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An 'Amuse-Bouche at Best':
360° VR Storytelling in Full Perspective

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ABSTRACT

Much has been written about the function of narrative in virtual reality (VR) productions (Aylett & Louchart, 2003; Aylett et al, 2005; Ryan, 2001; 2005; 2008; 2009), but the role of the audience, and the relative degree of control that they have over the content, has led some scholars to believe that there is an ontological problem with describing VR in narrative terms. This article investigates some of these assumptions, via an analysis of an undertheorised aspect of VR that has emerged in recent years – the 360° film. It argues that 360° film represents a much more important aspect of VR than has been previously recognised. In so doing, the article establishes this medium as an important field of study, and argues that ultimately, it will be the commercial infrastructure for this content which will define the parameters of immersive storytelling.

KEYWORDS

360° Film, Immersive Storytelling, Narrative, Virtual Reality, VR

INTRODUCTION

The 2016 launch of the Playstation VR headset arguably marked the moment in which virtual reality (VR) technology entered fully into mainstream public consciousness (Lynch, 2017). Despite this, it remains a form in flux and in which there is little agreement as to what constitutes the limitations and possibilities of the medium. One such area that is especially problematic in this regard is how to discuss narrative in a VR context. Much has been written about the function of narrative in VR (Aylett, 1999; Aylett & Louchart, 2003; Aylett et al, 2005; Ryan, 2001; 2005; 2008; 2009), but the role of the audience, and the relative degree of control that they have over the content, has led some scholars to believe that there is an ontological problem with describing VR in narrative terms. As several authors have noted, there has been a 'tendency to consider narrative in VR in relation to film or television' (Aylett & Louchart, 2003, p. 2), but this approach appears to provide an insufficient explanation of the narrative possibilities of the medium. Pimentel and Texeria's definition of VR as an 'immersive, interactive experience generated by a computer' (Pimentel & Texeira, 1993), seems far removed from the inherently passive pleasures afforded by most traditional film productions, and this conundrum has ensured that the field has remained relatively underdeveloped in narrative terms, with content tending to be limited to short form entertainment.

This article is an attempt to investigate some of the assumptions made about VR narratives, via an analysis of an undertheorised aspect of VR that has emerged in recent years – the 360° film. It

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argues that 360° film represents a much more important aspect of VR than has been recognised, with currency with both audiences and practitioners, to the extent that it is a potential solution to some of the issues that VR poses to narrative construction. It argues that this medium is an important field of study, and one that presents the best opportunity for VR as a mass entertainment form in the near future.

THE CURRENT ENVIRONMENT FOR 360° FILM

360° film enables what appears to be an exciting new way for audiences to experience stories, by providing a full 360° perspective of filmed events, allowing the audience to determine where it wants to look without being at the mercy of the director's framing and camera placement choices. Despite this, it is in many ways a pariah of the VR community, despised by its detractors as not 'proper' VR, an '*amuse-bouche* at best' (Smith, 2015) before the main course of fully computer-generated VR. This distaste stems from the technological limitations of the medium, with the films by their very nature remaining two-dimensional and from a fixed perspective, and as such not offering the possibilities for three-dimensional exploration that a computer-generated VR environment has the potential to. In addition, by being filmed by an omni-directional camera, there are issues with 'stitching' (the way that the individual frames are composited), often resulting in various 'gaps' in the image where frames do not link together seamlessly. As a result, its detractors argue, 360° films merely 'represent' reality in the way that its precursor, traditional two-dimensional cinema films do, rather than provide a true 'simulation' of reality that, they argue, computer-generated VR offers. Because of this, 360° film is deemed to be less 'immersive' than 'pure' VR, and thus, as a storytelling medium, it is claimed that it offers little more than what is provided by traditional film screenings. Carrie Heeters' oft-cited concept of 'being there', the moment in which one is fully immersed in the virtual world, is presented as the holy grail of VR experiences and everything that 360° film is not, and this notion has been developed and refined by many other authors following in her wake (Calleja, 2011; IJsselsteijn & Riva, 2003; McMahan, 2003; Murray, 1997; Ryan, 2001; Thon, 2008). Yet even Heeters, referencing Sheridan (1992) and Zeltzer (1992), acknowledged that "different kinds of virtual tasks may have different optimal minimal fidelity requirements" (Heeters, 1992, p. 264), or in other words, the 'full' VR experience might not be necessary to achieve immersion in a virtual world. This article argues that the more restrictive pleasures of the 360° film, which are experienced much more passively than many other forms of immersive storytelling, are not a barrier to immersion, and that in fact, many of its restrictions are likely to become conventions for VR experiences in general in the future.

Interest in 360° film increased dramatically in March 2015, with the official launch of YouTube's facility to upload and view productions made in this manner. By September that year, Facebook had also added this function to its site, confirming the widespread interest in this content. Most 360° films are short in duration, no more than a few minutes, and this has led to their particular prominence as short promotional adverts (scenic views of beautiful landscapes in Australia and Dubai are particularly popular examples) and music videos (most notably Bjork's *Stonemilker* (Huang, 2015)). Fictional narratives have also so far been created mainly as promotional videos for traditional films, such as the horror short for the film *The Conjuring 2* (Wan, 2016), entitled *The Conjuring 2: Experience Enfield* (Warner Brothers, 2016). This lack of content is partly due to the technical limitations of the medium, including motion sickness from prolonged exposure to VR (although it is believed that these issues can be resolved by future iterations of both hardware and software), and partly due to commercial reasons, with the budget for a feature length 360° film as expensive as a traditional production - although with no immediately obvious way of commercialising the product and thus seeing a return on investment.

Even more pressing than these issues, is the fact that 360° storytelling is still in its infancy, and to date, there is little knowledge of how to construct a long-form narrative for a 360° film. Most attempts to produce these stories have remained steadfastly at between 20-30 minutes, and highlight the problems inherent in the idea of narrativising an allegedly interactive, immersive environment. Aylett and Louchart argue that VR moves beyond "'mimetic' theories of classical narratives, with their emphasis on 'showing', towards a concept that is about 'experiencing'" (Aylett & Louchart, 2003, p. 11), and they conclude that "a process approach to narrative, based on character interaction" is the most suitable way to address storytelling in VR, providing a "non-restrictive and flexible approach to any possible plot development" (Aylett & Louchart, 2003, p. 13). This is an elegant solution to many of the problems inherent in immersive storytelling, but as this article will show, is flawed when addressing 360° film. To explain this further, the following sections identify five different contentions relating to VR narrative: authorship, framing and space, temporality, repetition, and infrastructure; and explore their relationship with 360° film.

AUTHORSHIP

The first area that has proven problematic for attempts to conceptualise VR narrative is the notion of authorship. According to Aylett and Louchart, "narrative theories have been heavily influenced by the idea that narrative must be authored" (Aylett & Louchart, 2003, p. 3), and this has become a key criticism of existing theoretical approaches to VR. The concept of authorship is problematic for VR, for there is a degree of audience control that does not feature in traditional narrative film, which is mostly a more passive experience. This problem is normally expressed as twofold; firstly, a problem for the audience, who it is claimed wishes to have the freedom that a plot-centred approach does not afford (Aylett & Louchart, 2003, p. 10) and secondly (and most importantly for theoretical considerations), is what has been called the 'interactivity paradox' – "the integration of the unpredictable, bottom up input of the user into a sequence of events that fulfils the conditions of narrativity – conditions that presuppose a top-down design" (Ryan, 2009, p. 45). As such, it is claimed that the notions of narrative and 'full' user interaction are totally incompatible with each other. As Ryan argues, "the more active and the less constrained the user's role – in other words, the more lifelike … the more problematic its integration into a well formed narrative arc" (Ryan, 2009, p. 44).

One potential solution to this is what Ryan refers to as 'hypertext fiction' (Ryan, 2009, p. 44), whereby viewers can select different pathways for the progression of the story via a series of limited options. This has its drawbacks; Ryan refers to the reduction in "ability to create narrative meaning and immersion in a fictional world" (Ryan, 2009, p. 44), and Aylett and Louchart (2004) have tried to go beyond this with what they describe as the 'emergent narrative' whose rules encompass a 'hypothetical plot' that is fluid and develops out of the interactions of the users with the VR environment. This approach is much more open than traditional hypertext fiction, but arguably retains a core narrative context. While these two approaches are persuasive, they both start from an idealised theoretical position that overemphasises the level of interaction available in 'full' VR. In fact, one can already see from the world of video games, that these environments cannot support full interaction – there is always some form of restriction, whether it is a door that is permanently locked, or a character in the background that one cannot converse with. These limitations are acknowledged, and for most users do not detract from the immersive experience of the game and its story.

This is where the distinction between VR and 360° film becomes most apparent. While the producers of VR as a computer-generated form are right to seek to break down barriers between the user and the narrative, the viewers of 360° film expect some degree of pre-existing authorship, and appreciate that they cannot interact completely with the characters. Different users understand and accept the limitations of the medium they are experiencing, and 360° film is likely to be more limited than computer-generated VR. Viewers of 360° film content expect a certain degree of loss of control, and desire a narrative that is to some degree 'authored'. While full interaction would be

desirable in future iterations of computer-generated VR, this premise is insufficient as a theoretical basis for contemporary VR production, and especially for 360° film. 360° film does not suffer from the authorship problem in the way that VR does, as it clearly requires a degree of authorship to depict the events on screen in a way that is similar to traditional cinematic entertainment.

FRAMING AND SPACE

The second issue facing any discussion of VR narrative, is the question of framing and spacial representation. Classical film theory argues that narrative space is constructed and reconstructed mainly via two cinematic techniques; that of framing/composition, and continuity editing (Bordwell et al., 1985). Together, these techniques ensure that the audience is always positioned in the optimum place for viewing the storyline, as when the information being imparted by an individual shot ends, a cut takes the audience to the ideal position for the next piece of information. This can be seen most commonly is the classic shot/reverse shot construction, in which a medium close-up on one character is maintained for the duration of their dialogue, before switching to a medium close-up of the second character to view their response. This construction can also be used to hide information from the viewer, by stopping them from seeing an important clue in a mystery film, for example, until near the end of the plot in order to build suspense.

Of course, in 360° film, this concept exists only in terms of the limits of the viewer's peripheral vision, which 'frames' their viewing experience in much the same way that we experience visual information in reality. More importantly, the viewer can turn his or her head, looking in any direction and thus rendering the concept of framing, as it exists in a traditional cinematic context, meaningless. Therefore, the usual means by which a director can guide a viewer to the key information for each scene, ensuring the ideal composition, lighting and *mise en scene*, is lost. This is extremely problematic for the construction of VR narratives, and once more undermines the notion of authorship that one would associate with most other forms of narrative entertainment.

However, this issue is not quite so problematic for 360° film. In this medium, while the viewer will have a complete 360° viewpoint, importantly, it will be from a fixed perspective. The viewer will be positioned, stationary, with the ability to look around them, but not to move through the space three-dimensionally. This limitation is partly because of infrastructure, which will be explored in more detail later, but if the images on screen are to be actual film (or more likely, digital video), as opposed to a computer generation, then they will by definition be two-dimensional representations (albeit potentially positioned on a linear plane with the illusion of depth, as in current '3D' cinema releases). For 360° film to work, the audience member must be able to interact with the narrative without physically being able to touch the participants, so the positioning of the viewer becomes crucial. Therefore, as much as traditional cinematic *mise en scene*, the placement of objects in the frame, is critical to classic cinematic storytelling, the placement of the viewer in relation to the action will be one of the defining elements of 360° film.

Immersive storytelling is often described as being dependent on the user feeling that the experience is authentically 'real', and this is often conflated with notions of spacial awareness. Ryan argues that to "apprehend a world as real is to feel surrounded by it, to be able to interact physically with it, and to have the power to modify this environment" (Ryan, 1999, p. 111). Yet it is a fallacy to think that we will be able to experience fully immersive VR in the sense described above, while we still need our physical bodies to navigate it. There are several good reasons for users to not be able to move around a virtual space fully, not least the fact that most people's rooms at home would limit their virtual characters to a similarly restricted space, and would rule out any public exhibition where audiences tend to sit closely together in rows of chairs. Even if it were possible for the user to physically navigate a virtual world (some companies are currently prototyping movable platforms that users can stand on to enable them to walk and run through environments), it is unclear how much enthusiasm there would be for this type of entertainment. All of our existing forms of narrative entertainment involve

sitting down, from reading a book through to watching a play (with the exception of a few forms of 'immersive' theatre experiences). It seems unlikely that this will change if VR is to become a mass entertainment. It is for this reason that the majority of VR products, whether computer generated or not, will work on the basis of a panoramic, 360° view of an area, rather than full physical immersion with the viewer able to walk through the space. This suggests that 360° film will not seem inferior to computer generated VR, as both will share a similar limitation. Finally, for 360° film, being able to interact with filmed actors, in terms of moving around their space in the screen, would provide an inauthenticity in that the actor would have to be computer generated to render him or her as a three-dimensional object. Hence, a 360° film viewer will accept that they will inevitably be watching a two-dimensional representation, as they would in the cinema, but that they have a 360° perspective on this environment.

TEMPORALITY

Even with this acceptance of a fixed perspective, there are still issues with how to move the narrative space from one perspective to the next, in order to drive the story forward. Onega and Landa argue that narrative is "the semiotic representation of a sequence of events, meaningfully connected in a temporal and causal way" (Onega & Landa, 1996, p. 3), and this connection between individual events can be achieved only by editing them together, often to move the story form one narrative space to another. However, Aylett and Louchart caution against the use of editing in this way in VR environments, arguing that a "VR user would experience rapid and repeated travel from location to location and playing with time constraints as loss of control" (Aylett & Louchart 2003, p. 5). A notable 360° film from 2016, *Collisions* (Wallworth, 2016) provides a clear example of this, by featuring several cuts during drone footage of the Australian landscape, transposing the viewer from a sitting position on the ground to apparently floating in mid-air – a disorientating effect which pulls the viewer out of his or her immersion with the environment. But even if one avoids these extreme examples of disorientation, editing still provides many challenges for a 360° film narrative, none more so than in the way that editing is used to compress time.

Temporality has always been a crucial feature of film narratives. Stephen Prince argues that "narrative is the representation of at least two real or fictive events in a time sequence, neither of which presupposes or entails the other" (Prince, 1982, p. 4), and it is a generally accepted aspect of narrative that it takes place within a clearly defined timeframe. However, most proponents of VR argue that if the viewer is to fully interact and immerse in the environment, then their experience must take place in 'real time', by which they mean that the viewer's actions should have an effect that is temporally consistent with their experience of this action in their real lives. Aylett and Louchart contrast this with other entertainment forms, such as literature and the cinema, which they describe as "incompatible" with the representation of real time (Aylett & Louchart, p. 6).

There are several problems with this analysis. Firstly, this discounts several examples of films from *Rope* (Hitchcock, 1958) to *Timecode* (Figgis, 2000) which have played with notions of 'real time', and which demonstrate that it is possible to construct a filmic narrative in this fashion. Secondly, time as a limiting factor is an inescapable factor of filmic narrative. While there are some examples of franchises which continue storylines *ad infinitum*, each of these are presented in finite blocks of time, usually between 90-120 minutes. There are of course many good reasons for this, perhaps the most pertinent relating to the infrastructure of conveying these stories in a public environment and the commercial demands of having a steady stream of new productions to continue generating income for the exhibitors. Temporality also suggests closure of a narrative, whether this is as a cliffhanger, or even an ambiguous final scene, but in all instances, there is something that represents a formal end to the story, unlike in some video games that could theoretically continue forever. Once again, this finality has a commercial imperative.

However, these criticisms still do not explain how a 360° film can retain the viewer in an immersive story world, if the film uses editing to compress time in the classical Hollywood style. It is quite clear in examples like *Collisions* that one is watching authorship of a traditional film transposed into a 360° environment, but there are more subtle ways of constructing a transition which can solve this problem for 360° film. For example, the 'cinematic' PlayStation VR game *Virginia* (Burroughs & Kenny, 2016) uses an elliptical plot structure to present different moments from the main character's life (whose viewpoint is embodied by the player), using a series of fades to black to create the ellipsis. This enables the viewer to remain immersed in the story world of the game, but provides ways for the game designers to shift location and move back and forth in time. One would expect longer form 360° films to use similar techniques, with characters drifting in and out of consciousness, to create moments to move the narrative forwards. These moments could either be self-directed, caused by, for example, the viewer looking in a certain direction or on a specific object, or be forced on the viewer after a specific amount of time. Regardless, a genuine 360° film narrative involves some kind of time constraint, which works, in effect, as a way to either propel the narrative forward, or to end the narrative after a specific duration. Thus, there is scope for both 'real time' narratives (such as *Rope*), but also, importantly, room for narratives which use editing to compress time and space. By adding this layer of temporality, the makers of 360° films are also providing the foundations for a solution to the next problematic narrative element, repetition.

REPETITION

Part of the joy of narrative fiction is gained from seeing the familiar repeated. Without our understanding of the conventions of narrative, which of course has a close correlation to genre, we would not be able to be surprised (and hence, find a narrative even more enjoyable) when a story differs from these norms. Hence, repetition is a key element of narrative, and becomes especially important when linked to notions such as suspense, which as Ryan points out, is "much more resistant to interactivity" (Ryan, 2009, p. 55) because of the requirement for a long-term development of tension which requires some degree of authorial control. This suggests that certain genres, such as thrillers, may struggle to operate in the world of 360° film, unless there are several familiar, repeatable elements incorporated into the plot.

More importantly, without any degree of repetition, as the promise of the fully open world VR model suggests, the viewing experience becomes a solitary one, for one cannot experience the same effect as another viewer, in the way that I can direct a friend to a favourite paragraph in a novel, or to a scene in a film, or even to a moment in an immersive game. Without the guarantee of another viewer being able to witness and discuss similar phenomena, a work of art does not have the potential to succeed with a mass audience. This might work for independently produced, artistic works, perhaps best suited to a gallery environment, but this is not appropriate for a commercial product. This is also vitally important for another aspect of the mass entertainment process – professional criticism in the form of journalistic reviews. Of course, open world computer games provide different experiences for different players, and a professional reviewer will never be able to capture the full range of these experiences in a 300-word review. However, gamers can still buy the product confident that the main overarching narrative will be similar in scope, and that the game will provide a similarly enjoyable experience to that described by the reviewer. Without these repeatable characteristics, the entire process of reviewing (and hence, promoting) the work is undermined. Thus, for VR fiction to gain acceptance beyond a gimmick or curiosity, it has to incorporate some repeatable features which different audiences would be able to discuss. This is a defining quality of mass audience entertainment, and it is a problem that the wider VR industry has to solve – but this is not an issue for 360° film, with its fixed perspective ensuring a degree of repetition in the images presented to the viewer. By having these in-built restrictions to interaction, a 360° film will be able to include identifiable narrative 'cues' or 'hooks' that will have the potential to be recognised (and hence, discussed) by a wide audience.

It is this drive for a wide audience base that will ultimately determine the fate of 360° film, and this will largely be dependent on the infrastructure that supports it.

INFRASTRUCTURE

The main barrier to any commercial expansion of 360° film is the supporting infrastructure, in the sense of a wide distribution/exhibition network that will make it financially viable. At present, the infrastructure of screenings in small theatres and art galleries supports experimental and artistic work, often that which public funding bodies have financed. To have a fictional narrative on the scale of a major cinema release would require a professional distribution platform that enabled the viewer to download or stream the file to their headset, or a theatre space that handed out headsets or glasses in a cinema venue. While platforms for home download exist, these are mainly in the realm of computer gaming, and it is not yet clear whether fictional 360° narratives would be ideally suited to this environment. The streaming environment exists mainly on YouTube and Facebook, and the commercial prospects of both to sustain feature-length 360° film production is also uncertain. Nor is it yet clear whether a suitable public exhibition space will transpire, and so, as yet, 360° film is relegated to being a small-scale operation.

In terms of production, costs for traditional feature films are prohibitively expensive and laden with risk, and major production companies will not want to add to that exponentially by recording an endless series of alternative narrative options that are dependent on the whim of the user. There is already a parallel here in the world of video games, which often have budgets which outstrip that of Hollywood productions, and which, as previously discussed, have in-built limitations on what the gamer can or cannot do in the game world. In many ways, contemporary 360° film bears a striking resemblance to the early days of cinema exhibition, where nickelodeon's competed with shop-front screenings and lecturers would narrate the events on screen in order to provide context for the audience. Contemporary 360° film is a similar mishmash of short 'one-reelers' and entrepreneurs trying to formulate what will eventually become the *de facto* standard form of exhibition – with similar experimentation in content. It took cinema almost 25 years to settle on the feature-length format now most commonly associated with the medium, and it is likely that a standardised approach to 360° film will have an equally long gestation.

However, it is also likely that whatever becomes the standard form will not be the fully immersive VR proposed by many of its adherents. As Ryan argues, "It would take an artificial intelligence far beyond the capabilities of existing systems to be able to process whatever the user decides to do or say, and a creativity far beyond the imagination of the best novelists and playwrights to be able to integrate this input into a well-formed plot" (Ryan 2009, p. 44). While technological difficulties may eventually be surmountable, the creative hurdles are so great that it is unlikely that we will ever see a fully-formed immersive storytelling experience as proposed by many VR advocates. But it does a disservice to the audience to expect that they will find a 360° film narrative less engaging as a result. There is an inherent passivity in the nature of watching cinematic stories, and this is something that many viewers will want to continue, allowing a storyline to unfold in front of them with defined moments that happen at specific times. Users will not necessarily have an expectation of full interactivity as proposed by traditional approaches to VR narrative theory, in much the same way as they do not expect a game character to enable them to do everything that a person can do in reality. Immersive storytelling is not dependent on having an experience that is completely 'authentic'.

CONCLUSION

Discussion of 360° film has been neglected in the general debate over the nature of VR. 360° film and 'full' VR are subtly different forms, but share a number of the same limitations, and existing theories of narrative which have problematized VR as a storytelling form can be seen to be deficient when

considering 360° film. The key issue is the claim, made by exponents for VR, that its immersive, interactive nature is incompatible with traditional approaches to narrative. However, I have attempted to show here that this claim can be contested. Many of the arguments against VR narrative have over-emphasised the level of interactivity that VR can offer, and the expectations that audiences will have for an experience to be fully 'immersive' in a pure theoretical sense, whereby they can interact with the virtual environment in the same way that they can interact with reality. This article argues that this is not the case, and that most VR experiences, whether 'full' or 360° film, will work from several pre-defined limitations, the most likely of which will be a fixed perspective. This will provide an anchoring for the user, in which a narrative can play out in front of them. Whether they choose to observe, or instead look behind them at a completely innocuous and unimportant object, is of little consequence – what matters is that there will be some form of repeatable narrative content which will play out in some part of the 360° view.

Writers and directors will use several innovative, creative techniques in order to move this narrative forward, employing everything from sound cues to ellipsis to compress time and space. As the medium develops, the better artists will integrate these elements seamlessly into the overarching narrative, and the placement of the user in the environment will grow in importance. Audiences will grow to understand these structures and codes, in much the same way as audiences did when first presented with edited cuts in cinema at the turn of the twentieth century, and will return to storytellers whose work they appreciate. Audiences will always gravitate to specific stories and storytellers, and thus the medium will become defined by its own leading artists. But the most profound moment will come when this creativity in turn provides the foundations for a mass entertainment form, which will be further solidified by the arrival of major production houses and distribution platforms, which will be accessible to all in the way that a cinema screen is today. 360° films will be created by artists, but as the article argued here, ultimately, it will be the commercial infrastructure and the power of the market for this content, which will define the parameters of immersive storytelling.

REFERENCES

Aylett, R. (1999). Narrative in virtual environments – towards emergent narrative. *Proceedings of the AAAI Symposium on Narrative Intelligence* (pp. 83-86).

Aylett, R., & Louchart, S. (2003). Towards a narrative theory of Virtual Reality. *Virtual Reality (Waltham Cross)*, *7*(2), 2–19. doi:10.1007/s10055-003-0114-9

Aylett, R., & Louchart, S. (2004). The emergent narrative theoretical investigation. *Proceedings of the Conference on Narrative and Interactive Learning Environments* (pp. 21-28).

Aylett, R., Louchart, S., Dias, J., Paiva, A., & Vala, M. (2005). FearNot! – An Experiment in Emergent Narrative. *Proceedings of the International Workshop on Intelligent Virtual Agents* (pp. 305-316).

Bordwell, D., Staiger, J., & Thompson, K. (1985). *The Classical Hollywood Cinema: Film Style and Mode of Production to 1960*. New York: Routledge. doi:10.4324/9780203358818

Calleja, G. (2011). *In-Game: Immersion to Incorporation*. Cambridge: MIT Press.

Heeters, C. (1992). *Being* there: The subjective experience of presence. *Presence (Cambridge, Mass.)*, *1*(2), 262–271. doi:10.1162/pres.1992.1.2.262

IJsselstein, W., & Riva, G. (2003). *Being There: Concepts, Effects and Measurements of User Presence Synthetic Environments*. Amsterdam: Ios Press.

Lynch, G. (2017). VR goes mainstream: PlayStation VR approaches the 1 million sales mark. *Techradar*. Retrieved from http://www.techradar.com/news/vr-goes-mainstream-playstation-vr-approaches-the-1-million-sales-mark

McMahan, A. (2003). Immersion, engagement, and presence: A method for analyzing 3-D video games. In J. P. Wolf & B. Perron (Eds.), *The Video Game Theory Reader* (pp. 81–97). London: Routledge.

Murray, J. (1997). *Hamlet on the Holodeck: The Future of Narrative in Cyberspace*. New York: The Free Press.

Onega, S., & Landa, J. A. G. (1996). Introduction. In S. Onega & J. A. G. Landa (Eds.), *Narratology: An Introduction* (pp. 1–44). London: Longman.

Pimentel, K., & Texeria, K. (1993). *Virtual Reality: Through the New Looking Glass*. New York: McGraw Hill.

Prince, G. (1982). *Narratology: The Form and Functioning of Narrative*. Berlin: Mouton. doi:10.1515/9783110838626

Ryan, M.-L. (1999). Immersion vs. interactivity: Virtual reality and literary theory. *SubStance*, *28*(2), 110–137. doi:10.1353/sub.1999.0015

Ryan, M.-L. (2001). *Narrative as Virtual Reality: Immersion and Interactivity in Literature and Electronic Media*. Baltimore: Johns Hopkins University Press.

Ryan, M.-L. (2005). *Avatars of Story*. Minneapolis: Minnesota Press.

Ryan, M.-L. (2008). Interactive Narrative, Plot Types, and Interpersonal Relations. *Proceedings of the Joint International Conference on Interactive Digital Storytelling* (pp. 6-13). doi:10.1007/978-3-540-89454-4_2

Ryan, M-L. (2009). From narrative games to playable stories: Toward a poetics of interactive narrative. *Storyworlds: A Journal of Narrative Studies, 1*, 43-59.

Sheridan, T. (1992). Musings on telepresence and virtual presence. *Presence (Cambridge, Mass.)*, *1*(1), 120–126. doi:10.1162/pres.1992.1.1.120

Smith, W. (2015). Stop calling Google Cardboard's 360-degree videos 'VR'. *Wired*. Retrieved from https://www.wired.com/2015/11/360-video-isnt-virtual-reality/

Thon, J. (2008). Immersion revisited: On the value of a contested concept. In F. Amyris, O. Leino, & H. Wirman (Eds.), Extending experiences. Structure, analysis and design of computer game player experience (pp. 29-43). Rovianemi: Lapland University Press.

Zeltzer, D. (1992). Autonomy, interaction and presence. *Presence (Cambridge, Mass.)*, *1*(1), 127–132. doi:10.1162/pres.1992.1.1.127