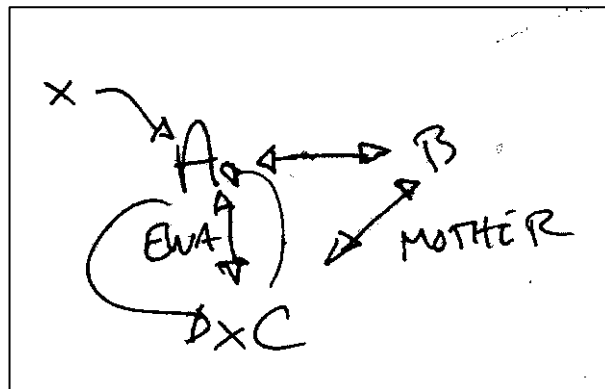


Figure 4.2-1: Damsbo's drawing during his interview






Symbol	Meaning
	<p>A circle represents the location of the audience in the scene.</p> <p>If it is discontinuous, it means that there is no audience embodiment.</p>
	<p>If it is continuous, it means that the audience is given a body.</p>
<p>X</p>	<p>Letters represent the roles of the actors in the scene.</p> <p>An “X” is for an observer audience.</p>
<p>A</p>	<p>Any other letter (starting by “A”) represents the characters.</p>
	<p>A discontinuous and curved arrow is used when there is a change in the role of the audience.</p>
	<p>Arrows represent the relations between the actors.</p> <p>A one-sided arrow means that there is only one actor acknowledging the other.</p>
	<p>A two-sided arrow means that both actors acknowledge each other.</p>

Table 4.2-2: Definition of the elements included in the analysis diagram. Prepared by author

The analytic diagrams have been used not only in the VR film analysis, but also in the expert interviews in an attempt to illustrate the concepts and ideas that the interviewees described.

5 Analysis and results

In this chapter are listed and described the main results that have been found through the analysis of the expert interviews and the VR films. The expert interviews were analysed first, since their results would influence the VR film analysis.

5.1 Expert interviews

As mentioned before, the qualitative interviews have been conducted to three experts in the field of cinematic virtual reality:

- *Mads Damsbo* is a Danish media director and producer. He is also the founder of Makropol, a trans-media production company. He has studied Film Production in Super16 Film School and he is especially interested in interactive experiences, so cinematic virtual reality is the ultimate medium for him.
- *Johan Knattrup Jensen* is a Danish director and writer, and also Damsbo's partner in Makropol. He has also studied at Super16 Film School but unlike Damsbo, he is more interested in the audience's emotions and feelings in cinematic virtual reality experiences.
- *Nicolás Alcalá Schächter* is a Spanish director and the founder of Future Lighthouse, a virtual reality production company. He has studied Exponential Technologies in the Singularity University and his main interest is how VR will change cinema with its new technologies.

The data collected in the interviews has been regrouped in six main subjects: *Traditional Cinema versus Cinematic Virtual Reality*, *Point-Of-View (POV) and character embodiment*, *Interactivity as a new tool*, *A new language*, *Directing and editing without a frame*, and *The future of Cinematic Virtual Reality*.

Traditional Cinema versus Cinematic Virtual Reality

When asked about the characteristics that cinematic virtual reality shares with traditional cinema, the opinions are slightly different. Damsbo points that the main one is the passage of time. He explains that in cinema a story is told through a definite amount of time and that in virtual reality filmmakers can still keep people on the storyline. Similarly, Alcalá mentions the question of rhythm as the main characteristic that cinematic VR shares not only with cinema but also with other mediums such as poetry. Thus the plot, the development of the story, becomes a strong cinematic value. Both Damsbo and Jensen also mention the *mise-en-scène*, understood as the chosen aesthetics behind what the audience feel or see. As for the differences between cinema and cinematic VR, Damsbo and Jensen also share Steure's experiential approach to virtual reality, since their main focus is the audience's feelings and emotions when having a VR experience. Jensen believes that the first thing that one notices with cinematic VR is the feeling of being inside the film:

Jensen: *'It feels like you are inside of the movie and all of the sudden there is no distance between you and the film on the screen or on the wall: you are inside it.'*

This idea is clearly related to Unseld's theory of the disappearance of the fourth wall, which the audience is used to in traditional cinema (Unseld, 2015). Similarly, Alcalá talks about the concept of "suspension of disbelief" in traditional cinema. He defines it as a state of the audience that occurs when they are so deeply immersed in the story that they forget that they are actually in a cinema theatre. It is very difficult to make the audience reach this state in cinema, 'and if you do', he says, 'is because you have created a master piece'. In virtual reality, however, it is quite the contrary: the audience have to remind themselves that they are not really in the virtual world. For Alcalá this makes everything easier, because the audience feel like being inside of the story very easily, and he believes that it will get better in the future.

Point-Of-View (POV) and character embodiment

Damsbo explains the feeling of being inside the movie by comparing cinema and cinematic VR when approaching the same narrative situation, for example, a

conversation between two characters. In cinema, when character A and character B are chatting, the camera is an “X factor” –called “the third person”– and it is placed between both characters. Therefore, there is a one-sided relationship between the audience and the characters, meanwhile A and B have their own relationship (see Figure 5.1-1). Sometimes, the camera can also be located “inside” A or B as a subjective point-of-view shot (see Figure 5.1-2), but Damsbo remarks that this technique does not really induce the feeling of being inside them or the feeling of being seen by the other character. However, he believes that virtual reality transforms the “X factor” into a character. Then, a new interrelation between A, B and C is created (see Figure 5.1-3). For Damsbo, this is how VR changes the cinematic experience.

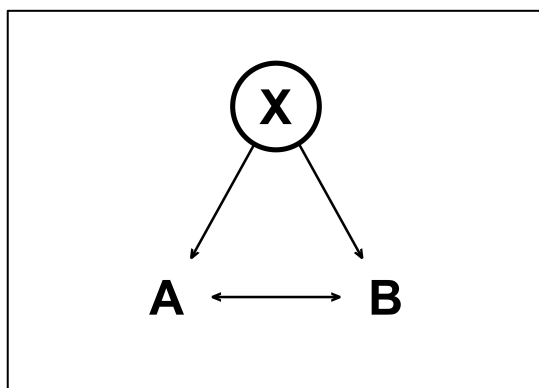


Figure 5.1-3: Camera placement in traditional cinema. Prepared by author based on Damsbo’s interview.

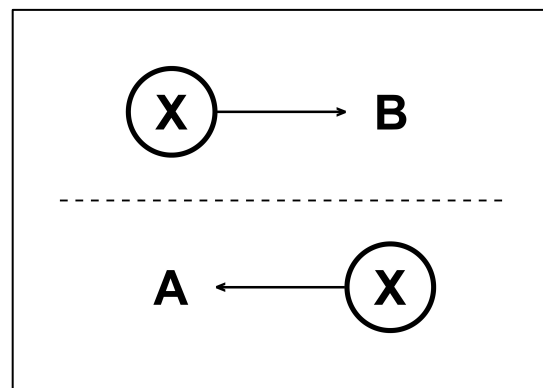


Figure 5.1-3: Subjective point-of-view shot in traditional cinema. Prepared by author based on Damsbo’s interview.

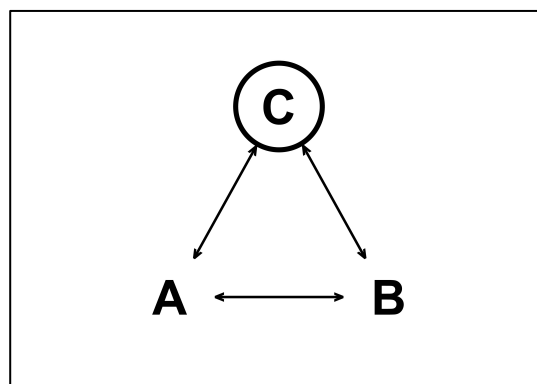


Figure 5.1-3: Camera placement in cinematic virtual reality. Prepared by author based on Damsbo’s interview.

Jensen believes that since VR makes possible to place the audience inside the movie, it is reasonable to give them a role in the story. This is how their POV

technique came up: they built a rig that allowed the actors to wear the cameras close to their eyes (see Figure 5.1-4), so when the audience looks around, it would feel like they have the actor's body and eventually they would be able to feel like the character.



Figure 5.1-4: Jensen and Damsbo's recording set for *Ewa, Out Of Body* (2016). Source: <https://www.facebook.com/makropol/>

Jensen also thinks that whenever one tries VR, they question their identity inside of the experience, so giving a body and a personality to the audience is a way to give them an answer. In *The Dog House* (2014), defined as a first person virtual reality film, Jensen and Damsbo gave the audience the possibility to choose which character they wanted to be –out of five possible characters– so every one of them would have a different experience from the person sitting next to them (see Figure 5.1-5).



Figure 5.1-5: Display of *The Dog House* (2014). Source: <http://skammekrogen.dk/>

When the experience was over and they removed their headset, they often started talking to each other. This is when Jensen observed that the audience often “absorbed” the character’s feelings:

Jensen: *‘Not everybody: some didn’t connect, but some connected quite a lot, and people started talking about what the characters were doing and saying “why did you say stuff like that to me?” or “what did you do in the basement?”’*

However, Alcalá is sceptical about having a body inside the experience, since he believes that it may be too determining. He is convinced that the audience dives equally into the experience either if they are placed into a body or not:

Alcalá: *‘We are testing it now, we are experimenting with it... Both with having a body –computer generated or real image– or not. But I dare to say that without a body it is easier to enter the experience, because at the end, a body is very conditioning. Although it depends a little bit on the narrative.’*

Nevertheless, he keeps open to the idea of experimenting with that, as he is convinced that through testing different techniques we will be able to discover what works better for the audience. However, he has a different approach to POV than the Danish filmmakers. He thinks that the 180-degree POV technique is not to be considered virtual reality. He admits that it is more immersive than traditional cinema, but he claims that virtual reality has to be at least spherical:

Alcalá: *‘Rober [Alcalás’ business partner] is a little bit more radical than I am because he thinks that if it is not interactive and stereoscopic it is not even virtual reality... I say that if you are watching a 360 video in the goggles and you can look around it is virtual reality, even if it is not stereoscopic.’*

Interactivity as a new tool

Alcalá has more technical approach to cinematic virtual reality than the Jensen and Damsbo. He is interested in the new tools that VR can offer to storytellers. The first main difference that he notices between the two mediums is the disappearance of the frame in VR. The ability to look around, he says, changes everything. But what he thinks that is the greatest innovation is the possibility of being able to choose, the addition of interactive elements in films. The interactivity factor can be displayed in different levels: the possibility to look around would be the most basic one, and being able to ramify the narrative according to the audience's actions or choices is the next step. Damsbo explains that since VR headsets are equipped with head-tracking devices, filmmakers have now the opportunity to know where exactly the audience is looking at. For him, this means that filmmakers can offer different endings to the same narrative without them even knowing where the bifurcation has taken place. He calls it “invisible edit” or “invisible interaction”:

Damsbo: *‘You, the audience, by looking somewhere, are creating consequences for the film that they cannot see. I mean, you see them, but you do not know that you created the consequences.’*

This is a new tool that the filmmaker has never been able to use before. Damsbo also calls it the “if not, then that” mechanics: if the audience does this, then that happens in the film. He mentions *Wild: The Experience* (2014) as an example of this new cinematic technique. In this VR film, the audience find themselves as an invisible spectator placed in the middle of the woods when the main character appears and sits on a close rock. Another woman then starts talking and thanks to the use of omni-binaural sound, if the audience were looking at the main character, they can locate the source of the voice right behind them. This is when the “invisible interaction” takes place: if the audience turn their head to look at the source of the voice, they see that a new character has appeared –and they find themselves standing between both characters (see Figure 5.1-6). However, if they do not turn around in that exact moment, the new character never appears and it seems like it is just a voice in the air.



Figure 5.1-6: Panoramic screenshot from *Wild: The Experience* (2014). Source: (Bishop, 2015)

When talking about interactivity in cinema the term “gamming” is always mentioned. It looks like the more VR technology evolves, the more difficult is to separate cinema from games. Jensen has found a way to draw a line between both of them. He says that if a film is interactive, in the sense that the audience can deliberately make a choice, then it is a game. However, if the film is secretly interactive –meaning that the audience is not aware of where the choices have been made– then it is a film; a film that can be experienced in different ways. For Jensen then, this is on the verge of cinema and game. Damsbo also highlights the importance of the unconsciousness of the audience when this changes of the narrative take place. He believes that this “invisible interaction” is a good way to reach the perfect balance:

Damsbo: *‘It is the balance of not giving the audience too much agency and freedom of movement, but still giving them the opportunity of having agency and movement and keep the cinematic experience. That is a balance that is hard to find.’*

Damsbo also believes that VR overtook cinema in being the ultimate medium. Thanks to using the right degree of interactivity, it is easier for the audience to forget themselves and be absorbed by the story. For him, too much interactivity makes the audience focus too much on what they are doing and this takes them away from the story. This is the reason why he believes that games are not the best way to tell a story, at least yet.

On the other hand, Alcalá is more eager to erase the barriers between mediums. He thinks that virtual reality cannot longer be tagged as cinema or as gaming. For him, it is an intermediate point where there are different levels of interactivity available and he even suggests that a new term needs to be proposed in order to designate this kind of experiences, because both “gaming” and “cinema” are terms that can induce rejection to the public.

A new language

As it has already been mention, defining the concept of cinematic virtual reality is not easy when virtual reality itself is still developing. However, many experts on the field, including the ones interviewed in this research, have used the term “language” when they talk about cinematic VR.

Alcalá is convinced that virtual reality offers us a new language. He thinks that every technology that humanity has invented, starting with writing, defines the way we tell stories. When cinema was born, a new language was born with it too. So now we are facing the birth of a new medium, virtual reality, but we also facing the birth of a new language. This idea is also developed in his experience *Tomorrow: The evolution of language* (2016), where a narrator explains that languages are what makes us human and that technology is an extension of our minds. He believes that VR filmmakers have a huge opportunity: to define the language that will be used in the next 20 or 30 years. Very few times in history humans have witnessed a situation like this:

Alcalá: ‘I fell in love with the concept of being able to mix technology and storytelling. And I thought that the cool thing about this was that it was going to create a new industry. It was not the cinema industry adapting to a new technology, but it was something completely new that was going to be leaded by the technology people like Google, Facebook or Samsung.’

Alcalá mentions the birth of cinema as an example: pioneers started developing techniques such as montage, time ellipsis or a close-up and in the beginning the audience did not understand them. So for him, cinematic virtual reality

is in that phase. He claims that we need to lose many concepts and maybe remember other techniques that we have been forgotten from the beginning of cinema or even theatre, such as staging.

Similarly, Damsbo defines cinematic virtual reality as a new form of expression. He thinks that to compare it to other mediums is not the solution, since he says that a new language is being developed and it has nothing to do with cinema. And as for Jensen, virtual reality has given him the opportunity to create his very own language, something that was not possible with him when he works with traditional cinema:

Jensen: *‘When I was a child I dreamt about creating my own cinematic language, I dreamt about building my own cameras and create something that was very unique and very mine, my language. And what I realised when I went to Film School was that you really use a lot of the same rules as everybody else, the same structure.’*

Directing and editing without a frame

Jensen has developed another filming technique related to the audience’s identity in the film. He calls it “the out-of-body experience” and it consists of taking the control of the camera in a POV experience, so the audience feels like they have abandoned the body they were in. He used this in *Ewa, Out Of Body* (2016) and Damsbo explains it as follows: the audience is placed in Ewa’s body, a young girl whose mother is punishing for no reason (see Figure 5.1-7). Then, at some point, the camera smoothly moves out of Ewa’s body so suddenly the audience can see the scene from the outside, as a floating invisible consciousness. However, both Ewa and her mother end up acknowledging this presence –the audience–, which raises the question of the new identity of the audience (see Figure 5.1-8). After a while, the audience goes back into Ewa’s body. Therefore, the acknowledgment of the audience’s presence by the other characters in the experience is a key factor in determining the role of the audience.

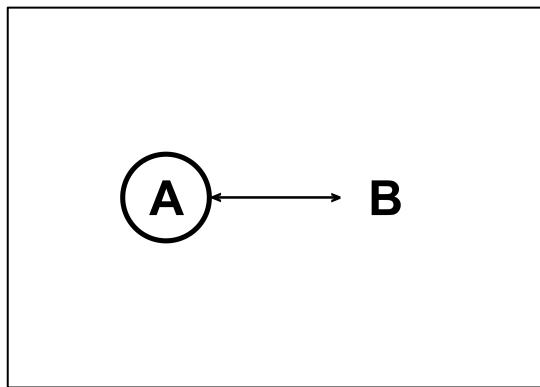


Figure 5.1-8: Ewa's embodiment scene, where A is Ewa and B is her mother. Prepared by author based on Damsbo's interview.

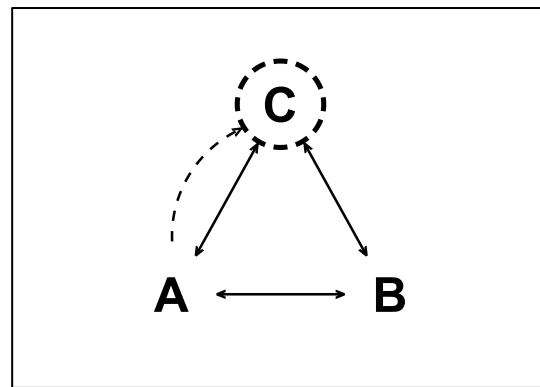


Figure 5.1-8: Out-of-body scene, where a new character C appears after leaving Ewa's body. Prepared by author based on Damsbo's interview.

Damsbo also points out that in *Wild: The Experience* (2014) the audience is not acknowledged by the other characters –thus one deduces that it is just an observer role– but at the end, when all the characters are gone, a fox approaches the camera and stares at it, which gives the audience the feeling that the fox knows they exist in the virtual world. For Damsbo, that means that nature acknowledges the audience, so they become part of the movie somehow.

For Jensen, this technique lets him take the control of the camera back and by doing so, not only he reduces the motion sickness, but he also discovered that he could create emotions with the way the camera moves:

Jensen: *'This is an amazing experience to have but it is also very useful in telling the story and creating suspense. The movement of the camera [...] is something that of course I have learnt from conventional cinema.'*

This is one of the reasons why Jensen claims that VR carries a new need of the figure of the director. The relation between filmmakers and their audience is much more complex now, and he describes it as a dance: it is the audience's decision to follow the story that the director is trying to tell. For example, using multiple plots in VR is different from doing it in cinema, because in cinema the director is the one shifting from plot A to plot B, but in VR the audience do the shifting. Because with VR, there is no frame to tell the audience where to look, so the director will have to use other tricks to grab their attention. For Jensen, to make the audience look to a certain direction and then make something happen where they are not looking at is a

good way to use their imagination. He uses tricks like putting a wall between a character and the audience or putting the camera in a corner of a room –instead of place it in the centre as most 360 do. Thus, the director still has some control over the audience’s attention, but for Jensen this means a great deal of *mise-en-scène*. Damsbo also mentions the use of sound as another good tool to direct the audience’s attention when the experience has more than one plot:

Damsbo: *‘If I want to make a very dense story VR is the perfect medium for that. I can sit in a restaurant where there are conversations everywhere and I can sort of be looking around and focus on one conversation, then its sound gets louder.’*

Damsbo also points that editing is a common element that cinematic VR and traditional cinema share too. For him, the editing either has a concrete purpose or has to be as least disturbing as possible. He points the out-of-body experience as an editing technique and he labels it as “a cut in relations” or “a cut in the audience’s identity”. The already mentioned “invisible edit” is also an example of a VR editing technique.

Alcalá compares the editing in both mediums too. For example, he believes that both in cinema and VR cuts can be annoying because they are not edited well enough. However, if done right, the audience barely notice them because it is a smooth transition. Alcalá explains that cuts in VR depend on what is happening in the scene and where they transition to, and in order to make it less violent filmmakers often need to come up with some trick. For example, in his experience *El Ministerio del Tiempo* (2016), an object was used as a distraction to change the scene.

The future of Cinematic Virtual Reality

It seems clear that virtual reality has a lot more to offer technologically speaking. But experts have just speculations about how the new advances will affect to the way to tell stories in VR. Alcalá is the interviewee that appeared more excited about the future possibilities that virtual reality can offer. As a medium, he believes that virtual reality –together with augmented reality– will be the future platform where we will find everything:

Alcalá: *‘In the same way as we did with computers –we invented them and it is a box where we put any activity you could think of inside them– [...] inside virtual reality there will be everything: education, social interactions...’*

As for the future of cinema, Alcalá predicts that 15 years from now more than half the films produced every year will be for virtual reality. He explains it as a technological evolution from which we cannot go back and he compares it to black and white films: once colour was introduced people forgot about them. Of course, he believes that this transition to virtual reality will only take place when the technology is spread to the population and the contents are ready to be distributed. He also thinks that all the cinematic experiences will have a certain degree of interaction in the future, which will lead to the possibility to have more complex and ramified narratives. Thus, VR films will be much closer to videogames. Finally, he is also convinced that at least the 90% of the VR films will be computer-generated. He explains that today it is already possible to create entire CGI scenarios that can be confused with life-action. Moreover, not only CGI experiences are much easier to work with than life-action, but also they allow for real-time interaction: the scene changes depending on what the audience is interacting with:

Alcalá: *‘I think that video is a transition, since nowadays we cannot make hyper-realistic CGI –because it means a lot of work or it cannot be made in real-time– so we still film everything, but 10 years from now this will not be necessary.’*

Therefore, he concludes that a part of the future cinematic experiences will be similar to *The VOID*: a real-time “mixed reality” experience that matches the virtual world with the real environment, so the participants can freely move around (Road to VR, 2016). In the Figure 5.1-9, the two realities are shown: in the top picture, the participants in the real world; and in the bottom picture, their representation in the virtual world.



Figure 5.1-9: Scene from *The VOID*. Source: (Road to VR, 2016)

On the other hand, Damsbo is more cautious about the future of cinema. For him, cinema will keep on existing in the same way as we know it and cinematic virtual reality will be just another option added to the entertainment repertoire:

Damsbo: *‘I do not think [VR] is the future of cinema. It is the future of some type of experiences but there will probably still be a need for cinema and a need for theatre [...].’*

As for the future possibilities in VR filmmaking, Damsbo only adds that the “invisible interaction” technique is probably the most powerful tool in the future.

Finally, Jensen is especially concerned with the evolution of storytelling. He briefly mentions that the audience may be able to have their own body placed inside the experience. However, his biggest worry is that most VR filmmakers are obsessed with the technology instead of considering the storytelling possibilities. Thus, he believes that great artists still need to adapt to VR. As a conclusion, he adds that virtual reality is the closest thing there is to what he considers that would be “the ultimate movie”:

Jensen: *‘The best camera that we can think of is the human camera. [...] If I wanted to tell you a story about something, I would experience it and then I would just take out the data and put it into your head.’*

5.2 VR film analysis

In this chapter, the concepts that have been learned in the theoretical framework are analysed in the two cinematic experiences that have been chosen as samples: *Allumette* (2016) and *Ewa, Out Of Body* (2016). The elements that are studied in each film are the narrative, the mise-en-scène, the camera work, the editing, the sound and, finally, the factors that determine the level of telepresence.

Example 1: Allumette

- **Year:** 2016
- **Director:** Eugene Chung
- **Production company:** Penrose Studios
- **Type:** Animation
- **Duration:** 20 minutes



Figure 5.2-1: Cover picture for *Allumette* (2016). Source: www.penrosetudios.com

a) Narrative

- **Structure:** A&B plot
- **Techniques:** Flashbacks

The story is about a girl (Allumette) and her mother, who travel around a fantastical world of floating islands in an airboat. There are multiple plots that can be located in different timelines: first, Allumette is sitting alone in one of these floating islands, it is dark and cold –there is snow everywhere– and she looks sad; then, every time that Allumette lights one of her “giant” matches, the audience go back to a past

event of her life, where she is with her mother. In these past events, mother and daughter travel in their airboat to the same island where the present Allumette is. When they land, they make a performance using the matches while some other characters watch them. There is also a performance in an island located just beneath the boat: another character is singing for a small crowd. Then, the airboat is accidentally set on fire, putting on risk the singer and the people listening to her. Allumette's mother jumps into the airboat and drives it as far as she can from the people, until the vehicle explodes in the sky. When the Allumette from the present has only one match left, she meets another character and she gives it to him as an act of kindness.



Figure 5.2-2: Screenshots from the two different plots in *Allumette* (2016). Source: www.penrosestudios.com

b) *Mise-en-scène*

- **Props:** The “giant” matches
- **Blocking:** Moderate movement
- **Lighting:** Fire from the matches, Streetlight

The fantasy world of *Allumette* is inspired by the city of Venice, and it was carefully designed to amaze the audience with every detail:

To tell the story of *Allumette*, Penrose crafted an entirely new and fantastical VR world, with a city loosely inspired by Venice floating in the sky. Clouds lap the buildings like waves in the winding canals and rios of Allumette's world. (Chung, 2016)

Moreover, the *mise-en-scène* proves to be essential to set the mood in the two different plots. When Allumette is alone, it is dark, it is snowing and the city looks empty, which makes the audience understand even more her sadness. On the other hand, in the flashback scenes, it is always sunny and there are other characters in the city, which looks vibrant and happy.

The matches are key props in the story. Even though it is not clear if they are magical or which exactly their function is, every time that Allumette lightens one of them, the light from their flame floods the scene and the audience is transported to a memory from the past. For the same reason, the lighting effect that the matches produce is a trigger element in the story. Especially because it contrasts with the sad-nighttime scene, where there is only one source of light: a weak streetlight near Allumette.

Finally, another significant detail from the *mise-en-scène* is the location of the characters. In both plots, the main characters are located in the same exact point: the island that is closer to the audience, right next to a bridge. The bridge is also a key element because the final character to which Allumette gives a match is hiding beneath it, and in the scenes from the past there is some activity there too. Generally, the two main characters –Allumette and her mother– stay in the same spot.

c) Camera work

In this case, the analysis of the camera work is not possible, since the audience “is” the camera and they can move around freely –they can use the six degrees of freedom. Therefore, they choose where they want to stand and in which direction they want to look.

d) Editing

- **Cuts:** 4
- **Mise-en-cadre:** Fade-ins with the matches’ flames, Sunshine

In every transition between scenes in this experience, the light is the element that smoothly transports the audience. The very first scene is located in a dark environment where tiny windows appear (see Figure 5.2-3). It is a situation

scene that allows the audience to get used to virtual reality and its characteristics. A ray of sunlight is then used to lighten the scene and transport the audience to Allumette's world of clouds. And as mentioned before, the light from the matches' flames is strategically used to change from scene to scene in a gentle way.



Figure 5.2-3: Screenshot from the situation scene in *Allumette* (2016). Source: www.penrocestudios.com

e) Sound

- **Spoken words:** No
- **Music:** Background music
- **Sound effects:** Characters' expressions, Matches

There is no dialogue between the characters or a narrator. For this reason, the characters not only have an exaggerated body language, but they also make some noises when they appear to be communicating with each other. Other sound effects are also relevant for the story, such as the sound from the matches being lightened. As for the background music, it is specially written for the experience and it helps to set the mood depending on the scene.

f) Telepresence

- **Breath:** Sight, hearing and touch
- **Depth:** 360°, stereoscopic image and omni-binaural sound
- **Range:** 6 DOF and object interaction
- **Mapping:** Head-tracking, position-tracking, hand-tracking

This experience was originally created to stimulate three sensory systems: sight, hearing and haptic. The haptic input comes from a hand controller that allows

the audience to have feedback when they interact with some of the objects in the scene. The experience uses 360° technology, and it has an extremely high resolution, in the sense that the audience can appreciate every little detail in the scene. Moreover, the quality of the visual experience is also increased by the stereoscopic element. Since it is a 6 DOF experience, the audience cannot only choose the direction they want to look at, but they can also change their location in the virtual world. In addition, some of the elements from the scene change when the audience get closer to them –for example, the inside of the is visible if they get close enough until a wall disappears (see Figure 5.2-4).



Figure 5.2-4: The inside of the airboat in *Allumette* (2014). Source: www.penrosetudios.com

g) Audience's experience

The audience experience this piece as an observer: none of the characters acknowledge them. They are not embodied, and they are placed in the air –so it feels like they are floating. Surprisingly, the audience perceives the virtual world as doll-sized, since the characters' height seems to be no more than 15 centimetres. Penrose Studios used this “trick” in order to reduce possible motion sickness.

In the analytic diagram of this experience (see Figure 5.2-5), the audience is represented with an X as a symbol of no characterization. The discontinuous circle means that the audience is not embodied either, and the one-sided arrows mean that the other characters –for example, A and B– do not acknowledge the presence of the audience.

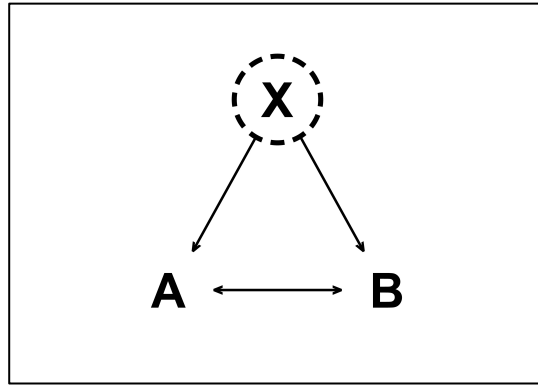


Figure 5.2-5: Diagram of the audience's experience in *Allumette* (2016). Prepared by author

Example 2: Ewa, Out Of Body

- **Year:** 2016
- **Director:** Johan Knattrup Jensen
- **Production company:** Makropol
- **Type:** Life-action
- **Duration:** 8 minutes



Figure 5.2-6: Cover picture for *Ewa, Out Of Body* (2016). Source: www.facebook.com/makropol

a) Narrative

- **Structure:** One event
- **Techniques:** Out-of-body

Ewa is a young girl and she's the main character of this piece. The whole experience occurs in a single event –a specific moment in the timeline of her life. The scene starts with Ewa standing in a kitchen, in front of a fridge with the door opened. There is a cake inside the fridge and she takes a little bit of the frosting with her finger. Afterwards, she opens a drawer from the kitchen, she takes to chocolates, and she carefully unwraps them and eats them. Suddenly, a voice in the distance says 'I thought you weren't feeling good'. Her mother appears into the scene. Ewa replies, nervous, but her mother is clearly upset –even though she stays calmed– and makes her sit on the table in the dinning room. Then the mother starts explaining a disturbing story about a hamster that she had when she was Ewa's age. Meanwhile, she goes into the kitchen and, when she is back, she is carrying the cake from the fridge. She sits on the dinning table, next to Ewa, and asks her to eat the cake. Apparently, the cake is for Ewa's birthday party, so she asks her mother to forgive her for eating the chocolates.

But her mother calls her selfish and greedy, and insists that she must eat the cake. The girl starts eating little bits of it with a fork; meanwhile, her mother says that she is going to cancel the birthday party and then she just repeats ‘keep eating, keep eating...’. This is when the out-of-body experience takes place. Another presence appears in the room, but its nature is unclear: is it Ewa’s consciousness? Is it a future version of Ewa remembering that concrete moment of her life?

b) Mise-en-scène

- **Props:** Cake
- **Blocking:** The mother’s disappearance
- **Lighting:** Natural

The design of the set was simple on purpose: the director wanted the audience to be focused on the conversation, so both the kitchen and the dining room are cleaned of props. Therefore, the chocolates and specially the cake are the only significant elements from the scene.

The location of the mother is also a key factor that adds meaning to the piece. In the beginning, when Ewa –therefore the audience– is in the kitchen, the mother starts talking but she is nowhere to be seen. And as mentioned before, when the mother goes to the kitchen, the audience cannot see her again, even though she is still explaining the story about the hamster.

Finally, the director used artificial light, but only on the outside of the house with the purpose of potentiating the natural light. As a result, the scene is clear and the colours are a bit warm. In general, the mise-en-scène –including the characters’ appearance– reflects a discipline and tidiness that matches the strict character of the Ewa’s mother.

c) Camera work

- **Camera placement:** POV, off-screen space/Eye-level shot
- **Camera movement:** POV/Handheld shot

The camera work in a virtual reality POV shot is very delicate, especially when the actor is the one in control of the camera. Therefore, the actress that played Ewa had two difficult tasks: acting and at the same time move carefully and following very strict instructions from the director. A sudden movement or even a slight turn of her head could lead to create a great discomfort to the audience. Moreover, since the cameras had the 180° limitation, the audience can only see exactly what the actress was seeing when the scene was shot. Thus, unlike 360° shots, the cinematic concept “off-screen space” is relevant here, because the screen turns black if the audience tries to look in the opposite direction as the actor.

And as for the out-of-body experience, the director took the camera and smoothly moved it until the audience could see Ewa and her mother in sitting in the table just in front of them, in an eye-level shot. The move had to be very careful in order to induce to the audience the feeling of being an invisible presence, a ghost.

d) Editing

- **Cuts:** 1
- **Mise-en-cadre:** Fade-out

The whole scene has recorded in a single shot; there is not a single cut –not even during the out-of-body– until the end. The final scene fades into a black screen where a white text –a short poem– appears at the same time as a voice reads it.

e) Sound

- **Spoken words:** Dialogue
- **Music:** Background music
- **Sound effects:** In scene

The dialogue between Ewa and her mother is a very important element to understand the relation between them: the mother, strict and even mean, punishes her daughter in a very harsh and psychological way, meanwhile Ewa’s reaction makes the audience understand that it is not the first time that this kind of situation happens. The fact that there is an embodiment in Ewa puts her words in the audience’s mouth, in a way that when the mother speaks to her it does not feel like direct address: it feels like

there is a dialogue between the audience and the mother. Finally, there is also a very subtle piano line in the background, and the sound effects were recorded in the scene.

f) Telepresence

- **Breath:** Sight and hearing
- **Depth:** 180° and binaural sound
- **Range:** Orientation
- **Mapping:** Head-tracking

Only the two basic senses are stimulated in this experience –sight and hearing. Since it is a life-action VR film, stereoscopic technology was not used. And because it is a POV film, omni-binaural sound was not used either. Instead, binaural sound was used to record exactly what the actor that played Ewa was hearing, so the audience would hear the same.

In addition, also because the audience is placed in Ewa, pitching, yawing and rolling are the only degrees of freedom given to the audience –thus the position-tracking technology is not used. This means that the audience is subjected to the actress' moves, specially in this case, since the 180° degrees technique also limit the field of view.

g) Analysis diagram

The audience is placed in Ewa until the out-of-body experience. Thus, they see everything through her eyes. When the mother makes her sit on the table and then goes to get the cake in the kitchen, she disappears from Ewa's field of view. Therefore, the audience is unaware of what the mother is doing until she comes back to the dinning room (see Figure 5.2-7), and this fact increases the tension that was already being built in the scene.



Figure 5.2-7: Screenshot from *Ewa, Out Of Body* (2016). Source: www.makropol.dk

As mentioned in the analysis of the expert interviews, the out-of-body experience takes the audience away from Ewa's body and transforms them in an invisible being: they observe the scene from the other side of the room. At the beginning it seems like the audience just turned into a spectator, but then the mother stares directly at them before she leaves the room quietly, still with a severe attitude. Then Ewa –who is still sitting down in front of the cake– also looks at the audience. Finally, the audience slowly go back to being Ewa and right after that, the scene ends.

In the following diagram (see Figure 5.2-8), the two roles of the audience are represented by an A –Ewa– and an X –the invisible presence. It is an X and not another character C because I consider that it is not an active role and, therefore, it should be labelled as an observer, even though there is an acknowledgement by the other actors in the scene –represented by the two-sided arrows.

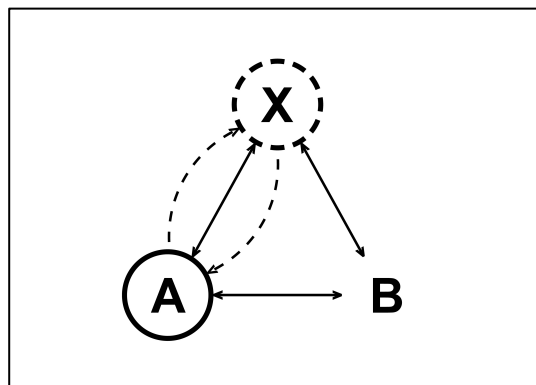


Figure 5.2-8: Diagram of the audience's experience in *Ewa, Out Of Body* (2016). Prepared by author

First results

In this part of the chapter are listed the main relations between variables that have been found during the analysis.

a) The three roles of the audience

The main focus in this research is the experience that has the audience when they are in a VR film. Keeping this in mind, I have found that there is an undeniable relation between three of all the analysed variables: the camera work in the VR film, the direct address from the characters and a third additional variable: the embodiment –which refers to the technique of giving the audience a body inside the experience. The values of these variables are combined in three different ways that determine three different types of audience experiences: the *observer* audience, the audience as a *character*, and the audience as an *invisible presence*.

The *observer* audience is the most common type amongst the VR films that have been analysed in this research. It happens when the cameras are just planted in the scene and, if there is movement, it is smooth and mechanic. Secondly, there is not any kind of direct address, meaning that the actors in the VR film ignore the cameras: they do not look at them and they certainly do not talk to them. Thus, they play their role in the story ignoring the audience. And finally, there is not an embodiment: the audience do not have a body in the virtual world, so there is a feeling of being invisible. When these three characteristics are brought together, the audience feels like they have no other role than just observe and follow the story that is happening around them. The observer audience is commonly used in documentary films, in which usually the director places the cameras in the middle of the action and a narrator explains what is happening. Some examples of this kind of documentaries are *Welcome to Aleppo* (2015) –a documentary about the war conflict in Syria– and *The Click Effect* (2016) –a sea documentary about the communication between dolphins and whales. An observer audience seems to be also frequent in VR films that have fantastical elements, such as the floating city in *Allumette* (2016) and the dystopian world in *Moderat “Reminder”* (2016) –both are animation productions– or the computer-generated alien in *Help* (2016) –a life-action production.

On the other hand, the audience can also be a *character* in the VR film. This means that the cameras are manipulated in a subjective POV way as if they were the eyes of a character. Moreover, there is a direct address from the other characters: they interact with the cameras as if they were another character. Therefore, the audience feel like the characters are addressing to them, so they are integrated in the story; they are not just invisible observers. Embodiment is very common in these situations: the audience is given a body inside the experience, a body that can or not resemble their own. If an actor or an actress plays the audience's character, they will be not also in charge of the camera movements, but they also speak and move as the character. This is the case of *The Dog House* (2014), *Catatonic* (2015) –a horror film where the audience is a patient in a mental institution– or *Nuestros Amantes* (2016) –a short VR trailer in which the audience is a character who is approached by a girl that flirts with him. However, it is also possible to induce to the audience the feeling of being one more character without giving them a body inside the experience. For example, in *El Ministerio del Tiempo: El Tiempo en tus Manos* (2016) the characters talk to the audience and even give them objects, even though the audience is technically invisible in the scene. Another example is the animation VR film *Invasion!* (2016), in which the audience is supposed to be a rabbit –they do not have a body, but another rabbit interacts with them.

And finally, I also consider a third option called the *invisible presence*. In this case, the audience are not a character in story. It is quite similar to the observer audience, in a sense that there is no embodiment and they do not have an active role in the story either. However, there is somehow a level of direct address or, in other words, acknowledgment. This happens when, at some point of the experience, a character looks at the cameras. For the audience, it feels like they were an invisible observer that is suddenly spotted in the scene in a specific moment of the story. This usually happens when the story is focused on the human relations, emotions or other psychological issues. For example, in the *Mr Robot* (2016) experience, the main character has heavy mental issues and he talks to the audience as if they are his invisible friend, while the other character of the story does not acknowledge them. Another example is *The Invisible Man* (2016), where three gangsters argue about money and one of them blames the “the invisible man” for having stolen it, referring to the audience, while the rest of the characters do not acknowledge the audience.

And of course, the out-of-body scene in *Ewa, Out Of Body* (2016) is also a good example, as the audience suddenly feel like a ghost, an invisible consciousness, something between an observer and a character. Similarly, the invisible presence technique has also been detected in specific scenes of some documentaries, such as *Clouds Over Sidra* (2015), when the main character –a 12-year-old refugee– explains her story. Therefore, it is also a very emotional situation and there is some kind of intimacy created between her and the audience.

In the following figures, these three possible roles of the audience are illustrated using the analysis diagram tool:

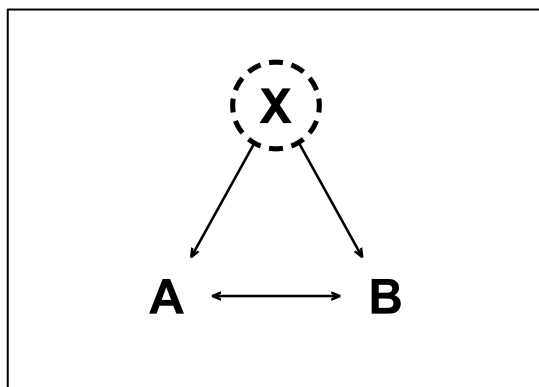


Figure 5.2-12: The observer audience. The characters in the VR film do not acknowledge the audience.

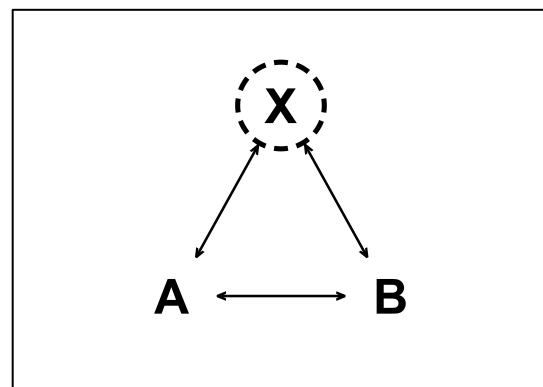


Figure 5.2-12: The invisible presence. The main difference with the observer audience is that there is acknowledgment.

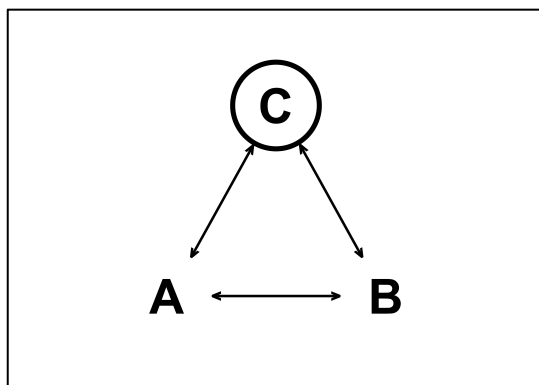


Figure 5.2-12: The audience as a character, with embodiment of the audience.

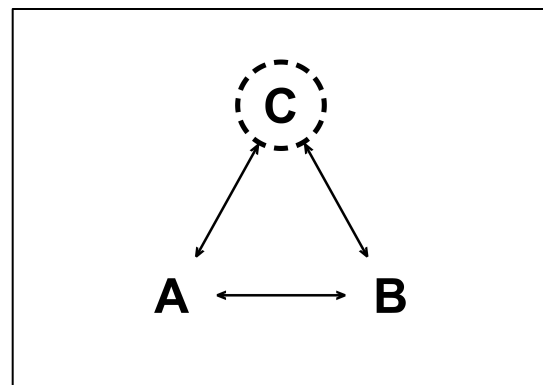


Figure 5.2-12: The audience as a character, when there is not embodiment.

b) The art of the mise-en-cadre

Another relevant relation has been detected between the variables of *props* and the *mise-en-cadre*. Even though a lot of the cinematic experiences are edited with cuts to change from one scene to another, some of them use other transitioning cinematic techniques such as fading and dissolve. In some of these cases, a great deal of *mise-en-cadre* is applied, this is, there is an artistic composition during the transitioning point, and the specific objects in the scene have an important paper in it. For example, as mentioned above, in *Allumette* (2016) the flame from the matches gets so bright that the scene fades-in to another scene. Similarly, in *Mr Robot* (2016) the main character is smoking a joint and at some point he blows the smoke to the cameras, which also creates a fade-in to one of his memories from the past. Another example is *Ministerio del Tiempo: El Tiempo en tus Manos* (2016), where every time that there is a transition between scenes, a character hands an object to the audience –such as a folder or a paper–, then the image gets blurry and the scene dissolves to the next one.

Additionally, in the first two examples the objects that are used for transitioning carry a great meaning, this is, they are relevant in the story. In *Allumette* (2016), the matches are important for the girl because they belonged to her mother. And in *Mr Robot* (2016), the joint is also relevant because when he smokes, he remembers his first date with his dead girlfriend, with whom he used to smoke too.

6 Conclusions

In this final chapter the findings from the expert interviews and the VR film analysis are listed summarized. Afterward, the research question and sub-questions contemplated in the beginning of this study are answered and discussed according to the theories exposed in the theoretical framework chapter. Finally, a few suggestions for the future studies in the Cinematic Virtual Reality field are also stated.

6.1 Summary of findings

After the deep analysis of the data extracted from the expert interviews and the VR film analysis, the most relevant findings are explained in this chapter. They have been divided in three topics: *the telepresence, the cinematic elements and the audience experience*.

The telepresence

Ever since virtual reality was born, new features have been added to it, especially for the past five years: haptic feedback, interactivity, stereoscopic 3D, 3D audio, etc. And it seems very likely that many other characteristics will be added in the future. What all of these new features have in common is the aim to improve the sense of telepresence. Thus, even though Steure's theory is more than twenty years old, it is still applicable to today's Virtual Reality. Telepresence, or in other words, the sense of "being there", is still the main experiential value that the experts remark in virtual reality in contrast with the other mediums.

The cinematic elements

The most relevant elements that cinematic VR has borrowed from cinema are the mise-en-cadre, the direct address and the subjective point of view. These concepts have been adapted in VR and they have been reused in a new and improved way. First, the art of the mise-en-cadre is used to transport the audience to different places

and/or times in a smooth, spiritual or even magical way. Now, cuts between scenes can have a meaning or a significant purpose. To achieve it, other cinematic elements can be used, such as lighting, editing techniques and props filled with meaning.

On the other hand, direct address has now been taken to another level with cinematic VR. Meanwhile it is not used very often in cinema, in virtual reality it adds a whole new level of engagement in the experience, especially if it is combined with the subjective point of view technique.

The audience experience

There have been discovered three possible levels of audience engagement with the cinematic experience:

1. The *observer* audience: the audience do not have a role in the story; they are invisible observers of the action that is happening around them.
2. The audience as a *character*: they play an active role in the story and the other characters interact with them.
3. The *invisible presence*: the audience is an invisible observer that is however acknowledged by at least one character.

The role of the audience in the story is probably the main difference between cinematic VR and cinema. The audience is now more engaged to the story, as they can be a part of it. In some cases, the audience can forget about their physical body and fully immerse themselves in the experience. Sometimes, when the audience is the character type, they can even adopt the character's attitude and personality, and they can also feel like the other characters are truly interacting with them. This is the main reason why virtual reality has been called "the empathy machine".

6.2 The answers to the research questions

Referring to the first research question –“*What is Cinematic Virtual Reality?*”– I have concluded that the simplest answer is the following: Cinematic Virtual Reality is the language that is used to tell a story in Virtual Reality. This definition can be extended by determining that Virtual Reality is a medium that

induces telepresence. Moreover, the role of the audience could also be included as an important characteristic. Therefore, another definition could be:

Cinematic Virtual Reality is the art of explaining a story by making the audience telepresence it with Virtual Reality.

The verb “to experience” could also be used instead of “to telepresence” if the concept of Virtual Reality was further developed afterward. Furthermore, the techniques that are used in order to “make” the audience experience the story should also be explained to get the full idea of the concept.

As for the following sub-question –“*How can cinematic virtual reality experiences be classified?*” – the best answer would be:

One way to classify cinematic experiences is according to the role that the audience play in them: an *observer*, a *character* or an *invisible presence*.

6.3 Discussion

Virtual Reality might be a new medium, but Cinematic Virtual Reality is not. One thing is the tool, the platform, the form; the other is a form of expression, a storytelling technique, a language. This language has been primarily associated to cinema because it is the closest medium and this is something that humans have always done. The first filmmakers had to defend cinema as a new art form while the rest of the world thought it was just something curious to show in punctual events. Then, when films started being produced, filmmakers faced a new challenge: they had to invent new techniques to tell a story. Back at that time, the closest medium to cinema was theatre, so they started by just filming a play and afterward they started adding more features, such as cuts and camera movements, until the cinematographic language was finally settled.

Cinematic VR is exactly in that point of its evolution. We need a reference, a starting point, and we look for it in cinema. But as filmmakers and other experts experiment with VR and all its possibilities, new elements are being added and little

by little the language of virtual reality is being crafted. It is probably a mistake then to call it *cinematic* virtual reality, but cinema was called “filmed theatre” in the beginning, so I believe that a better name will be suggested in the future, when this new language is settled and finally proved as different from cinema. Until then, there is still a lot of work to do. VR experts need to experiment with both the technology and the contents and the audience need to learn to understand this new language too. If we compare the actual situation of VR with the beginning of cinema again, back then it was a common issue that the audience often did not understand some new elements such as a cut between scenes, thus this kind of confusions could also be possible with VR.

Even though we are dealing with a new language, many of the elements used in filmmaking are common to the production of VR films. Some of them just need to be adapted to the VR form, such as the concept of “shot”. It does not feel right to use this term in virtual reality, for the simple reason that a shot in film just lasts a few seconds and it is not recommended to do that in VR: the greater is the number of cuts in a experience, the bigger is the motion sickness. But as it has been demonstrated in the analysis, transitions between scenes are very common. Therefore, the word “shot” is being translated to “scene” or “moment” in the VR language. It is a change in the basic unit. If Eisenstein said that the basic elements of cinema are the shot and the montage, now in cinematic VR the equivalents are the scene and the montage. As Nicolás Alcalá said during his interview, we need to forget about many of the concepts that we know from cinema in order to develop this new language, but he also recommends to look back and remember some of the old concepts from cinema and even theatre. I believe that this is what is happening with Eisenstein’s idea of the *mise-en-cadre*: in the beginning of cinema, the transitions between shots and scenes were studied to the detail and filled with meaning, but nowadays few films pay attention to this. However, in cinematic VR the art of the *mise-en-cadre* is being relevant again.

Finally, I believe that the key element that differentiates cinema and cinematic VR is the new role of the audience. Technologically speaking, this would be a synonym for the concept of immersion. But for me, in the communication field it translates to the audience experience. And if we talk about virtual reality in general, Steuer’s theory about telepresence is an equivalent too. Therefore, these three

concepts –telepresence, immersion and audience experience– are strongly related to each other. I also believe that in cinematic VR, what I have designed as an observer audience is the least immersive of the three types of audience. If there is no direct address of any kind, the greatest thing about VR is being ignored: there is no feeling of “being there”. The fourth wall remains unbroken then, because it does not matter if the experience is stereoscopic, or uses omni-binaural sound, or uses high pixel-density devices; there will not be a suspension of disbelief in cinematic VR if the audience is not included in the story.

6.4 For further study

Since cinematic virtual reality is such a new concept, there are still many possible focuses to take in order to study it from the communication studies field. For example, it would be interesting to make a comparison between the birth of cinema and film theory and the birth of cinematic VR, since I have already glimpsed in this research that many aspects are alike in both situations. This kind of research could lead to conclude with some future predictions.

On the other hand, it would also be pertinent to conduct a quantitative research on cinematic experiences in order to determine which variables induce motion sickness and which elements make the experience more comfortable. In the same line, another similar research could be conducted in order to determine which are the elements that induce more sense of telepresence, immersion and engagement with the story.

7 Bibliography

- Andrew, D. J. (1976). *The Major Film Theories: An Introduction*. New York: Oxford University Press.
- Bishop, B. (2015, January 6). *From gimmick to main attraction: virtual reality is coming to Hollywood*. Retrieved August 16, 2016 from The Verge: <http://www.theverge.com/2015/1/6/7499501/CES-2015-virtual-reality-wild-fox-searchlight>
- Bishop, B. (2016, July 25). *The year that virtual reality took over Comic-Con*. Retrieved July 30, 2016 from The Verge: <http://www.theverge.com/2016/7/25/12279274/virtual-reality-x-men-mr-robot-suicide-squad-comic-con-2016>
- Brinkmann, S. (2014). Interview. In T. Teo, *Encyclopedia of Critical Psychology* (pp. 1008-1010). New York: Springer.
- Cassidy, A. (2015, December 3). *What does virtual reality mean for advertising in 2016?* Retrieved July 30, 2016 from The Guardian: <https://www.theguardian.com/media-network/2015/dec/03/virtual-reality-in-advertising-2016>
- Child, B. (2016, May 19). *Steven Spielberg warns VR technology could be 'dangerous' for film-making*. Retrieved August 21, 2016 from The Guardian: <https://www.theguardian.com/film/2016/may/19/steven-spielberg-warns-vr-technology-dangerous-for-film-making>
- Chung, E. (2016, January 26). *Introducing Allumette*. Retrieved August 3, 2016 from Penrose Studios: <http://www.penrotestudios.com/stories/2016/4/13/introducing-allumette>
- Craig, A. B., Sherman, W. R., & Will, J. D. (2009). *Developing Virtual Reality Applications: Foundations of Effective Design*. Burlington: Morgan Kaufmann.
- Davies, R. (2010, April 18). *The long history of short films*. Retrieved August 20, 2016 from The Telegraph: <http://www.telegraph.co.uk/culture/film/film-life/7593291/The-long-history-of-short-films.html>
- Eisenstein, S. (1949). *Film Form: Essays in Film Theory*. (J. Leyda, Ed.) New York: HBJ.
- Flick, U. (2009). *An Introduction to Qualitative Research* (4th ed.). London: Sage Publications Ltd.
- Franklin-Wallis, O. (2016, January 27). *Virtual reality will transform cinema in 2016*. Retrieved July 30, 2016 from Wired: <http://www.wired.co.uk/article/virtual-reality-breaks-fourth-wall>
- Gunter, B. (2012). The quantitative research process. In K. B. Jensen, *A Handbook of Media and Communication Research: Qualitative and Quantitative Methodologies* (2nd ed., pp. 237-264). New York: Routledge.

- Hsieh, H., & Shannon, S. E. (2005). Three Approaches to Qualitative Content Analysis. *Qualitative Health Research*, 15, 1277-1288.
- Hurst, B. S. (2016, June 9). *GOING IN CIRCLES - A Primer On Virtual Reality Production*. Retrieved August 21, 2016 from Producers Guild of America: <http://www.producersguild.org/blogpost/1466418/249497/GOING-IN-CIRCLES--A-Primer-On-Virtual-Reality-Production>
- Jackson, B. (2015, June 3). *What is Virtual Reality? [Definition and Examples]*. Retrieved August 11, 2016 from Marxent: <http://www.marxentlabs.com/what-is-virtual-reality-definition-and-examples/>
- Jones, N. (2014, December 15). *Filmmakers Will Have to Adopt New Ways of Storytelling to Make Virtual-Reality Movies*. Retrieved August 21, 2016 from Vulture: <http://www.vulture.com/2014/12/virtual-reality-movies.html>
- Kulager, F. (2015, December 14). *Virtual reality pornoen er lige på trapperne og den vil have dig*. Retrieved December 14, 2015 from Politiken: <http://politiken.dk/kultur/medier/ECE2970419/virtual-reality-pornoen-er-lige-paa-trapperne-og-den-vil-have-dig/>
- Kulager, F. (n.d.). *Virtual reality pornoen er lige paaa*. From <http://politiken.dk/kultur/medier/ECE2970419/virtual-reality-pornoen-er-lige-paa-trapperne-og-den-vil-have-dig/>
- Lalwani, M. (2015, February 12). *Surrounded by sound: how 3D audio hacks your brain*. Retrieved August 15, 2016 from The Verge: <http://www.theverge.com/2015/2/12/8021733/3d-audio-3dio-binaural-immersive-vr-sound-times-square-new-york>
- Lalwani, M. (2016, June 23). *The struggle to adapt storytelling for virtual reality*. Retrieved August 20, 2016 from Engadget: <https://www.engadget.com/2016/06/23/the-struggle-to-adapt-storytelling-for-virtual-reality/>
- Lamkin, P. (2016, July 5). *The best VR headsets: The virtual reality race is on*. Retrieved July 14, 2016 from Wareable: <http://www.wareable.com/headgear/the-best-ar-and-vr-headsets>
- Lewis, J. (2014). *Essential Cinema: An Introduction to Film Analysis*. Boston: Wadsworth.
- Mihelj, M., Novak, D., & Beguš, S. (2014). *Virtual Reality Technology and Applications*. Ljubljana: Springer.
- Milk, C. (2015, March 10). *How virtual reality can create the ultimate empathy machine*. Retrieved August 20, 2016 from TED: https://www.ted.com/talks/chris_milk_how_virtual_reality_can_create_the_ultimate_empathy_machine
- Milk, C. (2016, February 17). *The birth of virtual reality as an art form*. Retrieved August 22, 2016 from TED: https://www.ted.com/talks/chris_milk_the_birth_of_virtual_reality_as_an_art_form

- mLAB. (2015, August 18). *Facts and Analysis of Virtual Reality*. Retrieved August 25, 2016 from Huawei: <http://www.huawei.com/minisite/4-5g/en/industryjsdc-d.html>
- Monaco, J. (1981). *How to Read a Film: The Art, Technology, Language, History and Theory of Film and Media*. New York: Oxford University Press.
- Oculus VR. (2016). *Documentation: Initialization and Sensor Enumeration*. Retrieved August 12, 2016 from Developers: <https://developer3.oculus.com/documentation/pcsdk/latest/concepts/dg-sensor/>
- Riff, D., Lacy, S., & Fico, F. (2014). *Analyzing Media Messages: Using Quantitative Content Analysis in Research* (3rd ed.). New York: Routledge.
- Road to VR. (2016, February 1). *Sneak Peek at The VOID's Latest Tech to Feature at TED 2016*. Retrieved August 26, 2016 from Road to VR: <http://www.roadtovr.com/we-take-a-sneak-peek-at-the-voids-ted2016-experience/>
- Robertson, A. (2016, February 9). *Here's how Sundance's first VR residency film got made*. Retrieved July 25, 2016 from The Verge: <http://www.theverge.com/2016/2/9/10940236/sundance-virtual-reality-residency-lynette-wallworth-collisions>
- Rowell, M. (2015, September 2). *Stereo vs Mono 360° Video for VR*. Retrieved August 11, 2016 from 360 Labs: <http://360labs.net/blog/stereo-vs-mono-360-video-vr>
- Ryan, M.-L. (2015). *Narrative as Virtual Reality 2: Revisiting Immersion and Interactivity in Literature and Electronic Media*. Baltimore: Johns Hopkins University Press.
- Sherman, W. R., & Craig, A. B. (2003). *Understanding Virtual Reality: Interface, Application, and Design*. San Francisco: Morgan Kaufmann.
- Smith, W. (2015, November 16). *Stop Calling Google Carboard's 360-Degree Videos 'VR'*. Retrieved August 11, 2016 from Wired: <http://www.wired.com/2015/11/360-video-isnt-virtual-reality/>
- Steuer, J. (1992). Defining Virtual Reality: Dimensions Determining Telepresence. *Journal of Communication* , 42 (4), 73-93.
- Unseld, S. (2015, September 23). *Saschka Unseld: Uncovering the grammar of VR*. Retrieved August 23, 2016 from Future of StoryTelling: <https://futureofstorytelling.org/video/saschka-unseld-uncovering-the-grammar-of-vr/>
- Vanian, J. (2015, November 30). *Investors Bet That Virtual Reality is No Illusion*. Retrieved August 1, 2016 from Fortune: <http://fortune.com/2015/11/30/investment-hot-virtual-reality/>