Narrative cues within cinematic virtual reality

An exploratory study of narrative cues within the content and motives of virtual reality developers

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ABSTRACT

This exploratory research inquires how narrative cues are constructed within cinematic virtual reality content, together with inquiring the main objectives of cinematic virtual reality developers regarding the use of narrative cues. Within this thesis, narrative cues are elements within the story world that draw the attention of the spectator, and therefore direct a spectator's gaze towards important plot elements within the virtual world. This study employs a mixed method approach, which combines qualitative expert interviews with qualitative content analysis. The results show that narrative cues, either diegetic or non-diegetic, work collectively towards a similar goal, namely, a spectator who better comprehends the plot. Moreover, maintaining the spectator's feeling of presence throughout the experience, the type of narrative, and the developer's aesthetic objectives, have shown to be of vital importance with regards to the use of narrative cues in cinematic virtual reality content.

KEYWORDS: *Cinematic virtual reality, narrative cues, interactive narrative, virtual reality films, gaze direction*

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Chapter 1: Introduction

1.1 Topic and research questions

Recent innovations in the field of virtual reality technology have opened the way for consumers to experience virtual reality content for a variety of means. The medium has already shown its value for educational and training purposes (Psotka, 1995; Seymour et al., 2002). Recently, however, virtual reality has gained more attention within the entertainment industry as well. Prestigious film festivals, such as Cannes and Sundance, show a particular interest in interactive storytelling, as popular media inform us (Coldewey, 2017; Wallenstein, 2017). Even in smaller markets, such as The Netherlands, virtual reality is developing fast. Many virtual reality companies are based in Amsterdam, among the first virtual reality cinema. This virtual reality cinema is a home for cinematic virtual reality content, where the spectator can watch narrative content within a 360-degree virtual environment. During this experience, the spectator experiences freedom of gaze allocation as the only factor of interactivity, which means that the spectator can look freely around him- or herself within the 360-degree story world (Mateer, 2017).

In this regard, cinematic virtual reality content is different than virtual reality game content, because the spectator's interactivity is limited by means of gaze direction within the content. For example, the spectator cannot move around physically within the 360-degree virtual environment, contrary to most virtual reality game content (Mateer, 2017; McMahan, Bowman, Zielinksi, & Brady, 2012). Nonetheless, cinematic virtual reality has proven the ability to provide an immersive experience, where the spectator can experience a feeling of presence within the virtual world (Mateer, 2017). This means that the spectator will feel as if he or she is really there, and therefore feels less connected to the physical real world (Aylett & Louchart, 2003; Mateer, 2017).

While this increased interactivity is often regarded as the added value of virtual reality in relation to other media (Aylett & Louchart, 2003). It has also resulted in problems, especially with regards to narrative and storytelling. When speaking about narrative, cinematic virtual reality positions itself between traditional films and interactive narrative media (e.g., videogames, interactive novels)[1], as it provides the spectator with a fixed narrative structure, but at the same time the spectator is allowed to interact within the content by means of the allocation of his or her gaze (Mateer, 2017). Consequently, the author of a cinematic virtual reality story has less control over what the spectator will and will not spectate. The contradiction between presenting a fixed narrative structure in a 360-degree story world, where the spectator has influence over the narrative, has been termed as the narrative paradox within studies of interactive narrative (Riedl & Bulitko, 2013; Sobral, Machado & Paiva, 2003). This paradox is part of a debate in scholarship which questions whether it is possible to create meaningful narratives in a story world where the story is co-authored by the spectator's actions

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[1] An example of an interactive novel would be a novel published on the internet, where the reader can create his or her own narrative by clicking on hyperlinks.

(see Mateas and Stern (2006) for an overview of this debate). While these studies usually discuss 'narrative systems', which imply a game-like environment where the narrative is constructed by both spectator and agents within the story world, this thesis differs from such studies because the objects of analysis will not entail narrative systems.

Rather, this study will focus on cinematic virtual reality films, which, contrary to narrative systems contain more authorial control for the content producers (Mateer, 2017; Nielsen et al., 2016). The spectator, however, does still have influence on his or her perception of the narrative. This does not mean that the spectator can alter the structure of narrative events. In other words, the plot remains the same. However, it can be suggested that the spectator can alter his or her experience with the content to the way he or she pleases. In this sense, there is a possibility that the spectator misses particular parts of the plot, due to miss-allocation of gaze. This default in gaze direction can occur because of various reasons. The spectator might look away on purpose during certain story events, because the portrayed events might invoke a scared feeling, or a feeling of disgust for the spectator. Another possible reason for miss-allocation, could be that the spectator is distracted by other elements within the 360-degree story world. In this sense, story world design has become crucial to cinematic virtual reality developers. If the story world fails to make the spectator feel present, or if the story world draws the spectator's attention away from important narrative events, then it can be considered a failed experience within cinematic virtual reality, because the spectator will not experience a coherent narrative and will not feel immersed within the story world (Mateer, 2017).

Thereby, it is up to virtual reality developers to provide guidance to the spectator, so the spectator can be involved in a meaningful narrative experience (Bates, 1991). To do so, the author of interactive (virtual reality) content can manipulate and set constraints to the spectator's actions, which in this case entail the spectator's head movements (Mateas, 2001; Mateer, 2017). Until now, virtual reality filmmakers have tried to direct the spectator's gaze towards important plot elements by means of narrative cues (Nielsen et al., 2016). Broadly speaking, a narrative cue can be considered an element that catches the attention of the spectator during the virtual reality experience, and therefore changes the spectator's gaze allocation (Nielsen et al., 2016). When the spectator acts upon this narrative cue, which means that he or she changes their gaze, the spectator will be guided towards the narrative action that is important for a better understanding of the plot within the 360-degree story world. These cues can be either diegetic or non-diegetic in their aesthetic form (Nielsen et al., 2016). An example of a narrative cue, used by Nielsen et al. (2016), could be a bee, which flies through the field of vision of the spectator during the experience, and therefore catches the attention of the spectator.

Hence, by using narrative cues, the narrative becomes easier for the spectator to follow, which likely results in a better understanding of the story (Nielsen et al., 2016). This is important, as cinematic virtual reality contents contain a fixed narrative structure, where the author wants to convey a message or statement to the spectator (Mateer, 2017). Yet, while this game of chess between

spectator and author, by means of narrative cues, sounds promising, little is still known about the employment of narrative cues within cinematic virtual reality content. The only notable studies of narrative cues are those by Mateer (2017) and Nielsen et al. (2016), which provide two valuable theoretical models to analyse narrative cues. Whereas Nielsen et al. (2016) offer a framework for narrative cues with regards to their effectiveness and their aesthetic form (e.g. diegetic/non-diegetic), Mateer (2017) provides a valuable outline of the grammar of cinematic virtual reality in comparison with traditional filmmaking techniques. Moreover, Mateer (2017) is the first significant study, which focuses on the virtual reality filmmaker, aside from the content and spectator. Because this thesis research matters of content and virtual reality filmmakers, this thesis will rely on the works of Mateer (2017) and Nielsen et al. (2016). Together, these studies offer a framework which helps to better understand the relation between virtual reality filmmaker and content, in relation to narrative cues. Additionally, this thesis borrows from interactive narrative studies, firstly developed by Brenda Laurel (1986, 1991), and later elaborated on by Michael Mateas (2001). Concepts deriving from interactive narrative studies have shown to be helpful in addressing the spectator's freedom of gaze allocation in combination with cinematic virtual reality's fixed narrative structures. Especially, the concept of dramatic probability, which entails the spectator's ability to speculate about the future development of the narrative throughout the duration of the story (Mateer, 2001), has been useful for exploring narrative cues and possible motives for gaze allocation.

By building upon these theories, this thesis will perform a qualitative content analysis of six cinematic virtual reality films, together with the analysis of in-depth interview results, based on perceptions and experiences of six experts within the Dutch virtual reality industry. By using this methodology, this thesis attempts to answer the following two research questions:

RQ1: *How are narrative cues constructed within cinematic virtual reality content?*

RQ2: *What objectives can be detected in the motives and experiences of content developers regarding the use of narrative cues within cinematic virtual reality content?*

1.2 Business relevance
Before discussing matters of social- and scientific relevance of this thesis, it is important to briefly outline how this thesis can be valuable to virtual reality businesses, as this thesis is written in a media and business content, but primarily discusses issues of cinematic virtual reality contents and virtual reality filmmakers. Thereby, the value for businesses might not be obvious on first sight.

While it can be very interesting and fruitful to look at subjects such as business models, innovation, or strategic developments within the cinematic virtual reality industry, these subjects are difficult to study at the moment, as the virtual reality industry is still in its early stage (Kunkel & Soechtig, 2017). Some large consultancy agencies, such as Deloitte, offer trend reports on the current

and future state of affairs regarding the virtual reality industry. The only solid conclusions that can be derived from these reports are that the virtual reality industry is fragmented, and that the market need to mature before any grounded statements can be made about the future of virtual reality. However, on this subject, those trend reports note that the time to discover and explore virtual reality is now (Kunkel & Soechtig, 2017).

Thereby, for businesses it is more urgent to investigate how virtual reality content appeals and works in relation to audiences, rather than find a business model for the content that they are currently offering. During Sundance 2017, a virtual reality executive mentioned that virtual reality needs a big hit before it will be accepted by mass audiences (Wallenstein, 2017). However, in order to make virtual reality more accepted by audiences, virtual reality developers would benefit from tools that help them to create better content. To put it differently, at the moment there is a high urgency to make content that ties neatly with the needs and wants of mass audiences. This is an obstacle that needs to be overcome before companies can effectively start monetizing on virtual reality.

On this subject, it is particularly interesting for commercial companies to know more about the interrelationships between virtual reality filmmakers, the spectators (read: consumers), and the content. Currently, there are many concerns and insecurities with regards to these relations (Mateer, 2017). This thesis deals with one of those concerns, namely the problem of virtual reality developers to effectively guide a spectator's gaze towards important plot elements within the 360-degree story world, so the spectator will gain a meaningful experience and experience a coherent story. Businesses would benefit from more insights into this subject, as a better understanding of the works of narrative cues could help content developers to create more effective narratives that connect more to the spectator's needs and wants when using virtual reality as a medium for entertainment purposes.

1.3 Social and scientific relevance

Virtual reality is often regarded as a medium with great social relevance for educational and training purposes (Psotka, 1995). However, obtained insights from studies of cinematic virtual reality can be beneficial to other employments of virtual reality as well. Within scholarship, there is evidence that virtual reality can enable people, with mental or physical disabilities, to experience things and events that they could not easily experience in real life (Weiss, Bialik, & Kizony, 2003; Yalon-Chamovitz & Weiss, 2008). Thereby, by improving virtual reality content, through inquiry into narrative cues, those experiences can be improved, and therefore benefit the lives of people who use virtual reality for entertainment purposes, and especially people who suffer from particular mental or physical disabilities. In the same line of reasoning, higher quality of content will benefit educational purposes as well. If there is more knowledge about how to influence the spectator of virtual reality content, or how to trigger him or her, it can be suggested that education by means of virtual reality can be designed more effectively. Naturally, educational content needs to be designed in order to provide a

learning experience. Within medical virtual reality training, a surgeon might be distracted by particular elements within the story world, due to poorly designed content. However, a virtual reality maker can also design traps in the content, which test the skills of the spectator. For example, within medicine training content, a surgeon can be tested on his skills to remain focus, while he or she gets distracted by other cues around him or her in the 360-degree virtual world. This is only a simple example of what virtual reality has to offer for educational purposes.

Besides the improvement of content for moral and educational purposes, a smoother experience will likely reduce the chance of simulator sickness, which is regarded a problem that can occur during virtual reality experiences (Lin, Duh, Parker, Abi-Rached & Furness, 2002; Regan, 1995; Treleaven et al., 2015). If a spectator is disoriented, or gets motion sickness, and thereby might lose the feeling of presence within the story world, the experience can be considered a failure, as chapter 4 of this thesis will confirm. Hence, research into narrative cues could contribute to the debate on how to improve, and therefore prevent simulator sickness/motion sickness within cinematic virtual reality environments.

Lastly, aside from the debates in scholarship described above, this thesis can offer a contribution to other areas of academia as well. For example, interactive narrative studies could benefit from the inclusion of cinematic virtual reality within the discussion of the narrative paradox. While this inclusion is still limited, it is a step towards a better understanding of cinematic virtual reality in relation to spectator interactivity and narrative. Moreover, this thesis aims to add findings to cinematic virtual reality discussions from a virtual reality filmmaker perspective. As mentioned before, Mateer (2017) is the only notable study that questions the role of the virtual reality filmmaker with regards to cinematic virtual reality. Bates (1991) has already argued that the role of the virtual reality developer should be the role of a guide that assists the spectator in experiencing the content to its fullest potential. However, Bates' argument is based on game-like virtual reality content and not on cinematic virtual reality content. As outlined in the 'business relevance section' of this thesis, there is a high urgency to produce more knowledge about how cinematic virtual reality content can be improved, and what role cinematic virtual reality filmmakers should take in relation to the spectator's increased possibilities to interact with the content. This is not only true for businesses, but also for scientific debates, as published data is scarce in scholarship.

Chapter 2: Theoretical framework

This chapter will focus on theoretical models and concepts from three fields, namely: virtual reality studies, gaze direction studies and interactive narrative studies. First, a conceptualization and outline of important (theoretical) characteristics of cinematic virtual reality will be presented. Second, the value of traditional gaze direction studies will be discussed. Lastly, interactive narrative studies will be extensively elaborated on, as this field will form the basis of a lot of discussion within the result chapter of this thesis. Together, these three fields of study form a valuable framework in order to better understand the works of cinematic virtual reality content in relation to the spectator's freedom of gaze direction. These three fields will first be discussed individually, and later transformed into a framework, as presented in section 2.4 of this chapter. This framework will serve as basis for interpreting the results of content analysis and the results of the conducted interviews.

2.1. Conceptualization and characteristics of cinematic virtual reality
With current technological developments of cinematic virtual reality, doors have opened to tell new and exciting stories. By means of a head-mounted display, the spectator has the ability to look around freely in a 360-degree virtual story world (Mateer, 2017). Contrary to game-like virtual reality content, the spectator of cinematic virtual reality is more of witness to the story than an interactor (Mateer, 2017). Consequently, the spectator cannot alter the unfolding of the narrative, and therefore is bound to the experience of a fixed narrative structure, as in traditional films. Considering the spectator's freedom of gaze allocation together with the fixed narrative structure of the content, it is important for an author of a cinematic virtual reality story to direct the spectator's gaze towards important narrative elements, in order to experience a coherent story (Mateer, 2017; Nielsen et al., 2016). In general, stories are built on a cause-effect relationship (Branigan, 2013). Hence, if the spectator will miss the 'cause' of an event of the story, due to miss-allocation of his or her gaze, then he or she will likely not comprehend the development of the event.

　　　In order to address this problem, virtual reality filmmakers can use cues to draw the attention of the spectator to particular parts of the 360-degree story world (Nielsen et al., 2016). Narrative cues can be considered elements within the virtual world that can direct a spectator's gaze towards important plot elements within the story. The goal of a narrative cue is to move the spectator's field of vision, which can be done in a variety of ways (Nielsen et. al, 2016). The main criteria for a narrative cue are that it needs to account to one or multiple perceptual senses of the human body, as it is common logic that narrative cues need to be experienced first in order to work (Laurel, 1991). Moreover, narrative cues need to refer to important parts of the narrative of the virtual reality film. This relates to the fact that if a narrative cue cannot be experienced, the spectator cannot respond to it, as the spectator needs to be aware of a cue before he or she can take action within the 360-degree virtual world (Mateas, 2001). Moreover, if a narrative cue would not refer to important narrative

information, it would lose its value and it would likely become a tool to distract the spectator, rather than immerse the spectator into the narrative.

Regarding their form, narrative cues can be embedded into the story world (diegetic) or can operate outside the story world (non-diegetic) (Nielsen et al., 2016). Moreover, narrative cues can be either implicit or explicit in their form (Nielsen et al., 2016). An implicit cue could be an object that subtly grabs the attention of the viewer, for example, a woman dressed in a red dress at a funeral. Contrary, explicit cues tend to be very direct, for instance: a character that bluntly states to the camera where the spectator should look, or a descriptive non-diegetic text that provides information on where the spectator should allocate his or her gaze. Both implicit and explicit cues can either be diegetic or non-diegetic (Nielsen et al., 2016). A strong feature of this conceptualization of narrative cues is that it does not constrain narrative cues to a fixed aesthetic form, but rather implies that narrative cues can take all possible forms. The only distinguisher is that a cue can happen inside the story world or outside the story world. For example, it can be a camera-move, which happens outside of the story, but it can also be a strategically use of color elements within the story world, for instance. In this sense, Nielsen's et al. (2016) approach to narrative cues accounts to cinematic virtual reality as an artistic medium, where the form of narrative cues relies on the author's intentions in relation to aesthetics and narrative goals.

Aside from the freedom of gaze direction, immersion is a challenging new feature that can result in various hurdles for virtual reality filmmakers, as studies have shown that due to the immersive character of virtual reality, participants may become nauseous because of motion sickness or simulator sickness (Lin, Duh, Parker, Abi-Rached & Furness, 2002; Regan, 1995; Treleaven et al., 2015). Immersion and presence are two concepts that work neatly together in virtual reality content. Although often mixed up, immersion can be considered a technological concept that – by means of hardware – allows the spectator to be immersed into the content (Slater & Wilbur, 1997). As a result of immersive hardware, the spectator may feel present within the virtual world, which relates to a conscious state of being, where the spectator is not being aware of the physical real world anymore, and therefore fully 'immersed' into the content (Mateer, 2017; Slater & Wilbur, 1997).

Overall, from an author perspective, achieving the feeling of presence is considered the ultimate goal in cinematic virtual reality (Mateer, 2017; Slater & Wilbur, 1997). Therefore, it is likely that narrative cues should serve the immersive character of cinematic virtual reality. However, there are a couple of factors that should be taken into account when inquiring narrative cues from an author and content perspective. Considering cinematic virtual reality as an artistic medium, the virtual reality filmmaker can make various aesthetic decisions, amongst which the choice between the first- or third-person perspective. Prior studies to virtual reality, and virtual worlds in general, are mainly concerned with the spectator as an agent who experiences the story from a first-person perspective (Aylett & Louchart, 2003; Bates, 1991; Laurel, 1991; Mateas, 2001), which means that the spectator takes part in the story as an embodiment of a character of the story (Mateas & Stern, 2006).

These studies advocate for a first-person perspective as they consider it to be most immersive. While there is some evidence that cinematic virtual reality is most immersive when experienced from the first-person perspective (Cho et al., 2016), the third-person perspective remains a tool, which the virtual reality filmmaker can utilize, to convey a particular emotion. For example, Cho et al. (2016) argue that spectators of a cinematic virtual reality experience usually feel more calm and safe when watching cinematic virtual reality from the third-person perspective.

While there are different implications of using different perspectives, the choice of a particular perspective has a large effect on the narrative experience of the spectator. Because of the immersive characteristics of cinematic virtual reality, the spectator can become a part of the story world, in other words: an embodiment of a character. Hence, in this way, the author of a story can choose if the spectator will be a diegetic entity or a non-diegetic observer in the virtual story world. Being a character in the story world would likely mean that the action is more around the spectator, while an observer would likely have the action in front of him. Hence, the placement of the camera in relation to the action is paramount for the form that narrative cues would take. For example, if multiple things are happening at the same time around the spectator, a sound element could be a viable cue, as sound is detached from the spectator's gaze allocations and therefore can be experienced at any time during the experience, despite where the spectator looks. Contrary, if the action is more concentrated in one part of the 360-degree story world, it might be redundant to have very explicit sound cues, as it is likely that the spectator will follow the flow of action more easily. In general, the narrative choices regarding perspective, camera placement, editing etc., form the basis for narrative cues.

After all, for cinematic virtual reality filmmakers, the trick is to maintain the flow of immersion, and at the same time to provide a coherent narrative to the spectator (Mateer, 2017). Narrative cues can do so by compelling the spectator to the narrative (Nielsen et al., 2016). However, as Mateer (2017) argues, little is known about storytelling strategies within cinematic virtual reality, and the role of the cinematic virtual reality filmmaker in the narrative production process. Nonetheless, as gaze direction has become a key aspect of cinematic virtual reality (Mateer, 2017; Nielsen et al., 2016), it is paramount to inquire more into this field of research in relation to cinematic virtual reality.

2.2 Gaze direction and cinematic virtual reality

Over the past years, a growing body of research has been done on gaze direction, or simply put: what elements are drawing the attention of the human eye? Visual salience has become an important concept in this manner, which entails the perceptual signals that make an object stand out within its environment (Nielsen et al., 2016; Treue, 2003). Hence, by making an object more visually salient, the virtual reality filmmaker can draw the attention of the spectator to a particular object. Within film studies this is already being used, as compositional tools such as differences in: color, shape, the

grouping of objects, visibility, scale, and motion, have proven to be valuable elements to draw the attention of a spectator within the frame (Katz, 1991).

Nevertheless, a cinematic virtual reality film is experienced in a 360-degree story world, where the spectator cannot watch all parts of the story world at the same time (Mateer, 2017). In this regard, visually salient objects that stand out by means of visual appeal, are only effective when the spectator is looking at those objects, and therefore occur within the spectator's field of vision. As the virtual reality filmmaker cannot fully control where the spectator will look at (Mateer, 2017), it is not surprising that sound has become an important storytelling tool, as sound is one of the only elements that the author has full control over in the cinematic virtual reality experience (McArthur, Stewart, & Sandler, 2017). The spectator cannot interact with sound within cinematic virtual reality experiences. Moreover, sound can be considered a perceptual signal that makes an object stand out. Nowadays, most cinematic virtual reality films use spatial sound, which entails that the spectator experiences sound in the same way as in the physical real world (McArthur, Stewart, & Sandler, 2017). This means that sound is experienced three-dimensionally. So, if a character is approaching the spectator from behind, the spectator will experience the sounds of the character, as coming from behind.

While previous studies of gaze direction contain valuable insights for its discipline, such as visual salience, these studies only focus on the spectator, rather than the content or the author of the cinematic virtual reality experience (Bailey, McNamara, Sundarsanam & Grimm, 2009; Mackworth & Morandi, 1967; Mannan, Ruddock, & Wooding 1996; Parkhurst & Niebur, 2003). By using a quantitative approach, gaze direction studies have provided evidence that particular techniques are effective to draw the attention of the human eye, such as the use of compositional tools within film frames (Katz, 1991), or the finding that humans are more easily drawn to contrast or other human faces within imagery (Mackworth & Morandi, 1967; Mannan, Ruddock, & Wooding 1996; Parkhurst & Niebur, 2003). However, narrative cues are usually context-dependent and their form relies on the intentions of the author. Therefore, quantitative gaze direction studies fail to address cinematic virtual reality as an artistic medium. Nevertheless, concepts and findings of contemporary gaze direction studies have provided indications that particular forms of cues are highly effective in order to steer someone's gaze (Mackworth & Morandi, 1967; Mannan, Ruddock, & Wooding 1996; Parkhurst & Niebur, 2003). While these finding might not be very relevant with regards to the author's aesthetic intentions, they do have an added value as these findings outline which cues are likely to be the most effective.

However, it would be more interesting to approach gaze direction as a form of interactive action within the 360-degree story world. Interactive narratives usually rely on actions where the spectator has an influence on the narrative outcome (Mateas, 2001). In this regard, the notion of action can also be interpreted as the allocation of a spectator's gaze. This might be a limited form of interactivity, but it allows the spectator to alter his or her experience of the story by means of gaze direction. Therefore, with regards to cinematic virtual reality, the allocation of gaze can also be

interpreted as taking action. In this regard, narrative cues are part of a negotiation between content and spectator. The spectator can choose to accept the narrative cue and allocate his or her gaze towards the part where the narrative cue will lead the spectator. In order to gain a better understanding of gaze direction as an action within the 360-degree virtual world, contemporary studies of interactive narratives contain valuable concepts, which are able to connect narrative cues with the spectator's ability to take action within the 360-degree story world.

2.3 Interactive narrative studies

An interactive narrative has the goal to both immerse users in a virtual world, as to make sure that the user's actions can alter the unfolding of the story in a meaningful way (Riedl & Bulitko, 2013). When trying to accomplish this goal, it is almost impossible to avoid the narrative paradox, which entails that interactive content needs to be flexible enough to enable the user to make alterations to the narrative, but at the same time the content needs authorial structure so that the user will experience a coherent narrative, and a climax of the story (Sobral, Machado & Paiva, 2003). For example, if a player of a game can do whatever he or she pleases, the author will lose control, unless the author sets constraints to the player, by which the player can experience a coherent story (Mateas, 2001). In this regard, the narrative paradox can be interpreted in multiple ways, from an authorial perspective, but also from a user perspective.

Cinematic virtual reality relates to the narrative paradox, as it shares the same objective of providing a coherent narrative to the spectator and offers a way to interact with the content, by means of freedom of gaze direction. However, the spectator cannot alter the unfolding of the narrative within cinematic virtual reality. Nonetheless, the spectator will have a different perception of the narrative every time he or she watches the content. Hence, to the spectator, the form of the narrative will be slightly different every time, due to (slight) differences in gaze allocations of the spectator. In this regard, the narrative paradox applies to cinematic virtual reality, but needs to be interpreted differently. The emphasis lies on perception, rather than the actual adjustment of the narrative structure.

Within interactive narrative studies, multiple approaches can be explored. However, there is little consensus between approaches about the feasibility of combining narrative and interactivity. For example, studies of *ludology* and *narrativism* have criticized the practicability of combining narrative and interaction (Bernstein, 2003; Frasca, 2003). On the contrary, the Aristotelian approach has provided evidence that it is possible to combine narrative with interactivity, and still maintain a coherent narrative experience (Laurel, 1986; Laurel, 1991; Mateas, 2001; Mateas & Stern, 2006). Considering the fact that cinematic virtual reality filmmakers struggle to combine narrative with interactivity (Mateer, 2017), the Aristotelian approach is particularly interesting in this case, as it provides concepts that help to better understand how to guide the spectator through an interactive narrative. However, similar to the narrative paradox, these concepts are drawn from game studies and

fully interactive narratives as objects of study, where the spectator has much more influence on the creation of his or her own narrative. Thereby, these concepts need to be adjusted according to the functions of narrative cues and contextualized with regards to cinematic virtual reality.

2.3.1 An Aristotelian approach of interactive drama

As the name implies, the Aristotelian approach within interactive narrative studies can be traced back to Aristotle's (trans. 1902) concepts of a dramatic play. Aristotle's (trans. 1902) six parts of a dramatic play have maintained a relevant position for current debates of interactive narratives within virtual worlds (Mateas & Stern, 2006; Ryan, 2008; Tomaszewski, 2011; Tomaszewski & Binsted, 2006). According to Aristotle's *The Poetics* (trans. 1902), the six parts of a dramatic play include: plot, character, thought, dictation, melody, and spectacle. In this outline, plot refers to a set of narrative events with a clear beginning, middle and end. Characters are agents that play a role in the unfolding of the story and that contain thoughts and dictation in order to express themselves. Melody is the music that is incorporated within the dramatic play, which should be in line with the plot, and spectacle consists of all that is visible to the audience, which includes actor movement, objects on stage, props, quality of lighting, etc. In other words, the spectacle can be considered a whole of elements, provided by the play, that the audience can observe (Aristotle, trans. 1902). However, it needs to be noted that there is a degree of uncertainty within scholarship about the exact definitions of Aristotle's (trans. 1902) six parts of a dramatic play. Nonetheless, the core ideas of these concepts have shown to be very valuable for interactive narrative studies.

Drawing on concepts of Smiley (1971) and Aristotle (trans. 1902), Brenda Laurel's dissertation is known as the first significant work within the study of interactive narratives that focuses on human-computer activities. Considering that theatre has the highest potential of interactivity, in relation to other traditional media, such as cinema and literature (Aylett & Louchart, 2003), it is not surprising that studies of interactive narrative and virtual reality currently use concepts deriving from theatre studies. However, as Laurel (1991) points out, computers can offer an experience that accounts to more human senses than solely the eyes and the ears, which is the case in traditional theatre, for instance. With the immersive character of cinematic virtual reality, it is imaginable that cinematic virtual reality has the ability to address even more senses than regular computer games (Mateer, 2017).

Laurel (1991) bases her theory of interactive narrative on Smiley's (1971) form-matter principle, which consists of formal- and material causation in relation to Aristotle's (trans. 1902) six parts of a dramatic play. Formal causation is the process of the author, who materializes his vision into a plot (Smiley, 1971), which results into characters, thoughts, and so on. Material causation is the reversed process of formal causation, where thoughts form the material for characters, and characters are the material for the level of plot (Smiley, 1971). Contrary to formal causation, material causation is best understood from a spectator's point of view, as the spectator will first experience the spectacle of a play, then melody, and so on, until the spectator has reached the level of plot, and thereby has gained

an understanding of the unfolding of the story (Mateas, 2001; Smiley, 1971). However, in order to apply these processes to human-computer based narratives, Laurel (1991) adjusts these concepts into a hierarchical structure that looks as follows:
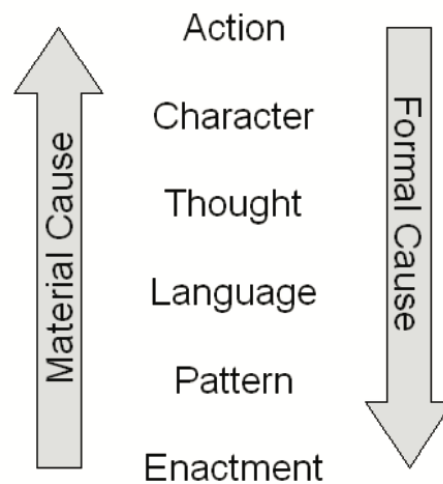

Figure 1: "Causal relations among elements of quantitative structure" (Laurel, 1991, p. 51)

In this framework (figure 1), enactment is the most important of the six parts with regards to cinematic virtual reality, because this is the part where the interaction between the spectator and the content takes place. Enactment, which is previously defined as all that is visible during a theatrical play, has been more broadly defined by Laurel (1991) as "the sensory dimensions of the action being represented: visual, auditory, kinesthetic and tactile, and potentially all others" (p. 50). Thereby, enactment is the level where the spectator is being triggered by the content by means of the just mentioned dimensions. Hence, this is the level where narrative cues operate, as narrative cues rely on signals that make them stand out from their environment and trigger the human brain to take action in that regard, as has been argued by Nielsen et al. (2016). By adapting Laurel's (1991) definition of enactment, narrative cues can be defined as every sensory dimension of the represented action that audiences can experience, and that is intended to direct the spectator to relevant elements of the plot, within a 360-degree story world. These cues can consist of visual, auditory, tactile, kinesthetic, and all other kinds of sensory cues, as long as they promote a better understanding of the narrative for the spectator.

Moreover, considering that Laurel's (1991) six parts are ordered hierarchical, it makes sense that narrative cues are a product of the plot, channeled through the levels of character, thought, language, and pattern, but eventually being experienced by the spectator on the level of enactment. However, this would only be the case of diegetic narrative cues, as cues that occur outside the story world cannot be delivered by, for example, characters within the story world. Nevertheless, non-diegetic cues can still serve the narrative. For example, by means of a subtle camera move, such as a

camera push-in, the virtual reality filmmaker can put an emphasis on a particular direction where he or she wants the spectator to look.

In the same vein, Mateas (2001) argues that agency (or in the case of cinematic virtual reality: presence) within a virtual story world can only be achieved if material- and formal constraints are balanced. Within games, material constraints can be considered limitations of interaction with regards to the player (Mateas, 2001). For example, if the spectator has the ability to pick up objects in the virtual world by means of a controller, then this ability would be a material resource of the player, but if the author does not allow for the spectator to pick up objects, then this would be a material constraint (Mateas, 2001). By using material resources, the spectator can climb the hierarchal chain of causation, as outlined by Laurel (see figure 1), and reach the level of action (read: plot). Thereby, the spectator has gained a better understanding of the plot, and knows which actions are dramatically probably. This means that the spectator has gained the ability to speculate about how the story will unfold, and therefore knows which actions are worth taking in order to accomplish the goal of the game (Mateas, 2001). The same applies to cinematic virtual reality films. If a spectator has too many elements to allocate his gaze towards, it is likely that the spectator will get disoriented and would not know where to look within the 360-degree story world. Therefore, the renewed role of the author is to guide the viewer through this experience by highlighting which cues are of importance for a better understanding of the story world (Mateer, 2017).

Moreover, the only material resource that the spectator has available for interaction is the freedom to allocate his or her gaze within the virtual story world (Mateer, 2017; Nielsen et al., 2016). Thereby, if the spectator has an understanding of the plot and its characters, and therefore knows which actions are dramatically probable, the spectator will know where to look in order to achieve a better understanding of the development of the plot. For instance, when a spectator finds him or herself in a living room with two people sitting on a couch, it is dramatically probable that the action will take place on the couch, and not in the corner of the room. The spectator derives this insight in the story world by reiterating the formal chain of causation (Mateas, 2001), and while dramatic probability is understood by means of visuals and sound, it extends visual and auditory representations, as it builds upon the spectator's ability to speculate about dramatic probable actions.

Furthermore, narrative cues can be considered material resources by which the spectator can interact with. For example, when the spectator hears a sound behind him or her in the virtual world, the spectator can decide to allocate his or her gaze towards the direction of the sound, or not. While gaze allocation cannot alter the narrative, it can alter the experience of the narrative, and therefore it can be considered interactive experience, which influences the spectator's perception of the narrative. Hence, this interaction is materially constrained by narrative cues. In other words, the spectator might think that he or she has total freedom with regards to gaze allocations, however, because of manipulations, such as narrative cues, the spectator is more constrained than he or she might believe.

2.3.2 Simulation and critiques of the Aristotelean approach

Within interactive narrative studies, there has been much debate about the feasibility of combining narrative and interactive experiences (Mateas & Stern, 2006). For example, studies of narrativism argue that too much interactive freedom would lead to a low narrative quality, as not every spectator is very skilled in creating stories (Bernstein, 2003). Moreover, ludology scholarship argues that it is almost impossible to merge interactivity with narrative, as the amount of freedom that a spectator gets makes it very difficult for the filmmaker to present a coherent narrative with a climax of the story (Frasca, 2003). The spectator will likely be distracted by other elements in the story world, and therefore loses focus of the story that is being told.

In this regard, Frasca (2003) developed an interesting theory of 'simulation', which is particular interesting in the light of cinematic virtual reality. Simulations can be considered virtual worlds, where the spectator's experience of a game is more important than the involvement with the narrative (Frasca, 2003). What is meant by this, is that interacting with an event feels totally different than solely spectating an event. The latter is usually the case with narrative experiences (Frasca, 2003). For example, driving a car will feel different than watching a car drive. Cinematic virtual reality films can relate to this, as experiencing a virtual reality narrative feels completely different than watching the same narrative in cinema, due to cinematic virtual reality's immersive character and possibilities to interact (Aylett & Louchart, 2003; Mateer, 2017). Moreover, due to the freedom of gaze allocation, the experience of the narrative will be different for the spectator, every time. This notion of 'experience' is something that virtual reality films share with Frasca's (2003) theory of simulation, but also contradicts, as cinematic virtual reality films contain a fixed-narrative structure (Mateer, 2017).

Furthermore, Frasca (2003) argues that, in general, an author of a narrative seeks to make statements about the world by means of sequenced events. In this regard, a spectator has to be able to comprehend the narrative in order to understand the statement that the author of the narrative tries to deliver to the audience. For Frasca (2003) the beauty of simulations is that the spectator has no clue of what will happen as the events are unfolding in present time, and therefore do not consists of a fixed narrative structure beforehand, contrary to cinematic virtual reality films.

Hence, cinematic virtual reality films can be considered a simulation with the potential of becoming a fixed narrative structure, if the author of the story succeeds in guiding the spectator through the narrative. However, Frasca (2003) will most likely disagree on this matter, as he argues that a major drawback of the neo-Aristotelean approach is the combination of user freedom with the experience of a coherent narrative. While there is definitely some truth in this claim, cinematic virtual reality films can be seen as a simulation, until the author of the story interferes and adds the experience of a fixed narrative structure to the simulation. In this regard, Mateas' (2001) argument of setting material and formal constraints in order to guide the viewer through the narrative can be considered the interference that could potentially lead to narrative comprehension of the spectator. In order to accomplish the latter, narrative cues and the design of the virtual world are valuable tools for

the virtual reality filmmaker. Nevertheless, the simulation of a cinematic virtual reality film forms the basis for a successful story, as it consists – in the case of cinematic virtual reality – of making the spectator feel present in the virtual world, which is the main objective of virtual reality developers (Mateer, 2017; Slater & Wilbur, 1997).

2.4 Towards a theoretical model to study narrative cues
While narrative cues can be both experienced by the viewer as diegetic and non-diegetic, their definition reaches much further. Nielsen's et al. (2016) categorization of cues (diegetic, non-diegetic, implicit, explicit) are a part of the enactment, as the enactment consists of the represented action, which contains a variety of sensory dimensions. In this regard, a subtle camera push-in can also be considered represented action that triggers a sensory dimension. For that reason, it can be suggested that Nielsen's et al. categorization of cues operates mainly on the level of enactment.

Complementary to this argument, and as argued briefly before, dramatic probability is a second level of gaze direction that should not be disregarded. By knowing which actions are dramatically probable, the spectator has insights on how to allocate his or her gaze most effectively, in order to experience a coherent narrative (Mateas, 2001). Hence, narrative cues can be inquired on two levels, namely cues that are designed by the cinematic virtual reality filmmaker, and the spectator's ability to speculate about the unfolding of the story. An example of the latter would be a descriptive text that gives the spectator narrative information before the cinematic virtual reality film starts. In this way, the spectator will most likely gain an understanding of what will be of importance during the cinematic virtual reality film. Dramatic probability can therefore be considered a second degree of gaze direction, that builds upon a spectator's ability of speculation, and that builds heavily on immersion, because a spectator needs to be compelled by the narrative in order to know which actions are dramatically probable (Mateas, 2001; Mateer, 2017).

In order to analyze narrative cues in cinematic virtual reality films, the Mateas' (2001) framework, which discusses how narrative comprehension works in relation to an interactive spectator, should be adjusted according to the characteristics of cinematic virtual reality. As argued thoroughly throughout this thesis, cinematic virtual reality is not fully interactive. Instead, the spectator's gaze allocation is the only form of interactive freedom for the spectator (Mateer, 2017). With this thought in mind, the following framework, which is an adaption of Mateas' (2001) framework, is proposed:
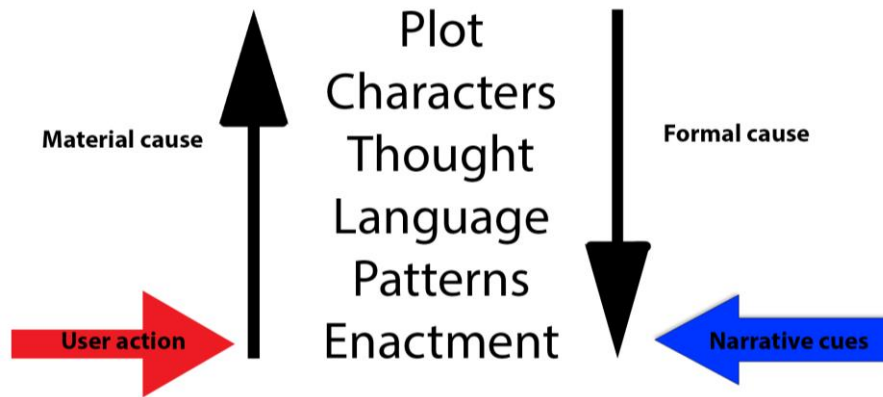
Figure 2: Adaption of "Neo-Aristotelean theory of drama" (Mateas, 2001)

While Mateas (2001) argues that user action happens on the level of character, as he approaches interactive narratives as fully interactive experiences, where the spectator can receive feedback from other characters, user action within cinematic virtual reality happens on the level of enactment. This has to do with the limited freedom of interaction for the spectator (Mateer, 2001).

Further, the interaction between the spectator's actions (gaze allocation) and the filmmaker's manipulations (narrative cues) are essential for a coherent narrative experience of the spectator (Bates, 1991; Mateas, 2001; Nielsen et al., 2016). For instance, when being presented with a narrative cue, the spectator can choose to accept or not accept the cue. If the spectator accepts the cue, he or she will allocate his or her gaze towards the cue. As argued previously, in response to this user action, the narrative cue reveals important plot information that the spectator can use in order to better comprehend the plot. If the spectator does not accept the cue, there is no interaction. Another way to put it, if the spectator does not interact with narrative cues, the cinematic virtual reality experience will remain a simulation with regards to the spectator's perception, as outlined by Frasca (2003) in section 2.3.2 of this chapter, instead of a coherent narrative experience.

Lastly, it can be suggested that the key concept derived from gaze direction studies, namely visual salience, is embedded into the enactment. Visual salience is also an element that can be easily manipulated by the cinematic virtual reality filmmaker. It is up to the filmmaker to decide if something will stand out from its environment. Considering that studies of gaze direction have shown that visual saliency can be a valuable tool to attract a spectator's gaze, the concept of visual saliency will be considered an important factor within the realm of the enactment (Nielsen et al., 2016; Treue, 2003).

Chapter 3: Methodology

The third chapter will discuss the used methods for acquiring the results of this thesis. First, the research design of this study will be discussed, which consists of a mixed method, combining qualitative content analysis with qualitative in-depth expert interviews. After a discussion of both methods, the units of analysis, the procedures of data collection, and how the data has been analyzed, will be elaborated on.

3.1 Research design

This study combines both qualitative in-depth expert interviews and qualitative content analysis of cinematic virtual reality content in order to examine how narrative cues are constructed within cinematic virtual reality narratives. Both methods maintain an inductive approach, which means that they look for theory regarding narrative cues grounded within the data, rather than testing theory regarding narrative cues, which is developed beforehand (Gibbs, 2007). The main reason for this approach is the fact that there is an overall lack of published theories about narrative cues and cinematic virtual reality as a medium in general. It is therefore necessary that narrative cues are being researched from a spectator, filmmaker, and content perspective. This study examines narrative cues from both a filmmaker, and content perspective, due to the limited time frame to perform this study. Hence, it would be fruitful if future studies on narrative cues would include more research on the spectator's perceptions of narrative cues, as performed in Nielsen et al. (2016).

In a same vein, due to the use of two methods, the possibility to explore deviant cases is an added value to research narrative cues, especially because little is known about narrative cues in cinematic virtual reality narratives, and this research can therefore not build upon, and compare, its results to previous studies. Instead, this study will rely on traditional theories of film narratives, as discussed by Branigan (2013) and echoed in the works of Mateer (2017) and Nielsen et al. (2016). While the possibility to inquire deviant cases is not the main reason for employing the two qualitative methods, it is certainly an added value for this research. For instance, if the results of the expert interviews contradict the results of the content analysis, it will lead to a different conclusion about narrative cues than when only one method would be employed.

Before delving into matters of analysis and procedure, it is important to further elaborate on why this research adopts an industry and content approach. From an industry perspective, qualitative expert interviews offer data that can lead to a better understanding of the experiences of experts (Kvale, 1996). In this case, it would provide insights into an expert's viewpoints and experiences of working with narrative cues. Moreover, as cinematic virtual reality films have to deal with a battle of narrative control and freedom of gaze allocation between author and spectator (Mateer, 2017), it is valuable to conduct expert interviews, as industry experts can elaborate on this battle of control within the content, from an authorial point of view.

Additionally, performing content analysis will provide insights into how narrative cues are embedded in contemporary cinematic virtual reality films. By categorizing important aspects of narrative cues, the ways in which narrative cues are embedded within the content can be analyzed. Aside from an industry perspective, it is important to look at the content, because the structure and other elements of the content might differ from an expert's particular viewpoint. For instance, if sound is outlined by experts as an important narrative cue, but it does not make sense from a content perspective, or it is barely used in relation to narrative, then the importance of sound will be nuanced in the conclusion of this thesis.

However, a critical reader will notice that there needs to be a relation between maker and content, as it does not make sense that an element, such as sound, could be regarded as important by content developers, but would not be regarded as a significant element within the content itself. On the other hand, because content developers make both conscious and subconscious decisions, this relation between content and maker is more capricious than one would think on first sight. For example, it could be possible that content developers emphasize the use of sound, but the content shows otherwise. In the results section of this thesis, it will become clear that editing between scenes is valuable for directing gaze, but is not emphasized in the motives of virtual reality experts. Thereby, it is important to use both methods, to discuss these techniques in multiple disciplines in relation to narrative cues.

In this regard, by retaining an industry and content approach, it is possible to address narrative cues from an authorial and content perspective. This is of interest for scholarship, because there is little published academic theory regarding this relation, and narrative cues in general (Mateer, 2017; Nielsen et al., 2016), as further outlined in the 'social and scientific relevance' section of this thesis. However, in this thesis, the spectator is left out as the object of research. This does not mean that this study does not take the spectator into account. By inquiring how the author approaches the spectator by using narrative cues, and by researching how this is reflected in the content, suggestions can be made about the spectator. Nevertheless, these claims need to be further researched. For further research, it is thereby important to also include the spectator as the object of research. The study of Nielsen et al. (2016) would serve as a good starting point for such inquiry.

3.2 Units of analysis

3.2.1 Qualitative content analysis
The data for qualitative content analysis exists out of six cinematic virtual reality films (see table 1). In comparison to other narrative media, there are currently not many mainstream cinematic virtual reality films in circulation. Therefore, all films have been sampled selectively by criteria of quality and narrative structure. While there is no pre-established set of criteria with regards to the quality of a cinematic virtual reality film, this study considers a film a quality film when it is produced by a

renowned production company, with a team that has a notable track record, or when the film has received recognition for its artistic accomplishments from the industry in the form of awards.

As for the narrative structure, the virtual reality films have to contain a clear beginning, middle, and end. This is important because this study builds upon Aristotelean (trans. 1902) theory of drama, which argues that the plot needs to be considered as an organic whole. Within cinematic virtual reality content, it is important for the spectator to understand the 'whole of elements' that form the plot. Such stories usually contain a cause-effect relationship, which means that a story unfolds itself through previous narrative occurrences and events, and contains a climax and conflict (Branigan, 2013). Hence, previous events and occurrences are essential to form the whole of elements, which is called the plot. If the spectator would miss an element of the whole, he or she would likely not comprehend the plot. Thereby, these characteristics of a story – in relation to narrative cues - have been used to interpret the results of the content analysis.

Table 1: Research units of content analysis

Title	Year	Type	Producer	Length
Chapel	2016	Romantic drama (live-action)	Jaunt VR	5:12 minutes
Evolution of Verse	2015	Experimental drama (live-action/animation)	Within	3:59 minutes
Invasion	2016	Adventure (animation)	Baobab Studios	6:08 minutes
Mr. Robot	2016	Drama (live-action)	Here Be Dragons, Within	13:04 minutes
My Brother's Keeper	2017	Historical drama (live-action)	PBS Digital Studios	10:56 minutes
Paranormal Activity: The Ghost Dimension 360	2015	Horror (live-action)	Paramount Pictures, Socialtyze	3:44 minutes

Last, it is important to elaborate a bit more on why the films – mentioned above – have been selected, and what stories these films entail. Firstly, *Chapel* (2016) is a love story between a woman and a deaf man. As the name implies, the story takes place in a chapel, and by means of dissolves, the viewer spectates important events of the love-story that take place during the life-time of the two protagonists.

The film is produced by Jaunt VR, which is one of the leading production companies of cinematic virtual reality films.

Evolution of Verse (2015) is a virtual reality experience that consist of a rather unusual narrative structure. In short, the film begins in the middle of a lake, where a train is approaching the viewer. Afterwards, the viewer is surrounded by birds and is transported to an abstract environment where the viewer explores the 'essence of life' by experiencing a baby within a woman's uterus. While the narrative of this film sounds unconventional, the film still contains a clear beginning, middle, and end. However, the unfolding of events is linked in an abstract way. Therefore, narrative cues might not fulfill a crucial role to understand the story completely. However, the film is regarded as an important work within the medium of cinematic virtual reality, as it has been created by Chris Milk, produced by renowned production company Within, and exhibited at Sundance Film Festival 2015. Together with the fact that the film has been released in 2015, the film is worth inquiring with regards to cues to steer the spectator's gaze.

Contrary to *Evolution of Verse*, *Invasion* (2016) is a cinematic virtual reality film with a very clear cause and effect relationship. The story entails an animated story of two aliens, 'Mac and Cheez', who desire to take over the universe, but are being sabotaged by a cute looking bunny. This virtual reality film is narrated by star actor Ethan Hawke, has received the daytime Emmy award 2017 for "outstanding interactive", and has been directed by the director of the animation film *Madagascar* (2005). In this sense, the film is a valuable source for inquiring narrative cues.

Next, *Mr. Robot* (2016) is a cinematic virtual reality film that is a spin-off of the similar named television show. It is produced by well-known production company Within, and nominated for an Emmy in the category 'Outstanding Creative Achievement in Interactive Media within a Scripted Program' in 2017. The narrative of the film is about a man who relives his past memories of his time with his ex-girlfriend, as a result of a hallucination. The film contains a clear narrative structure, and contains a clear conflict, which entails the protagonists struggling with his memories of his ex-girlfriend. Hence, this film can be considered a rich source to analyze narrative cues.

Furthermore, *My Brother's Keeper* (2017) tells the story of two brothers who are fighting each other on opposite sides during the American Civil War. The film was exhibited at Sundance Film Festival 2017, and has been praised in popular media for its innovative film techniques (Coldewey, 2017). Moreover, the film has been produced by PBS Digital Studios, which is part of the largest public broadcaster (PBS) within the United States of America. Also, the film has a clear narrative structure and is a very valuable source of information with regards to inquiring narrative cues.

Lastly, *Paranormal Activity: The Ghost Dimension 360* (2015) is a horror story about a couple of friends who find themselves in a haunted house. After summoning a ghost, they are being killed one by one, until there is nobody left. This virtual reality film has been employed by Paramount Studios as a promotional film for the similar named theatrical film. It contains a clear beginning, middle, and

end. Moreover, the film builds up to a climax of the story, which is the reveal of the ghost(s) at the end of the film.

3.2.2 Qualitative expert interviews

The data of the qualitative expert interviews consists of six in-depth interviews with virtual reality experts. In this study, virtual reality experts are considered persons who have a significant role in the production or curation of virtual reality films. As virtual reality production teams are usually small and do not have pre-defined roles, it becomes more difficult to select experts in particular areas. Most of the times, virtual reality developers fulfill multiple roles within the production process. For example, a virtual reality developer can work on the story world design, and at the same time work as a sound engineer on the project. Consequently, the majority of virtual reality developers have knowledge about a wide range of production disciplines within virtual reality (e.g., sound, camera work, directing, visual effects, editing). Thereby, it is easy to find developers, who can talk about narrative cues within multiple production disciplines. However, in order to get the most out of the interviews, experts were selected who – aside from general knowledge – had an expertise within the cinematic virtual reality production process.

With the assistance of the *VR Cinema* in Amsterdam, and by attending several virtual reality meet-ups, six virtual reality experts have been selected. The six participants consist of two virtual reality developers, one content specialist, a creative director, a virtual reality writer, and a virtual reality audio specialist. One of the two virtual reality developers had a specialization in editing, while the other had a broader skillset, but mentioned that he preferred working in story space design. The content specialist works as a programmer for the VR Cinema, and due to her amount of knowledge about the topic, also has an advisory function within the company &Samhoud Media. The creative director could be considered the head of development during a virtual reality production. His role during this process is best understood as the director of the film, although he fulfills multiple (creative) positions, as they work with small teams. The virtual reality writer has written a couple virtual reality films/projects, but seeks to also be involved in the making process of the films. Lastly, the audio specialist is solely responsible for the audio within the virtual reality production. This ranges from the actual recordings to the design of artificial sounds in the story world. To close this paragraph, it might be valuable to mention that three of the six interviewees work at the same virtual reality company (&Samhoud Media), while the others work at three different media companies. Furthermore, three of the six interviewees are Dutch, while the other three are international (German, Greek, and Portuguese).

While all the experts work in the Dutch virtual reality industry, the six selected virtual reality films are all international productions, mainly produced in the United States of America. At first sight, this might look like an incorrect combination, because can the motives of professionals in the Dutch virtual reality industry be linked to international content? In this regard, it is important to mention that

most virtual reality companies work internationally, although stationed in certain geographical places. In other words, there is not yet a country with a 'national virtual reality industry'. Therefore, due to the international character of virtual reality industries, it is not strange to compare motives of professionals from different countries with content that is produced in different countries. Nevertheless, this thesis acknowledges the fact that this comparison is not ideal, especially in the long run, as virtual reality matures into a more sophisticated industry.

3.3. Procedures for data collection

3.3.1 Qualitative content analysis

The virtual reality films have been viewed on a PlayStation virtual reality headset, and by means of a 360-degree media player. The 360-degree media player allows the researcher to easily pause the content and explore the 360-degree virtual world by means of the 'drag' function of the computer mouse. While it is not possible to experience the cinematic virtual reality content in 3D by means of the 360-degree media player, the content could be explored more thoroughly and in greater detail within the 360-degree media player. Therefore, the decision has been made to watch the content through a virtual reality headset, aside from a computer screen. During the analysis process, the content has been watched multiple times, from beginning to end, until saturation of findings occurred. This was usually after four to five times of watching the content. The beginning of the film was determined at 00:00 of the duration of the film, and the end was determined when the credits rolled. At every valuable observation in relation to narrative cues, the content was paused, notes were taken, and a time stamp was written down.

3.3.2 Qualitative expert interviews

Each interview has been performed by means of a semi-structured interview approach, which entails that there was not a strict questionnaire (Curtis & Curtis, 2012). Instead, there were a couple of themes that were addressed in each interview. These themes were mainly derived from literature debates in the field of virtual reality and interactive narrative studies (Aylett & Louchart, 2003; Bates, 1991; Laurel, 1991; Mateas, 2001; Mateer, 2017; Nielsen et al., 2016). For instance, experts were asked questions about the problem of gaze direction in virtual reality, narrative cues, and dramatic probability. It needs to be noted that the questions served as a guideline for the interviews, and were not asked literally in every interview. Instead, this study maintained an open interview approach, where there was a lot of freedom for the interviewee to talk about particular subjects. The reason for choosing an open interview approach was that this research is exploratory, and therefore relies mostly on what the interviewees bring to the table. Rather than the other way around.

Furthermore, all interviews were recorded auditory and took between 45 and 60 minutes in length. The interviews either took place at the office of the interviewee, or at a place where they felt comfortable, and that was not too crowded. All interviews were conducted in an informal way, so the participants would feel relaxed, and would be able to talk freely about their views on the previously mentioned themes (Richards & Emslie, 2000). Afterwards, the interviews were transcribed verbatim, which means that the data has been cleaned up regarding unnecessary filling words (e.g., 'uh', 'eh', stuttering, etc.). In the context of this research, it is more important *what* is being said, rather than *how* it is being articulated by the interviewees. After the transcription of the interviews, the audio and the transcript were checked again to make sure it was accurate.

3.4 Data analysis

3.4.1 Interview data analysis

The interview data has been analyzed by means of qualitative thematic analysis, which means that the researcher looked for patterns, and aimed at identifying sensitizing concepts within the data (Braun & Clarke, 2006). In this case, the researcher searched for patterns within *each* interview. For instance, how often does the interviewee mentions a particular cue as relevant? Additionally, the researcher looked for patterns amongst *different* interviews. For example, is there a cue or experience that all interviewees emphasize as important? Lastly, the patterns of the expert interviews were compared to patterns derived from the content analysis. In this comparison, the researcher looked for similarities and differences in both analyses.

During the analysis, the researcher first scanned through the data in order to familiarize with the information available and to see if any codes could already be determined. In this step, short notes were taken on a piece of paper. Next, the process of open coding was applied, where the researcher created (broad) categories for different patterns within the interview. Notes were taken, in the form of descriptions, on the margins of the transcripts. In this case, a (broad) category could be 'social behavior' or 'spectator as part of the story world'. An important note to make is that some of the codes were descriptive, as this exploratory research also seeks to identify as many narrative cues as possible. Hence, when an interviewee mentions a narrative cue directly, it has often been coded descriptively, and later put into context.

Following the open coding, the researcher employed axial coding, which means that relationships between the open codes were identified, labeled, and further defined (Gibbs, 2007). For example, in this research an axial code could be 'immersion', which would be the link between the open codes 'social behavior' and 'spectator as part of the story world'. During the axial coding process, a thematic map has been made in order to give a coherent and clear overview of the links between codes. See figure 3 for a segment of a thematic map within this research.

Lastly, the process of selective coding was applied, where the researcher looked for the core category that links all codes together (Gibbs, 2007). For example, within the interviews the main code could be 'authorial intent' that would entail that all narrative cues would flow from the author's vision and goals with regards to the narrative.

The results of open-, axial-, and selective coding were interpreted according to sensitizing concepts derived from interactive narrative studies, debates within virtual reality studies, and additional concepts derived from gaze direction scholarship. However, above all, the sensitizing concepts, where mainly a product of the suggested framework for understanding narrative cues within the theoretical framework of this thesis.
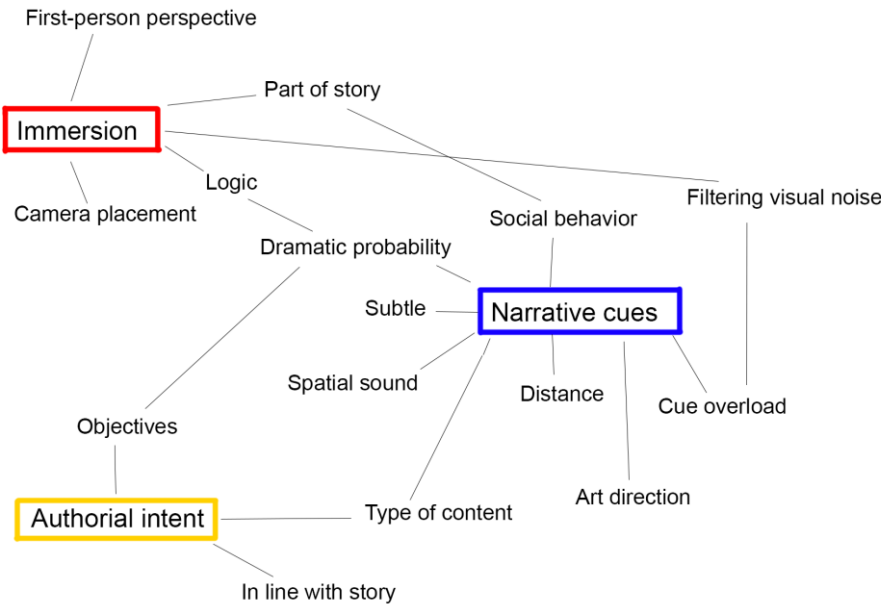
Figure 3: Segment of a thematic map

3.4.2 Content analysis

Similar to the interview data, the content analysis entailed a qualitative thematic analysis. The same steps were taken to perform this analysis. Open-, axial- and selective coding were employed to categorize the findings. Afterwards, these findings were interpreted in the light of sensitizing concepts derived from debates within virtual reality studies, interactive narrative studies, additional concepts derived from gaze direction scholarship, and the content theoretical framework of this thesis. It is important to note, however, that content analysis was performed without the use of transcripts. Instead, the content was analyzed together with the notes that have been taken during the observations of the virtual reality films, as outlined in section 3.3.1 of this thesis. While coding is more pleasant

when using a transcript (Gibbs, 2007), cinematic virtual reality films as a unit of analysis is too complex to turn into a feasible, and most importantly, understandable transcript. Also, the adaptation of the visual content into a transcript would consume a lot of valuable time. Therefore, the decision has been made to analyze the content directly by means of a virtual reality headset, and 360-degree media player. The notes, which were taken before, serve as a guideline for the analysis and interpretation of the content.

3.4.3 Comparative analysis

Aside from the two types of analysis in this thesis, this study compares the findings of the interviews with the findings of the content analysis. Any deviant cases that resulted from this comparison were further investigated and addressed in the results chapter of this thesis. By going back to the literature, and scholarship debates, explanations were sought for these deviant cases. However, it is important to note that the comments on the deviant cases are therefore primarily based on theory, and not on the practice itself. In this regard, the deviant cases offer interesting possibilities for future research. For example, one of the deviant cases that resulted from the comparative analysis is the dubious case of the use of dramatic probability within cinematic virtual reality. This can be tested by means of an experiment, where the spectator will be tested on plot comprehension, and his or her ability to speculate about the unfolding of the plot.

Chapter 4: Results and discussion

This chapter presents the results of this study, together with the interpretation and discussion of the results. In a nutshell, the results show that although non-diegetic elements are not often emphasized by the motives of virtual reality experts, they do have great value for gaze direction within 360-degree virtual environments. Moreover, the results chapter will outline that narrative cues are not best understood as single elements, but rather work collectively in order to establish a flow of gaze direction, which results in a spectator's better comprehension of the narrative. These results are further reflected on within the conclusion chapter of this thesis, and show that the suggested framework in section 2.4 of this thesis needs adjustments in order to be able to better inquire narrative cues.

4.1 Results content analysis

4.1.1 Flow of gaze direction through non-diegetic tools
From content analysis, it becomes clear that *editing* is an author's strongest tool to add narrative structure to a cinematic virtual reality film. All researched films show that the action of the upcoming scene takes place in the same location within the 360-degree story world as the action of the previous scene. Thereby, it can be suggested that the virtual reality filmmaker assumes that the spectator is looking at the action of the previous scene, and therefore places the action of the next scene in the same part of the virtual world. So, when the cut happens, the spectator is already looking in the right direction. For example, in the virtual reality film *Invasion*, the filmmaker maintains a flow of narrative action by placing the action of the antagonists (the aliens), which entails them flying in their space-ship towards the audience, in the same place as the action of the protagonist (the bunny), after the cut (see figure 4 and 5).

Figure 4: First shot   Figure 5: Second shot

All researched films use this technique in order to make it easier for the spectator to understand the unfolding of the narrative events, and to not miss out on any important narrative information. In this regard, the transition between scenes, and the placement of the action, makes it easier for the spectator to understand the unfolding of the story better.

However, in relation to Nielsen's et al. (2016) categorization of narrative cues, editing cannot be fully considered a narrative cue. Nevertheless, editing is a part of the enactment, as a transition within scenes is part of the content and can be experienced by the spectator. In this sense, editing can be interpreted as a tool that operates in the same realm as narrative cues. While the editing of a cinematic virtual reality film also composes the plot, the cut itself can evoke an emotional response within the spectator, as traditional film studies have argued (Murch, 2001). In other words, what the spectator will see after the cut can be important to his or her experience of the story. In this way, editing can be strategically employed as a material constraint, set by the author, in order to make sure that the spectator experiences the right kind of (narrative) information. As argued before (section 2.3.1), a narrative cue can be considered a material constraint with which the spectator can interact with. However, the spectator does not any influence on the editing of cinematic virtual reality films, and can therefore not interact with such elements. Maybe, a spectator can anticipate on a cut to happen, and thereby allocate his or her gaze differently, but the spectator cannot look away from the cut. Thereby, editing can be considered a tool, on which the author has more control to manipulate the spectator.

Furthermore, it was often observed that the spectator does not have a lot of time after the cut to orient him- or herself within the new 360-degree environment. Usually, the action starts right after the cut. It is an important goal for authors to keep spectators immersed into the content (Mateer, 2017), while experiencing a coherent narrative. Therefore, it is not confounded that virtual reality filmmakers maintain a fast pace of the narrative, in order to remain the attention of the spectator to the story. In a similar vein, it is understandable that virtual reality filmmakers do not use jump cuts or other forms of disruptive editing, as these elements would likely feel disruptive to the viewer, and thereby result in a decreasing feeling of presence within the cinematic virtual reality experience (Mateer, 2017). Additionally, nausea and motion-sickness can also be a viable reason to make transitions between scenes smoother (Lin, Duh, Parker, Abi-Rached & Furness, 2002; Regan, 1995; Treleaven et al., 2015). In this sense, editing is a tool to maintain a flow of action that keeps the attention of the spectator, while also upholding the flow of narrative action and spectator immersion. Because the spectator can only interact on the level of enactment by means of gaze allocation (Mateer, 2017), editing in combination with camera-placement becomes of importance.

Hence, the spectator has a fixed position within the 360-degree story world. This means that the spectator cannot walk around in the three-dimensional environment, and therefore camera-placement and editing become important tools for the author. By setting material constraints in relation to editing and camera placement, the author gets a lot of control in relation to the spectator. With a fixed position of the spectator, the author can make sure that the spectator experiences a constant flow of action. For example, if the spectator would not have a fixed position within the story world, and therefore would be enabled to walk around within the three-dimensional environment, the spectator might walk too far away from an action between other agents. Consequently, the spectator

might not experience this action, which could be important to the unfolding of the narrative, and therefore of the spectator's comprehension of the plot. Besides, if the spectator would walk away from the action, and a transition to another scene would happen, it would not be surprising if the spectator would get disoriented within the 360-degree story world. Therefore, editing works well in combination with a fixed camera placement. Both elements do not serve fully as narrative cues, but do fulfill a similar function, as they are valuable tools for a virtual reality filmmaker to constrain the spectator with regards to the experience of the narrative.

However, it is likely that the freedom to walk around in a three-dimensional virtual world would increase the spectator's feeling of presence, as it simulates actions which are also possible outside virtual reality in the physical real world. Nevertheless, considering cinematic virtual reality as an artistic medium, through which stories are being told (Mateer, 2017), it would serve cinematic virtual reality best if the spectator's actions are physically constrained, with the exception of freedom of gaze allocation. In this regard, the author of a story can still effectively convey artistic statements through the content. Without materially constraining the spectator's ability to physically move around in the virtual world, cinematic virtual reality would take a form of a simulation, as outlined by Frasca (2003), rather than a narrative medium.

However, this does not mean that the spectator cannot move through the virtual story world. By means of moving the camera, the author can mimic the spectator's ability to move around. This is possible because the spectator can only observe the 360-degree story world from the position of the camera. Therefore, the spectator is materially constrained by the author, who decides where the spectator will move within the space. Within the analyzed content a subtle camera push-in is often utilized to guide the spectator's gaze in a particular direction. For example, in a shot of the film *My Brother's Keeper*, the filmmakers move the camera forward in the direction of the two main characters. In this sense, the virtual reality filmmaker controls the spectator's place within the three-dimensional environment, and by making the spectator moving towards important objects within the 360-degree story world, it is likely that those objects draw the attention of the spectator, as they slowly become closer. In other words, those objects become visual more salient, as they stand out by means of size (Treue, 2003).

Aside from camera movement, the angle of the 360-degree camera can promote a particular gaze direction of the spectator, due to physical uncomfortable head movements. For example, the films *My Brother's Keeper* and *Mr. Robot* both use a few shots which are recorded in a canted camera angle. Considering that the camera is usually regarded as the embodiment of the spectator, the spectator has to turn his head in a very uncomfortable position in order to have a plain level of the virtual world again. Hence, without turning his or her head, the spectator watches the important action within the virtual world. Thereby, the suggested gaze direction of the author will likely feel very natural to the spectator. While the spectator has many alternative material resources (read: head rotations) at his or her disposal, those resources become very unattractive to act upon. Therefore, a

canted camera angle can function as a material constraint to force a spectator's gaze towards important plot elements. Contrary to editing and camera movement/placement, the spectator can interact with a canted camera angle. The spectator can choose to (not) accept the proposed angle by the virtual reality filmmaker. Thereby, the use of a canted angle is an element with less control for the author of the story, and is hence more likely to be a cue, rather than a forced direction, such as the employments of editing and camera movement/placement.

4.1.2 Concentrated action within the 360-degree story world

The majority of the researched films *concentrate important action* within a particular part of the 360-degree story world. For example, within the film *Invasion*, most actions between the protagonist and the antagonists take place in a small part of the 360-degree world. Or, in the film *My Brother's Keeper*, the filmmakers chose to put a certain part of the story world out of focus, in order to concentrate the action and narrowing down the field of vision of the spectator (see figure 6). In this way, the spectator does not have to turn his or her head often. Consequently, the story is easier to follow, as the action will be more in front of the spectator, rather than around the spectator. This also means that the spectator's sensory dimensions are triggered from only on direction. This will likely feel more common to the spectator, as people are used to be triggered from one direction in – for instance – media such as film, television, or the computer screen (Laurel, 1991).

In a few exemptions, the action is scattered in multiple parts of the 360-degree story world. For instance, in a battle scene at around 4:45 minutes in *My Brother's Keeper*, multiple actions happen around the spectator. Or, in *The Evolution of Verse*, where the spectator is surrounded by a flock of birds. In both examples, the represented action is not crucial for the development of the plot. In other words, during those scenes, it does not matter where the spectator allocates his or her gaze on, because the represented action is similar in all parts of the 360-degree story worlds. Wherever the spectator looks within the battle scenes of *My Brother's Keeper*, there are soldiers fighting each other. Additionally, the protagonist is absent in this scene. Whenever the protagonist is present within the scene, the filmmaker of *My Brother's Keeper* chose to put a focus on the protagonists by narrowing down the field of vision of the spectator by putting certain parts of the 360-degree story world out of focus (see right side of figure 6). Hence, within the battle scene of *My Brother's Keeper*, there are no significant elements which are important for the unfolding of the plot in this battle scene of *My Brother's Keeper*. Therefore, it can be suggested that those kinds of scenes function primarily as spectacle, which seek to trigger the spectator's sensory dimensions from multiple directions (Laurel, 1991). By arranging the enactment in a way that the action is surrounding the spectator, it is likely that the spectator will look around him or her more often, as there is more to see in the 360-degree story world, and the spectator's sensory dimensions can be triggered from multiple angles within the virtual world.

Figure 6: Narrowing down field of vision in *My Brother's Keeper*

To sum up the latter two paragraphs, within cinematic virtual reality, the placement of the action is often concentrated when elements are presented which are important for the development plot. When this is not the case, and the action is scattered around the spectator, it could be argued that the author lets go of control of the spectator. In other words, the spectator has more material resources to act upon, and therefore is less materially constrained. This means that the spectator has more freedom, and will likely experience a high degree of agency (or: presence) within the virtual world (Mateas, 2001). However, this agency will fade away if there is no goal for the spectator to work towards (Mateas, 2001). This is why the author of virtual reality content should be a guide to the spectator, in order to point him in the right direction (Bates, 1991). Hence, if the author seeks to tell a coherent story, these moments of spectacle, with no crucial significance for the unfolding of the plot, should not take too long. To paraphrase Mateas (2001), the spectator will get bored if he or she does not know what to do. This will in most cases result in a loss of presence within the virtual world, which is contradictory to production goals of remaining presence in a 360-degree story world, while at the same time telling a coherent story (Mateer, 2017). Nevertheless, it should be noted that these moments of spectacle, can enrich the story as well. Considering that the spectator is being triggered from all kinds of directions, it would not be surprising as this opens up new possibilities to trigger particular emotional responses within the spectator. In this way, the arrangement of the enactment plays a vital role in storytelling of cinematic virtual reality content, but also most likely on an emotional level.

Lastly, with regards to the concentrated action within scenes, it is valuable to note that most of the analyzed films are told by means of the third-person perspective. This makes sense, as this means that the spectator views the action more as a witness, rather than a participant. If the spectator views to action from a first-person perspective, the spectator will be part of the action (Cho et al., 2016), and the action will therefore play most logically around him or her. In this sense, the spectator is automatically triggered from multiple directions within the enactment. By using a third-person perspective, the author gains more control, as the author can choose to put the spectator in the middle of the action, or let the action play in front of the spectator. The latter is much harder to realize through

a first-person perspective (Cho et al., 2016). Thereby, in order to effectively tell a coherent story in cinematic virtual reality, the third person perspective offers the best possibilities. This also supports the characteristics of cinematic virtual reality; the spectator cannot interact fully with other agents in the virtual world, so it is not logic to make him or her embody a character within the story world.

4.1.3 Social cues and point of view

In relation to point of view, a recurring theme within cinematic virtual reality is the use of, what this thesis calls: *social cues*, which entail the reactions of characters to an event into the 360-degree story world. The reactions which were most prominent in the researched content was: characters pointing their finger towards a part of the story world, or referring to an element in the story world by means of dialogue. While these kinds of reactions are most of the time very implicit, they can function as a narrative cue, and help the spectator to make sense of what is happening in the virtual world. For example, after 2:20 minutes into the film *Paranormal Activity*, one of the characters is pointing towards a part of the 360-degree story world, accompanied with the line of dialogue: "What was that, over there.". In this way, the character is implying where the spectator of the film should allocate his or her gaze, by means of both visuals (pointing of the finger) and sound (the dialogue). This can be considered an effective way of subtly directing the spectator, as the spectator receives two triggers from the enactment.

In their form, the research films showed that social cues are mainly diegetic elements, which primarily consist of sounds, visuals, or both at the same time. Because the spectator's gaze is being directed by means of story elements, social cues are tied very neatly to the narrative, and therefore are very unlikely to be disruptive to the spectator's feeling of presence within the 360-degree story world.

However, as briefly discussed in the previous section (4.2.1), perspective becomes an important storytelling tool for authors of cinematic virtual reality, and raises interesting questions regarding social cues, presence, and narrative comprehension of the spectator. On the one hand, the spectator will likely feel more aligned with social cues if he or she experiences the content through the first-person perspective, because this offers the possibilities for other agents to directly address the spectator. On the other hand, the spectator cannot fully respond to the other agents by means of a first-person perspective. For example, when the character from the latter example of *Paranormal Activity* would address the spectator directly, the spectator would not be able to fully respond to the character, as the spectator cannot talk, or make any physical gestures, beside the allocation of his or her gaze. Thereby, the spectator might become aware of his or her limitations of responding to the content, and likely loses agency within the virtual world. While there is more evidence needed to support these claims, it shows that the decision of choosing a fitting perspective is more complex than previously argued in section 4.2.1 of this thesis, and deserves more attention within scholarship regarding cinematic virtual reality.

4.1.4 Sound as precedent of physical objects

In all analyzed films, sound cues often function as a precedent for visual cues. This is not only the case with social cues, which are connected to agents of the story world. In all films, a sound is most of the times linked to a physical object that produces the sound within the virtual world. This can be an agent, as in social cues, but this can also be an object, such as a vehicle or a glass that is falling from a table. However, whenever a sound is linked to an object in the story world, the sound needs to be diegetic in order to make sense to the spectator. Think of the glass that falls from a table to the ground. It is common logic that the glass makes a scattering sound on the floor as it breaks. By omitting the sound in this example, it would probably feel unnatural in relation to the spectator and his or her feeling of presence within the virtual world.

When sounds and visuals are working together, the analyzed films show that sound is often the first narrative cue in a string of cues regarding a particular plot element. For example, in *The Evolution of Verse* the sound of an arriving train precedes the visuals of the train arriving. Or, after 2:29 minutes into the film *Mr. Robot*, a woman knocks on the door, which produces a sound. This sound is followed by multiple actions, in this case, the protagonist walks to the door and lets the woman into his apartment. For the spectator, the introduction of this character contains three general cues that could draw the attention to this action. Namely, the sound of knocking on the door, the movement of the protagonist, and the dialogue between the woman and the protagonist. In this case, this segment consists of both social cues, and sound cues which are connected to physical objects. This shows that most of such cues are often intertwined and occur at the same time.

For scholarship, this means that narrative cues might not be best understood as single elements that attract the spectator's gaze. This assumption is present in the work of Nielsen et al. (2016), where they test narrative cues as individual triggers. As the previous examples show, narrative cues work most of the time simultaneous with other cues. Social cues and sound cues which are connected to physical objects, are only a small segment of cues that work in a broader network of cues which are present at the same time in the story world. Think of the example of *Mr. Robot* again. While there are three general cues at work, there are more cues present with a relation to the development of the narrative. For example, the lighting within the scene can have consequences where the spectator will look. In the scene, particular areas of the room are better-lit than others (see figure 7 and 8). The better-lit parts of the room emphasize that the action will unfold in these parts, as these parts are better visible for the spectator.

Figure 7: Well-lit room   Figure 8: Poorly lit room

While this kind of cue is very implicit, it does contribute to the unfolding of the narrative. Therefore, the content shows that narrative cues are best understood as elements that work together towards one goal, namely: a spectator who comprehends the story well. However, it needs to be noted that some cues are more obvious to the spectator than others. For instance, the sound of the woman knocking on the door is more prominent than the subtle differences in lighting in this scene. Hence, some cues can be considered 'stronger' to draw the spectator's gaze, but do also depend on other cues, such as the moving of the character towards the door, or the differences in lighting, in order to work.

4.1.5 Titles and voice-overs to provide plot information

While much attention has been given to diegetic cues to direct the spectator's gaze, non-diegetic cues also offer valuable possibilities to draw the attention of the spectator to particular (diegetic) elements. From the researched films, it became clear that visuals in the form of text are often used before the narrative starts in order to provide the viewer with plot information beforehand. For example, in *Paranormal Activity*, the filmmaker makes a very bold decision by providing the spectator with information about the setting, the characters and even the climax of the narrative. The virtual reality filmmaker 'forces' the spectator to look at the non-diegetic text by means of saturating the remaining part of the story world with arrows that are pointing towards the text (see figure 9 and 10).

Figure 9: Arrows   Figure 10: Non-diegetic text

In this sense, the virtual reality filmmaker plays with the concept of dramatic probability by giving the spectator important plot information beforehand. Consequently, the spectator can consider more effectively which gaze directions are worth pursuing. For instance, when the spectator is aware that the four main characters will be killed during the story, which is the case in *Paranormal Activity*, the spectator will then likely look for things that could potentially kill the main characters in the 360-degree story world. This second level of gaze direction works by revealing the outcome of the story, by which the virtual reality filmmaker formally constrains the spectator, as the spectator has received the ability to speculate effectively about the unfolding of the narrative, beforehand (Mateas, 2001)

Another tool that is used often in this regard is the use of a voice-over. By means of a voice-over, the virtual reality filmmaker provides the spectator with plot information, which serves as content material that the spectator can use to better comprehend the experience, which is the case in *My Brother's Keeper* and *Invasion*, for instance. While both visual texts and voice-overs are elements to provide plot information, the voice-over is subtler than the visual texts. The voice-over is tied more neatly within the narrative, as the voice-over is usually experienced during the story, in contrast to visual texts, which are usually presented before the story starts. This difference is of interest, as the voice-over can provide knowledge about the plot at any time within the experience without disrupting the flow of narrative action, contrary to visual texts. Due to the spectator's freedom of gaze allocation, it might be difficult to introduce a visual text in the middle of the narrative. It would not be surprising if this would disrupt the spectator's feeling of presence, because it is visually disturbing. However, more academic evidence is needed to support this statement.

Nevertheless, it can be said with certainty that the voice-over offers more control for the author of the story. Within virtual reality, an auditory cue can be experienced at any time during the narrative and is independent in relation to the spectator's gaze allocation (Mateer, 2017). Thereby, by means of a voice-over, the author can decide when the spectator gains more information about the plot, which he or she can utilize in order to make sense of the virtual world, without disrupting the flow of narrative action. In this sense, voice-overs, compared to visual texts, would be a more suitable choice for cinematic virtual reality developers and their objectives of providing both presence and a coherent narrative to the spectator (Mateer, 2017).

4.2 Interview results

4.2.1. Maintaining presence is paramount for cinematic virtual reality
From the interviews, it becomes clear that presence is the most important aspect for content developers, when it comes to storytelling in cinematic virtual reality. All participants agree that everything within the story world should support presence, because this is considered the added value of cinematic virtual reality in comparison with two-dimensional content, such as traditional cinema and television (Aylett & Louchart, 2003; Mateer, 2017). To put it differently, the added value of

cinematic virtual reality is to let the spectator experience as if he or she is transported to another world (Mateer, 2017). As one of the participants pointed out clearly: "You get this very interesting way of storytelling, because now that you can have the user's attention to different points of the story, you can actually make the person feel like he is inside of the story, and that is what I think is the beauty of it." (VR developer, 30). Or, as another participant puts it: "If a film respects itself, things have to be happening in the back as well. So, if nothing would be happening, why would you do it in 360? Do it in 180, or do it in 2D." (Content specialist, 28). Hence, participants confirm that presence and immersion, as argued by Mateer (2017), and Slater and Wilbur (1997), is a key aspect of (cinematic) virtual reality. In this sense, from an author's perspective, it would be recommended that narrative cues should be designed in a way that supports the spectator's feeling of presence.

While there is consensus about the importance of immersion and presence, participants have mixed views on whether to use the first-person or third-person perspective in cinematic virtual reality as a storytelling tool. On the one hand, the first-person perspective is considered more immersive, as one participant emphasizes regarding camera placement "It decides how you will feel inside the film; if you will be a part of it, or if you look at it from an observer perspective. Actually, in this medium, I want you to be a part of the story; that is something I want." (Creative director, 50). On the other hand, currently, the first-person perspective has some drawbacks for content developers, as it still contains some flaws that counterwork the achievement of an immersed experience. For example, one of the participants mentioned "you can never really feel that it is first-person, unless somebody is addressing you, but when you look down you always see nothing." (VR Developer, 26). In this sense, another participant noted that "when someone is starting to talk to you and you cannot answer, then the immersion is lost again" (Content specialist, 29). These mixed views on the preferred perspective within cinematic virtual reality outlines a current problem of interactivity, because the spectator can only interact on the level of enactment, and has not the possibility to respond to characters of the story world. Hence, while the first-person perspective can be considered more immersive (Cho et al., 2016), due to flaws within the content and limited possibilities for interactivity, the first-person perspective may counteract the feeling of presence in particular cases.

4.2.2. Narrative cues depend on the type of narrative

Another important theme that emerged from the interviews is that all participants stressed the fact that narrative cues are dependent on the type of narrative. In other words, narrative cues can take all kinds of forms, as long as it makes sense with regards to the narrative goal, and the author's intentions. For example, when discussing narrative cues a participant noted: "I think it also depends on the type of content that you want to show to your audience, because maybe in that case that you are saying, maybe it made sense because it was kind of surrealistic." (VR developer, 30). Therefore, from an author's perspective, narrative cues should feel logical to the spectator in relation to the narrative. This does not mean that narrative cues have to be realistic, as long as they account to a spectator's

suspension of disbelief, it is likely that they will work. In this regard, all participants discuss cues as being incorporated within the narrative.

The use of diegetic cues, as discussed in Nielsen et al. (2016), is therefore the preferred application of narrative cues in cinematic virtual reality, from an author perspective. A great advantage of diegetic narrative cues is that it is possible to use different cues together in order to create a synergy, while at the same time support the spectator's feeling of presence in the virtual story world. For example, when an author wants to draw the attention to a car, he or she can make use of sound cues (e.g., the horn, engine sound), but also visuals (e.g., flickering of car lights). These kinds of cues work logically together in the example of the car, and therefore relate to an action that the spectator is familiar with from the real physical world. By using these cues together, it is more likely that a spectator will be drawn to particular objects, as one participant noted: "I think the more cues you have the better, because that is how the world works. In the real world, if you hear a train coming, you just don't hear the train coming, but you also see the train coming, and then you see the smoke, you see the movements, you see colors. I think it is very important that you try to keep everything in chain." (VR developer, 30). In this sense, diegetic cues are more likely to maintain the flow of immersion with relation to the narrative developments.

Moreover, some of the participants explicitly claimed that within cinematic virtual reality blunt non-diegetic cues should be avoided. As one of the participants argued: "I would never use it. I think it is a huge weakness. I think it is stupid that in a free environment, that you are [bluntly] steering someone to look to the left." (Creative director, 50). Hence, this statement implies that implicit cues are preferred above explicit cues. Nonetheless, all cues are considered allowed as long as they make sense to the narrative and the intentions of the author of the story.

4.2.3. Strong forms of narrative cues from an author's perspective
While keeping in mind that the strength of a particular cue depends on the type of content and narrative, there are a few cues that are generally considered strong by content developers. All participants emphasized sound as the strongest cue to draw the attention of the spectator. This is not surprising, due to the fact that sound can be experienced at any time during the experience. The volume or position of the sound might change, because it is spatial and therefore changes in relation to the allocation of the spectator's gaze within the virtual world. However, contrary to visuals, the spectator cannot cut him or herself off from the sound; it is always there. Consequently, the author has more control over sound than visuals within cinematic virtual reality. The fact that sound is always present is one of the reasons that sound is considered a strong cue, as one of the participants mentioned: "You can say that sound is a very strong one. Because, when you are focused on something that is happening over there, and there is someone approaching you from behind and you don't hear his footsteps, then you have no clue that someone is approaching you." (VR sound specialist, 30). Thereby, for content developers, sound offers an effective way to set constraints, or in

this case narrative cues, to the spectator in order to guide him or her towards important parts of the 360-degree story world.

Furthermore, many participants mentioned that they use social cues as a tool to direct a spectator's gaze, which is clearly exemplified by one of the participants as: "If there falls a glass on the ground somewhere over there in the corner, we will look up to see what is falling. If I film us and we are looking towards that direction [pointing] to see what is happening, you – as spectator – will also look what is happening there" (Creative director, 50). Hence, a social cue contains the reaction of characters to a particular event in the story world that triggers the spectator's allocation of gaze. In this sense, social cues are heavily based on a cause-effect relationship. As a spectator, you'll see the effect of the event, which is the reaction of the characters. Consequently, the spectator will look around for the cause of the event. These cues can therefore only exist as diegetic cues (Nielsen et al., 2016). Moreover, a spectator needs to be compelled to the narrative in order to experience social cues. In this regard, presence is of utmost importance.

Lastly, the majority of participants claimed that art direction, or broadly put as story world design, is a very important element in directing the spectator towards important plot elements. For example, it is important to strike a balance between the number of objects, and intensity of certain visual elements, within the virtual world, as one of the participants mentioned: "it is very important to filter visual noise. For example, in this location where we are right now, there is a lot of visual noise. If you try to make a scene right here, there is too much to look at. There is too much light variation, there are too many colors, so you don't really know where to look at. And that is when art direction comes in." (VR developer, 30). Hence, it is important for content developers to create a well-balanced environment, where the art direction supports both immersion and emphasizes important narrative events.

4.2.4. Influential factors aside from narrative cues

While content developers prefer to incorporate cues into the narrative in order to grab the spectator's attention, there are some influential factors that content developers outlined as important in relation to gaze direction. While editing is regarded as a difficult feature in cinematic virtual reality, as it easily disrupts the flow of immersion, editing is also an important factor when it comes to directing the gaze of the spectator. For example, as one of the participants mentioned when discussing a chase scene: "The only way to make this work was by making the 'coming in and out' happening where you were looking in the previous scene. For instance, she leaves the room over there, then the next action has to be over there as well. It can be something different, but it needs to happen there." (Creative director, 50). What the participant is implying here, is that when editing a cinematic virtual reality scene, the spectator's field of vision will be allocated on the same part of the 360-degree world as in the previous scene. Hence, if the action does not take place within the spectator's field of vision after the cut, then it is likely that the spectator will miss the action. In this regard, editing is a vital tool for content

developers to create a continuous flow of action. To put it differently, it can be suggested that editing is not used to change the spectator's gaze, but rather to maintain the spectator's gaze allocation. Therefore, strategic editing cannot fully be considered a narrative cue. However, it does serve as an important factor that could influence a spectator's comprehension of the plot, as it maintains the spectator's perception of the flow of action.

Secondly, participants had mixed views on playing with dramatic probability and providing plot information to the spectator beforehand. As one participant claimed: "of course that makes sense, but I'm not sure if you lose tension, or maybe also immersion. I mean, if I watch a movie and I can predict it until the end, I will get bored of it. So, I'm not sure if it is counterproductive if you make things that obvious for people. Also, you don't want to sell them for dumb." (VR developer, 26). However, another participant argued: "That is something you can really play with here. In that family film that we made, *High Five*, there is a scene […] at a given moment she is hiding in the kitchen. We filmed this in a way that you can see the hidden girl and the thieves – who are entering – at the same time. So, your involvement with the girl and the thieves is much higher. You can look at your left and see the girl and you can look at your right and you see the thieves entering. They don't see each other – but you will get that as well - because there is stuff between them" (Creative director, 50). Hence, these statements imply that it depends on how the virtual reality filmmaker deals with dramatic probability. If the virtual reality filmmaker strategically plays with the knowledge that the viewer has, then it can be fruitful for directing the spectator's gaze. However, it can also work counter-productive if the spectator has too much knowledge about the unfolding of narrative events. Hence, by providing the spectator with insights about the unfolding of narrative events, the filmmaker can direct the spectator's gaze as long as these insights are well balanced.

4.3 Comparative analysis

When comparing findings from both content analysis and the interview analysis, it becomes clear that narrative cues, as proposed in section 4.1 of this thesis, are better understood as multiple elements that function as a whole in order to direct the spectator's gaze. In this sense, motives, mentioned by authors, regarding the fact that cues should emerge from the narrative, seem logic. Everything within the story world should be in line with the unfolding of the plot. For example, in *Mr. Robot* the lighting of the scene is a very subtle element. However, when the scene would be lit differently, the audio cue of the woman knocking on the door, would likely be perceived differently by the spectator. For example, when the area around the door would be pitch black, the spectator would not have a clue where the sound would come from. This simple example outlines this argument, which is confirmed by both content analysis and interview results, and which entails that narrative cues often function together, as a synergy.

Still, some deviant cases occurred when comparing both analyses. While results from content analysis favor non-diegetic elements for gaze directing, interview results emphasize diegetic cues as

the preferred method amongst virtual reality filmmakers to steer a spectator's gaze to important plot elements. While this looks as a deviant case at first sight, this contradiction makes more sense when taking in mind that maintaining presence is the most important objective of virtual reality filmmakers with regards to the experience of the spectator (Mateer, 2017). It is more difficult for a virtual reality filmmaker to use non-diegetic cues, as one of the interviewees explains about using editing: "In VR it does not really work like that, because if you want to make a transition, it has to be very well done. It cannot be like 'bam' there is a transition, and then you feel lost because it is like: wow, what is happening here, am I just in a different place now?" (VR Developer, 30). In this sense, it can be suggested that virtual reality filmmakers prefer diegetic cues, because they can make those cues easy in line with the type of narrative of the film. Thereby, those cues will most likely feel more logical to the spectator and promote the spectators feeling of presence within the 360-degree story world, rather than diminishing this feeling. However, content analysis findings show that many virtual reality filmmakers use non-diegetic cues, while this may not have their preference. The uncertainty about which cues are the most efficient in directing one's gaze remains an issue in studies of cinematic virtual reality. In this regard, Nielsen et al. (2016) reported findings which indicate no significant result when it comes to the effectiveness of diegetic cues versus non-diegetic cues. Thereby, more research into this deviant case, with regards to narrative and author intentions, would benefit the cinematic virtual reality industry. Especially, when taking into mind that narratives cues function as elements which work together as a synergy in order to steer the spectator's gaze.

However, this uncertainty surrounding this contradiction can also be understood in terms of cinematic virtual reality's narrative paradox. As noted before, in this paradox, the author seeks to provide a coherent narrative and at the same time gives the spectator the freedom to interact within the virtual world (Riedl & Bulitko, 2013; Sobral, Machado & Paiva, 2003). For cinematic virtual reality, the key factor is maintaining the spectator's feeling of presence during the experience (Mateer, 2017). Mateas (2001) already referred to this as the spectator's feeling of agency in his study of video games. However, the feeling of presence within virtual reality is enlarged because of the immersive characteristics of virtual reality as a medium (Aylett & Louchart, 2003; Mateer, 2017; Nielsen et al. 2016). Due to this higher degree of immersion, balancing material and formal constraints to achieve spectator agency becomes more important within cinematic virtual reality content (Mateas, 2001; Mateer, 2017). Within the result section of this thesis, diegetic cues and non-diegetic cues have shown that they can be both considered material constraints. Contrary, the process of formal constraints takes place in the design of the type of narrative content. In other words, a cinematic virtual reality horror film such as *Paranormal Activity* will build upon different material constraints than the animation film *Invasion*, due to the fact that these types of content have different authorial goals (Mateas, 2001). This also confirms the interview finding that narrative cues are dependent on the type of content, from an authorial point of view.

Hence, with regards to Mateas (2001) theory of agency, this contradiction between preference of diegetic and non-diegetic cues is not surprising. Diegetic cues are more tied to the type of narrative and the spectator's understanding of the type narrative, and therefore more related to the formal chain of causation, as discussed by Mateas (2001) (see figure 2). The fact that *Paranormal Activity* is a virtual reality horror film limits diegetic cues in their aesthetic form, as it needs to apply to a certain logic with regards to the spectator's understanding of the type of narrative, in order to achieve a spectator's feeling of presence (Mateer, 2017). As non-diegetic cues are less dependent on the type of narrative, it is more difficult to place them within the chain of causation, proposed in figure 2 of this thesis. Nonetheless, non-diegetic cues are a part of the enactment of the content, because non-diegetic cues can be experienced by the spectator, and thereby trigger the spectator's sensory dimensions. However, while non-diegetic elements might stand out from the content, due to the disconnection with the narrative, the results in this thesis show that non-diegetic elements (e.g., editing, camera placement, voice-overs, etc.) are often used very subtle, and in line with important plot points of the narrative. For example, in *Invasion*, the fact that the placement of important narrative action between scenes is tied neatly together by means of editing, shows that such non-diegetic elements can be employed in order to create a flow of gaze direction. In this regard, strategical use of editing and other non-diegetic elements can be considered cues, as the spectator can interact with this flow of gaze direction. To put it differently, the spectator can decide where to allocate his gaze, and thereby choose to not apply with the flow of gaze direction that the author has intended. For scholarship, this means that a divide between non-diegetic cues and diegetic cues, as proposed by Nielsen et al. (2016) is still a valid approach. Nonetheless, within diegetic cues, they should note that diegetic cues often work together, and that non-diegetic cues work more complex, as they usually do not have a literal relation to the story world Diegetic cues, for example, do have a literal relation to the story world, and are therefore easier to identify in relation to plot developments.

Lastly, a deviant case occurred when comparing interview results with content analysis. This deviant case is regarding experts' mixed views on dramatic probability, and the finding that many analyzed films of the content analysis contain title cards or voice-overs that reveal plot information to the spectator. This might have to do with the fact that non-diegetic cues are more difficult to tie to developments of the plot. Within diegetic cues, a strong cause and effect relationship can be observed within the story world. On the contrary, dramatic probability, which, in the result sections of this thesis, usually is stemming from non-diegetic elements, is more complex. Some interviewees emphasize that it can help the spectator to better understand the story if he or she knows more than the characters of the story. However, other interviewees note that it can also be boring to spectators if they know too much about the story and its unfolding, which might lead to a diminishment of presence to the spectator.

Nonetheless, the finding from content analysis and the mixed views of experts imply that it is possible to steer the spectator through the story by means of strategically playing with dramatic

probability. From a theoretical point of view, this makes sense, as Mateas (2001) argues that a player of a game knows which actions are dramatic probable because he or she has an understanding of the plot (see figure 2). This understanding is reached when the spectator goes through the hierarchal chain of causation, which starts with the enactment, where the narrative cues occur. Hence, by employing title cards and voice-over, the virtual reality filmmaker gives the spectator a feel for what events are dramatically probable within the 360-degree story world, and therefore the virtual reality filmmaker reverses Mateas' (2001) chain of causation. In this regard, by knowing which actions are dramatically probable within the story world, the spectator will have a better understanding of the enactment, and how he or she will likely be triggered (Mateas, 2001). Consequently, the spectator will likely interact with narrative cues more effectively. However, it should be noted that this is from a theoretical point of view, and does not include the virtual reality filmmaker's goal of maintaining the spectator's feeling of presence throughout the experience (Mateer, 2017). It might be the case that it indeed obstructs the spectator's flow of presence. Therefore, more research into this subject would benefit virtual reality studies.

Chapter 5: Conclusion

This exploratory study aimed to investigate the mechanics of narrative cues from a content perspective within cinematic virtual reality content. Six cinematic virtual reality films have been inquired by means of content analysis, in order to answer the previously proposed research question (RQ1). Moreover, by conducting interviews with six experts within the cinematic virtual reality industry, this study aimed to about the motives and experiences are of cinematic virtual reality developers (RQ2).

To answer the first research question "*How are narrative cues constructed within cinematic virtual reality content?*", the results of content analysis show that narrative cues can take a variety of aesthetic forms, and that there are multiple ways to direct a spectator's gaze. However, narrative cues are always constructed from an author's point of view. This means that narrative cues have to be in line with the author's intentions of the cinematic virtual reality film, which is often maintaining the spectator's feeling of presence, while at the same time providing a coherent narrative (Mateer, 2017). As presence showed to be a key factor in the narrative process, it was not confounding to find out that cinematic virtual reality contains a lot of subtle cues. For example, these subtle cues are in the form of sound, which is usually diegetic and therefore connected to a source within the 360-degree story world. Or, in the form of social cues, which consist of the reactions of characters to an event in the story world that can trigger the spectator to look towards the event as well. Within the content, many cues build upon a cause-and-effect relationship, where the spectator only sees the effect, and thereby most likely to be interested in the cause, which in this case is the event.

While it was expected to find subtle diegetic cues, content analysis mainly revealed effective non-diegetic ways to keep the spectator drawn to particular plot elements within the 360-degree story world, namely the strategic use of editing techniques, camera-placement/movement, and the provision of plot information before the start of the virtual reality story. These elements might not feel like a narrative cue at first hand, but can be utilized to materially constrain the spectator, and therefore subtly guide the spectator's options to interact with the story world. By composing the action of a coming scene in the place of the action in the previous scene, the author can subtly create a flow of action, where the spectator does not have to make any big swifts of gaze allocation. Or, by concentrating the action in a particular part of the story world, in relation to the camera, it will be easier to follow the unfolding of the plot. And, by providing information about the plot to the spectator, in the form of title cards or voice-overs, the spectator will have a better understanding of the story and its unfolding, and therefore can most likely allocate his or her gaze more accurately to important plot elements. As these kinds of techniques are not very evident to the spectator, it is likely that they minimize the risk to disrupt the spectator's feeling of presence within the 360-degree story world. This applies to the cinematic virtual reality's main objective (Mateer, 2017), and can be seen as a second level of gaze direction, as it is very subtle in its nature, and relies on non-diegetic elements that look, at first hand, not connected to the narrative.

These findings of second level of gaze direction techniques have interesting implications for scholarship. While there is still little known about the construction of narrative cues, contemporary findings do not include elements such as editing, camera-placement, and the provision of plot information as valuable ways to steer the spectator through the story. Within the categorization of Nielsen et al. (2016), it is argued that non-diegetic cues are more likely to diminish the spectator's feeling of presence during a cinematic virtual reality experience, because the spectator might become aware of the fact that he or she is being mediated. Although there is definitely some truth in this claim, non-diegetic elements, such as editing, camera placement/movement, and the provision of plot information beforehand, are very subtle ways of gaze direction, which materially constrain the spectator. In this regard, it limits possible ways of interacting, which is an effective way of gaze direction, according to Nielsen et al. (2016). Nevertheless, it is possible to lose the spectator's feeling of presence, due to non-diegetic elements that are contrasting too much with the overall aesthetics of the narrative. This is something which should not be neglected. That being said, diegetic cues can also result in a decrease of the spectator's feeling of presence, when they do not account to the type of narrative that is being portrayed, as the interview results of this thesis indicate.

By inquiring the research question: "*What objectives can be detected in the motives and experiences of content developers regarding the use of narrative cues within cinematic virtual reality content?*", the results have shown that maintaining the spectator's feeling of presence, during the experience, is paramount for cinematic virtual reality developers. This finding is in line with contemporary findings about the importance of presence, and the overall goal of cinematic virtual reality developers, which strives to create an experience that upholds the spectator's feeling of presence, but also provides a coherent narrative to the spectator (Mateer, 2017). Once this feeling of presence is preserved, experts point out that the construction of narrative cues relies on the type of narrative that is being told. This finding was not surprising in relation to the previous finding of the maintenance of presence, because if narrative cues would take an aesthetic form that is not in line with the narrative being told, then the spectator might experience this as disruptive, and therefore loses his or her feeling of presence within the virtual story world. This is also argued by Nielsen et al. (2016), with regards to non-diegetic cues and their relation to the spectator's feeling of presence, as mentioned above. While experts imply that narrative cues can take any possible aesthetic form, as long as they are in line with presence and the type of narrative, a few narrative cues are considered more powerful to experts within the field of cinematic virtual reality. These cues are: sound, social cues, and elements of art direction. A notable observation is that all these cues are mentioned as diegetic cues, which applies to Nielsen's et al. (2016) argumentation that diegetic cues are preferable, as their risk to break the feeling of presence is considered lower than non-diegetic elements. However, experts did mention particular non-diegetic elements, such as editing, that could be of assistance to direct the spectator's gaze towards particular elements within the 360-degree story world. While most experts noted editing as an important factor for gaze direction and storytelling in virtual reality, some experts disagreed on

this manner, as transitioning from one scene to another can be disruptive to the spectator and his or her feeling of presence. This can be an interesting area for future research, as there is no notable evidence of this connection between non-diegetic storytelling elements in relation to the spectator's feeling of presence.

Some experts also agreed that by letting the spectator know more about the plot, the story would be easier to comprehend. Others, however, felt that by playing with the spectator's knowledge of dramatically probable actions, the spectator might get bored, and therefore be disrupted from their flow of presence. Nevertheless, scholarship shows that strategical use of dramatic probability can help the spectator to make interactive decisions within the virtual story world more effectively (Mateas, 2001). However, what the results of the experts indicate is that the provision of plot information to the spectator should be handled with care, and by no means should it threaten the spectator's feeling of presence. In this regard, to create an effective story world, the spectator must feel present within the virtual environment. Otherwise, narrative cues, and the content in general, might not be experienced according the author's intentions.

Comparing findings of content analysis to the interview results, it can be concluded that both non-diegetic elements and diegetic cues play an important role in the construction of narrative cues, from an author's and content perspective. In this process, presence is a key concept, which is a subject that is not fully explored by content developers yet, and therefore remains vague to most virtual reality filmmakers in the practice of their art. The battle between the third-person perspective and first-person perspective, together with the concept of dramatic probability, are subjects that are very much related to the vagueness that hangs around the debates of presence within cinematic virtual reality. For example, Cho's et al. (2016) findings regarding the spectator's point of view, and the spectator's feeling of presence, are a good attempt to tackle this problem, but lack many aspects that could be of influence to the spectator's feeling of presence. For example, interactive possibilities of cinematic virtual reality should be inquired more thoroughly.

To conclude, it is important to emphasize, once again, that narrative cues function mainly collectively within and outside of the story world towards a similar goal. By making all cues in line with the author's pre-defined narrative structure, the spectator's gaze will likely be directed most effectively. Hence, the framework, proposed in figure 2 of this thesis, is still valid but needs some important adjustments. Dramatic probability should be added as a second level of gaze direction. As there is little known about this subject, it would be interesting to investigate more into this subject. Moreover, an elaboration is needed regarding the blue arrow of 'narrative cues'. This term has shown to be insufficient in the complex discussion of gaze direction within cinematic virtual reality, as narrative cues have shown to consist of diegetic, non-diegetic, and dramatically probable elements, which all, together, serve the spectator's comprehension of the unfolding of the plot.

5.1 Limitations and future research

Within this thesis, there are a few limitations that should be further elaborated. Firstly, this thesis does not include tests or experiments of the effects of narrative cues on the spectator's comprehension of the plot. This would be an interesting possibility for future research. However, it should be noted that it would not be very effective to test random cues on their effectiveness, as cues often rely on the goals of the author, and the type of narrative that is being told. Hence, those tests might be most valuable when narrative cues are approached as elements that work together as a synergy. For example, what will happen when – in the previous example of *Mr. Robot* – the area around the door would be pitch black, instead of well-lit? Would this have implications for other cues? Nevertheless, the concept of dramatic probability is an exception to this approach. This does not mean that it is not related to the other cues. However, dramatic probability can be more easily tested in the form of an experiment in relation to voice-overs and visual texts. This would be a very valuable contribution to virtual reality studies.

Additionally, this thesis fails to fully address matters of presence, perspective (first-person/third-person), and the spectator's limitations of responding within a cinematic virtual reality environment. As an exploratory study to narrative cues, it is difficult to address such issues. Throughout this thesis it becomes evident that these areas often overlap, which result in many questions. For example, it is questionable to what extent the spectator's feeling of presence is important in relation to narrative cues and plot comprehension of the spectator. It is logical to think that there is a clear relation between presence and narrative cues. However, there is little evidence in scholarship yet. Moreover, in other areas, such as perspective and limitations of interactivity, there is still a lot of ground to cover for scholars of cinematic virtual reality studies. Thereby, the claims within this thesis about these areas in relation to narrative cues, have a degree of uncertainty around them. Hence, these three areas are very interesting subjects for future research, which can build on studies of Cho et al. (2016), Mateer (2017), and interactive narrative studies in general (Laurel, 1991; Mateas, 2001). Nonetheless, (cinematic) virtual reality is still a very young medium, and therefore most likely to mature (Kunkel & Soechtig, 2017). This maturation will probably bring changes a long which will have an impact on scholarship. To refer back to the executive, who emphasized the need for a big hit in virtual reality (Wallenstein, 2017), I strongly believe that such a 'hit' is only possible if we collectively gather more knowledge about virtual reality storytelling. Not only in scholarship, but also in practice.

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Appendix A

Interview questionnaire

1. Introduction

Could you tell me a little bit about your working experience as a virtual reality developer/writer/director? (What have you done so far?)

Goal of the question: to start off in a relaxed way, and to give some context about who the interviewee is in relation to his work experience etc.

How would you describe a cinematic virtual reality film?

Goal of the question: to get a better sense of how VR developers define VR films, this is important as I want to argue, or oppose, that VR films differ from other interactive narratives forms (such as emergent narrative).

Cinematic virtual reality as a narrative medium is quite novel. What are, according to you, the strengths and weaknesses of telling a story of by means virtual reality?

Goal of the question: to outline strengths and weaknesses, which I can use in the contextualization of VR, and possibly to validate Aylett & Louchart (2003) and Bates (1992) claim that VR is a narrative medium of relevance.

2. General issues of gaze direction

[Before the questions a brief introduction of gaze direction is provided]

What are the main hurdles of freedom of gaze within cinematic virtual reality environments?

Goal of the question: to outline the hurdles of gaze, maybe there are more than only related to the narrative, and this could be a way to validate the importance of narrative cues.

What are the main opportunities of freedom of gaze within cinematic virtual reality environments?

Goal of the question: same as the previous one, but then regarding opportunities.

When writing a cinematic virtual reality narrative, how does the fact that a spectator has freedom of gaze influences your written work?

Goal of the question: to get more practical insights in the development of written work for VR, with an emphasis on gaze direction. This question only applies to virtual reality content writers.

When developing a cinematic virtual reality film, how do you usually deal with the fact that a spectator has freedom of gaze?

Goal of the question: to get more practical insights in current applications of gaze directions.

3. Narrative cues

[Beforehand, a brief introduction of the concept of narrative cues will be provided]

According to your experience, in which form would narrative cues be most effective (sound, visuals, flickering etc.)?

Goal of the question: to find out what the most feasible forms for narrative cues are.

Do you think narrative cues are the solution to improve narrative comprehension, or do you believe that other strategies are more important?

Goal of the question: to check if there are other significant ways to direct one's gaze to the plot. This could help in contextualizing narrative cues.

Have you, or a project that you worked on, ever used narrative cues intentionally?

Goal of the question: to confirm, or not, if they have used narrative cues intentionally.

[If answer on previous question is yes, then the following question applies]

Could you walk me through that project in detail and how you used narrative cues?

Goal of the question: get an in-depth understanding on how VR developers use (narrative) cues to direct gaze.

[If answer on previous question is no, then the following question applies]

How did you manage to create narrative understanding within a 360-degree virtual story world and without the use of narrative cues in your projects?

Goal of the question: get an in-depth understanding of how the particular project engaged with gaze direction, without the use of intended narrative cues.

Are there any other narrative cues or strategies that I should know of in relation to the spectator's gaze direction?

Goal of the question: to give the participant an opportunity to elaborate on themes, which were not covered by the interview questions.

4. Interactivity

[First, a description of the current debate within interactive narrative will be outlined, very briefly]

Do you believe that cinematic virtual reality films will benefit from more interactivity, meaning that spectators will be enabled to have more influence on the narrative?

Goal of the question: to get an industry perspective on the current debate about: authorial intent versus interactive freedom of the user.

Do you think cinematic virtual reality narratives will evolve during the coming years, with regards to interactivity?

Goal of the question: to give the interviewee the possibility to talk more freely about the future of VR. Moreover, this question is meant to end the discussion in a more relaxed and speculative way, so the interview will have a prosperous and positive ending.