Immersive Journalism in VR: Four Theoretical Domains for Researching a Narrative Design Framework

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Abstract. A major focus of research in Virtual Reality (VR) media examines the technological affordances for creating immersion, which in turn can generate presence – the feeling of being there – in a virtual environment. This research has given rise to an emerging form of fact-based storytelling called immersive journalism, a term used to describe digitally produced stories designed to provide a first-person, interactive experience with news events. This paper examines the concept of immersive journalism and discusses both its potential and its limitations as a narrative and journalistic genre. Immersive journalism will require a new narrative design framework, and four theoretical domains are discussed as underscoring this framework. The four are VR presence, narrative, cognition and journalistic ethics.

Keywords: Journalism · Virtual reality · Embodiment · Interactive narrative · Situated cognition · Ethics

1 Introduction to Immersive Journalism

Immersive journalism is a term used to describe an emerging form of news reporting that seeks to capitalize on the technological enhancements of virtual environments and Virtual Reality (VR) displays. Immersive journalism is described as an evolution of long-held, ongoing news reporting practices that attempt to elicit "a connection between the audience and the news story" [1]. In the 1950s, journalists Edward R. Murrow and Fred Friendly worked to create stronger audience connection in their broadcast series See It Now [2]; later, this form of journalistic reporting was presented in the You Are There radio and television series, re-created moments in history produced by former CBS news anchor Walter Cronkite [3]. Today, some journalists are beginning to use VR technology, and specifically Head Mounted Display (HMD) devices, to explore the narrative and technological possibilities and limitations for creating enhanced connection. The goal is to generate a greater sense of presence in a virtual representation of a news event. This paper analyzes the primary objective of immersive journalism – to create presence – and examines four interdisciplinary theoretical domains that underscore a design framework that can optimize communications potential of VR as a channel for journalism. Those four theoretical domains include VR, narrative, cognition and journalistic ethics.

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Before examining each of these, however, it is important to note how immersive journalism has arisen from decades of research into VR theory and HMD technologies. Renowned VR researcher Morton Heilig filed a patent for his first HMD in 1957 [4]. In the 1990s, Biocca and Levy specifically analyzed VR as a potential journalism channel. They noted that the history of communications media is "a history of interfaces that deliver information to more sensorimotor channels with increased sensory realism in each channel" [5]. The authors foresaw the need for interdisciplinary research into VR, one that combined cognitive psychology, haptic studies, multimedia design, communication theory and socio-cultural studies. They surmised that the ultimate communications interface "will never arrive" but is instead an always-moving target [6]. Still, such a Holy Grail caution has not abated the allure of using multisensory computer interfaces to give an audience a greater sense of presence in the virtual experience, and immersive journalism is yet another demonstration of the ongoing attraction to travel this fossilized path.

Advances in VE technology – 3D computer-generated graphics software, web-based videogame engines, 360-degree video technology, and HMD devices – are making VR in general, and immersive journalism as well, a less expensive, more commercially viable proposition. Biocca and Levy viewed VR as moving steadily closer to fulfilling "the oldest dream of the journalist, to conquer time and space. … the ability to create a sense on the part of audiences of being present at distant, newsworthy locations and events" [5, p. 137]. Creating a sense of presence in distant events – in terms of both time and space – is the chief motivation underscoring immersive journalism research. The objective is to create connections that can elicit a first-person, perhaps even emotional, reaction. Further, greater connection to the story could potentially address a concern about "compassion fatigue" in audiences, the "desensitization and emotional burnout, as a phenomenon associated with pervasive communication about social problems" [7, p. 687].

2 Four Research Domains for Immersive Journalism

The first theoretical domain to consider in researching a design framework for immersive journalism is an overview of the theory and research on presence, which is most commonly defined as the feeling of being in the virtual environment (VE). This definition is examined further in the next section. For the purposes of this paper, presence is viewed not as an absolute but as a continuum. At its optimal communicative state, presence is a product of what Mel Slater defines as both Place Illusion (PI) and Plausibility Illusion (Psi) [8]. PI is the feeling of a virtual embodied transformation into the VR experience, and Psi is the belief that events are really happening even though the audience knows they are not real. These two illusions can contribute to response-as-if-real actions (RAIR) by the user, which in turn enhances the expressive power of the story and contributes to the audience's willingness to suspend disbelief – a critical factor in any successful narrative [8].

The second theoretical domain is what one early VR engineer, William Bricken, proclaimed as the physics of VR – cognitive psychology [9]. Marshal McLuhan wrote

that all media "are extensions of some faculty, psychic or physical" [10]. In this paper, two lines of cognitive theory are discussed as the foundation that supports presence and VR's potential as a communications channel – be it for journalism or other uses. One is embodied cognition, which holds that the bodily activity shapes the world of human experience and presupposes higher forms of decision-making. The second is situated cognition theory, which contends that learning emerges through actions in specific, cultural, contextual arenas. More than other communications media, VR holds promise as a channel for embodied activity, multisensory information within the virtual representation of a contextual, lived experience.

A third perspective that will be examined briefly is narrative theory. At its core, journalism is about telling stories, and narrative theory supports storytelling as a time-tested, psychological organizing mechanism for understanding time, space and causality – for making sense of the world. Philosopher Paul Ricoeur identifies narrative as the way in which humans understand time and flat out declares that narrative is the "guardian" of time [11]. Psychologist Jerome Bruner contends that narrative "gives shape to things in the real world and often bestows on them a title to reality" [12, p. 8]. The challenge in immersive journalism is to design a framework that makes the handling of time, space and causality credible in an interactive medium – credibility that Slater contends can be difficult to maintain and easily lost [8]. Well-designed, interactive narrative, however, can support the goal of presence.

Finally, the principles, standards and ethics of professional journalism will be discussed. For a fact-based storytelling genre in a new medium to be embraced as journalism, these standards and codes of ethics stand at the gate as the guardian of professionalism and credibility. Immersive journalism is and will be held accountable to the current and historical ethics of the profession, standards such as accuracy, fairness, thoroughness, context, transparency, accountability and awareness of bias. Journalistic codes of ethics [13, 14], common to many news organizations, are critical to maintaining journalism's credibility with an audience but could potentially conflict with immersion techniques used to create the illusion of presence. Each of the next sections discusses these four domains in greater detail.

3 VR and the Pursuit of Presence

As stated above, the chief motivation for creating immersive journalism is to create a stronger connection to a news story by enhancing the audience's presence in the virtual representation of the real-world event. Presence is a term VR researchers use, often quite liberally, to define a phenomenological "feeling of being there" in the virtual environment (VE). Immersion is commonly reserved as the term used to define the level of fidelity – visual, auditory, haptic – afforded by the technology [8, 15, 16].

Some journalists and news organizations use the term presence to describe their 360-degree videos that cover a wide range of news topics, such as the demographic and economic changes impacting Iowa farmers [17] and the flight of immigrants from war in Syria [18]. In introducing its first 360 video series, The New York Times described them as a new form of storytelling that "enables an uncanny feeling of connection with

people whose lives are far from our own. By creating a 360-degree environment that encircles the viewer, virtual reality creates the experience of being present within distant worlds …" [18]. ABC states on its website the VR opens the door to "boundless possibilities, allowing viewers to be anywhere we are at any time" [19]. De la Peña develops immersive journalism using a videogame engine, 3D computer graphics, animation software, motion-tracking technology and HMDs to report on a wide range of topics, from hunger in Los Angeles and domestic violence to the war in Syria [20].

The concept of presence in VR applications typically includes the ability of the audience to take actions within the VE model, which in turn responds to the interactivity with perceptual and sometimes physiological feedback. The Handbook of Virtual Environments states that virtual environments and virtual reality provide a "model of reality with which a human can interact, getting information from the model by ordinary human senses such as sight, sound, and touch and/or controlling the model using ordinary human actions such as position and/or motion of body parts and voice" [21, p. 33]. Further, based on a body of research, Slater contends that the qualia of presence, meaning the internal and subjective component of sense perceptions, arises from the affordances of virtual reality media in which "people respond with their whole bodies, treating what they perceive as real" [8, p. 3549].

Using these definitions as criteria to define presence in VR, there is little surprise that one founder of a VR startup company criticizes the most common form of immersive journalism – 360-degree video – that is presented by numerous news organizations. Writing about The New York Times' 360 videos and its initiative to distribute 1 million Google Cardboard display devices, Smith states that this should not be called VR [22]. Smith writes, "Never, ever take control of the camera away from the viewer. …. The bad news for applications like the NYT VR application and 360 video as a whole is that it's impossible to avoid breaking this rule with 360 video. 360 video is inherently limited …" [22].

Smith's criticism highlights the problem of, as he says, "shoehorning old formats into new technologies." This is a particular challenge for immersive journalism and points to the need for new content design practices that can transition passive journalistic storytelling into practices that create higher levels of presence in VR media. Still, the critique that 360 video does not qualify as VR seems too strident. Instead, immersive journalism should be viewed as a continuum from low to high based on how well the narrative creates presence and handles narrative time, space and causality.

The history of storytelling is replete with experimentation in ways to transport an audience to a specific time and place and help them understand the causality of events through the organizing mechanisms of narrative. From cave paintings and ancient oral storytellers to paintings, photographs, newspapers, television and now VR narratives, storytelling represents time, space and offers some level of causality, either through the communication of a sequence of events or through information that the audience itself organizes. These core aspects of narrative are discussed further below. Arguably, 360 video enhances temporal and spatial presence not provided in 2D and allows modest enhancements to embodied presence by allowing the audience to turn their heads and bodies to see a broader contextual landscape of the story. Thinking of VR as a continuum, 360 video should be placed at the low end.

Slater's research provides both a language and framework for examining what immersive journalism should accomplish to move to the upper end of a presence continuum. As mentioned above, presence is shaped by both Place Illusion (PI) and Plausibility Illusion (Psi). Slater contends that PI is a factor of the level "sensorimotor contingencies" (SC) that are afforded by the VR system. "SCs refer to the actions that we know to carry out in order to perceive. … The SCs supported by a system define a set of valid actions that are meaningful in terms of perception within the virtual environment depicted. For example, turn your head or bend forward and the rendered visual images ideally change the same as they would if you were in an equivalent physical environment" [8, p. 3550]. The closer that SCs align to those used in physical reality, Slater states, the greater the sense of "placeness" or PI.

As an example, Slater collaborated with Maria Sanchez-Vives and De la Peña in the development of an immersive journalism story about detainees in the United States federal prison at Guantanamo, Cuba. De la Peña, a former Newsweek magazine reporter and documentary filmmaker, states that her research lab strives to create stories that elicit visceral reactions [18]. She calls immersive journalism an "empathy machine" [23]. The motion-tracking technology that De la Peña uses affords enhanced kinesthetics, allowing the virtual environment to respond to movement of the viewer. The Guantanamo Bay journalism experiment [24] allows viewers to undergo an illusionary transformation of their physical body and to enter perceptually the body of a detainee. To enhance physical presence, viewers are asked to sit in a chair with their hands behind the back. The virtual image presented is of a detainee with his hands behind his and squatting on a wooden box in a cell.

For immersive journalism to move higher on a presence continuum and optimize VR as a journalistic communications channel, then enhancing embodied engagement with the VE and the narrative is key. As Biocca and Levy note, "If the mass audience must be forced to view passively, then this experience fails to deliver the full promise of virtual reality. It becomes just another form of passive television, even if it is stereoscopic" [5, p. 139]. Eastgate et al. write that "it is reasonable to suppose that VE technology can offer more representations of the types of interactivity commonly encountered in real life" [25, p. 372]. The authors note that interactivity can mean both affording the user to take action to change a virtual object or virtual scene as well as updating the VE in response to the user's movement and position. As well, the authors consider a theory of presence a complex, multidimensional perception formed by multisensory data and cognitive processes [25]. The next section discusses two cognitive theory domains that are notably applicable to presence and immersive journalism.

4 Cognitive Theory, Presence and Immersive Journalism

The value of creating enhanced presence in a news story to create better understanding is supported by literature on cognitive theory. Two theoretical domains that are notably applicable to VR media share the concept of human activity as a central theme. These two are embodied and situated cognition.

Biocca notes that VR technology promises the potential for the artist – or in this case the journalist – to make "the creations of the imagination more literal" by engaging the user in an embodied experience. Biocca contended that a theory of presence rests on discovering what is going on when people use their senses to understand and interpret their surrounding environment and when they interact with objects in that environment [26]. He contended that the mind is at the heart of presence, and the mind is anchored by the body.

This contention aligns with the literature on embodied cognition. Maurice Merleau-Ponty argued that the body structures human understanding and experience in the real world [27]. He viewed physiology and psychology not as "parallel sciences, but rather two characterizations of behavior, the first concrete and the second abstract" [27, p. 33]. Hubert Dreyfuss and Samuel Todes amplified this philosophical perspective in their research. Dreyfus wrote that humans make themselves at home in the world "by moving so as to organize a stable spatiotemporal field in which we use our skills to make determinate the determinable objects that appear in that field. The skills we acquire then feed back into the perceptual world, which becomes more and more determinate as we learn to make more refined discriminations and have more reliable anticipations. Merleau-Ponty calls this feedback phenomenon the intentional arc" [28, pp. xvi-xvii].

Narrative in general, and journalism specifically, is about representing the world of human experiences. Bodily activity within a virtual mediation of real-world experiences can enhance understanding of the narrative. Todes contended that the "existence of the human body as capable of activity is necessary for" understanding the world of human experience. The primary form of directed action is an intention of the body, a body-directedness, which first gives us the global sense of space and time presupposed by all our higher personal forms of directed activity, principally those of will and judgment" [28, p. 65]. Or as cognitive theorist Andy Clark states: "… to be conscious is to be a subject of experience – to feel the toothache, to taste the bananas, to smell the croissant, and so on" [29, p. 37] Clark cites Dreyfus, who wrote about the "thickness of understanding" that comes from extensive bodily and real-world experience [29, p. 37]. Intelligent behavior, Clark wrote, stems from "the complex interplay of neural operations, bodily actions, and the use of multiple aids, props, and artifacts" [29, p. 161].

The potential of immersive journalism rests in the technological affordance of bodily actions and the amplification of multisensory feedback, adding kinesthetic, haptic and olfactory information to the visual and auditory. Biocca and Levy wrote that "virtual reality facilitates the imagination not by depressing the senses but by immersing the senses in information from the illusory space" [5, p. 136].

In addition to embodiment, the illusory space in VR affords contextual, situated activity. Situated cognition theory holds that cognition is a complex social phenomenon that involves persons solving problems in a specific arena – a culturally contextual time and space. Situated cognition theory holds that cognition "observed in everyday practice is distributed – stretched over, not divided among – mind, body, activity and culturally organized settings" [30, p. 1]. Lave researched the use of math in real-world settings – such as a grocery store– as a means of analyzing cognitive psychology's accounts for "stability and continuity of cognitive activity across settings through the psychological mechanism of learning transfer. That is, knowledge acquired in 'context free'

circumstances is supposed to be available for general applications in all contexts. …" [30, p. 8]. The conclusion that arose from her studies was that the more appropriate unit of analysis of cognition "is the whole person in action, acting with the settings of that activity" [30, p. 17].

VEs and VR can serve as a stage for representing culturally contextual, lived experiences. When VR and VEs afford psychological and embodied actions – allowing users to problem solve – they become arenas for practicing and experimenting situated cognition. Immersive journalism, as both a VR stage and a narrative, can afford audiences the opportunities to explore time, space and causality based on a fact-based reporting. Both embodied activity and problem solving in specific contextual arenas can be exercised, contributing to a better understanding of news events represented, to the audience's sense of presence and a connection to the story. Riva et al. wrote that "characteristics of the 'story' created when a subject is exploring a VE plays a key role in enhancing the sense of presence: to be a part of a narration, to play a more or less defined role in the story could influence the sense of identification … and the state of presence during a virtual experience" [9, p. 654]. Mantovani and Catelnuovo reference the relationship of situated activity to Csikszentmihalyi's theory of flow, which "refers to a merging of action and awareness, during which a person loses self-consciousness and a sense of time, focusing on the present, and blocking out the past and the future" [31, Sect. 11.3.2.4].

5 Narrative and Presence

Psychologist Jerome Bruner wrote that stories are not innocent; they always have a message [12, p. 15]. Kovach and Rosensteil wrote that journalism is "storytelling with a purpose. That purpose is to provide people with information they need to understand the world" [32, p. 214]. What both perspectives express is the critical role of narrative as means of guiding the audience to understanding information. It is in such perspectives that immersive journalism practitioners see such great potential in VR as a new emerging canvas for storytelling.

Just as storytellers have reconfigured narrative frameworks from medium to medium – from oral storytelling, to novels, to film, to videogames – designing stories for VR will require new practices. As Biocca and Levy point out, "Conceptually, VR journalism may be no different than present-day journalism. Certainly, the tools will change. But constructing a news space will increase the level of complexity of the news tasks by a power of 10…. Undoubtedly, the art and science of journalism will change" [5, p. 146].

A key research question for narrative in any medium, and certainly for immersive journalism, is what characteristics of storytelling are medium-free, or transmedial, and which are medium-specific to VR. As a starting point, Marie-Laure Ryan proposes that certain core characteristics of storytelling are medium-free: character, events, setting, time, space, and causality [33]. Two other concepts – immersion and presence – should be added as transmedial. The chapter structure of a printed novel can create page-turning immersion in the linear progression of the plot; film techniques and camera angles can be used to create a sense of presence. Both readers and audience can be technologically

induced to feel a strong connection to and presence in a story. In VEs and VR, however, immersion and presence hold particular significance. Presence is arguably the VR's core aesthetic. As multiple speakers at the first Vision Summit 2016, a conference on VR and Augmented Reality, emphasized, presence supplies VR media a special communications power, the "magic of being transported to another place" [34].

Technological possibilities and limitations for immersion can shape the level of presence in VR and will dictate what types of immersive journalism stories work best and how they should be designed and reported. Oral storytellers understand that the "live performance of face-to-face interaction makes a difference as to what kind of stories are told, how they are told, and why they are told" [33, p. 28]. The same holds for VEs and VR.

Practitioners of immersive journalism will have to consider how to move beyond thinking of VEs and VR as virtual containers for information and begin thinking of how to build fact-bound storyworlds that are channels for embodied activity and imaginative exploration. Alex McDowell, film producer and narrative scholar at the University of Southern California, contends that designing storyworlds is the must-have framework for VR that will disrupt the linear storytelling of other media [35]. In Storyworlds across Media, Ryan writes: "Storyworlds hold a greater fascination for the imagination than the plots that take place in them, because plots are self-enclosed, linear arrangements of events that come to an end while storyworlds can always sprout branches to their core plots that further immerse people, thereby providing new pleasures" [33, p. 19]. Designing storyworlds, and presence within them, will complicate the journalistic processes of story design and reporting, placing greater emphasis on recording specific timelines and spatial characteristics.

Techniques from other media, such as the fade-ins and fade-outs to communicate the passage of time in film, could break presence, necessitating the consideration of new methods for handling time. Storytellers will need to understand and design VR, medium-specific narrative clues that will help audiences transition from passive media that are largely based on literary frameworks and into interactive, embodied spaces – in other narrative spaces more like lived experiences in the real word.

The critical starting point for research into new narrative design methods is from the perspective of presence. The design of storytelling will have to grow from solely representations of "what is" and expand to explorations of "what if," to think of VR as space to engage in "acts of imagination" [33] that a feeling of presence allows. Immersive journalism stories will need to afford levels of reactivity in the VE and interactivity by the user in order to support both place illusion and plausibility illusion. To optimize the medium, immersive journalism will need to enhance the responses-as-if-real by the user. This aligns with what Rosensteil contends is the current evolution of journalism, which has moved from an ethic of "trust me" to an ethic of "show me" [36]. Immersive journalism practitioners will have to move away from passive authorship that speaks at the audience and towards narrative that immerses and guides the audience along potentially multiple narrative paths that provide varying changing perspectives and responsive environments.

6 Journalism Ethics in a New Medium

A fourth consideration for designing immersive journalism will undoubtedly be the current journalism practices and codes of ethics that professional journalism associations and news organizations typically embrace. Two representative examples are The American Press Institute's elements of journalism [13] and the Society of Professional Journalists' Code of Ethics [14]. Commonly these ethics define what journalists and news organizations should do and how they view their role in society – as informer, interpreter or sometimes advocate [37]. Values that are typically codified are the zeal for accuracy and context through thorough, fair and transparent reporting. Kovach and Rosenstiel contend that, although every generation creates its own journalism largely in reaction to technological advances, the purpose, underlying elements and essential values remain "remarkably constant" across countries, cultures and political systems [32, pp. 19–20].

Journalists have long viewed their profession – the Fourth Estate – as a virtuous guardianship of the public interest, and there is reason to expect this ethic to bridge new communications channels. Still, the language and mediation mechanics of VR appear inconsistent with journalism's objectives of realism and transparency. The art of creating presence in VR is described as the "illusion" of place and plausibility. VR developers speak of technological methods for tricking the brain or fooling the senses to create what some call consensual hallucination [5].

Biocca and Levy note that all news reporting is some kind of simulation: the print journalist re-creates an event with colorful language; the television news crew controls and edits what the viewer sees. An ever-present ethical question for journalism in many media is one of balancing engagement and reality. In television, CBS producer Don Hewitt called the balancing act a fine line between show business and news business, in which "some people stay so far away from the line that nobody wants to watch" and others keep crossing the line. Hewitt said the trick "is to walk up to that line and touch it with your toe but don't cross it" [38, p. 254]. Kovach and Rosenstiel contend engagement should be journalism's ethical commitment to the citizenry. They state that engaging storytelling and information are not in conflict, but instead are points on a continuum. Good storytelling pushes the two points together. [32, p. 214].

As practitioners of immersive journalism develop new frameworks for storytelling in VR, new journalism practices, standards and ethics will likely evolve to address the unique technological capabilities of VR. De la Peña, a leading developer of immersive journalism, acknowledges that VR media, given the possibilities for creating a robust illusion of presence, could easily allow for propaganda and mistruth as much, if not more, than other media. In an interview with The New York Times, she said, "What does transparency look like when you have goggles on? I don't know the answer, but it is something I think about a lot" [23]. Kovach and Rosenstiel state that whatever form journalism takes, its main purpose is distillation, storytelling that extracts the essential meaning, engages the public and provide "critical analytical thinking that illuminates the matter under consideration" [32, p. 215]. The engaging potential of presence in a fact-based narrative will need to be balanced with new methods for communicating the

accuracy of the facts, the fairness of multiple perspectives and the thoroughness of reporting that are used to support the simulation.

7 Summary

As in many fields of research into VR, immersive journalism seeks to take advantage of ongoing enhancements to the technology in an effort to provide an audience a greater sense of presence in virtual stories about news vents, and perhaps creating a stronger connection to the events portrayed. This goal requires new design considerations for storytelling in a nascent medium. To optimize the communicative potential of VR, this paper has proposed that ongoing development of immersive journalism should be an interdisciplinary effort that crosses four domains. Those four are theories on VR presence, narrative, cognition and journalistic ethics. VR presence is a core aesthetic of the technology and a primary motivator for storytelling in the medium. Narrative theory provides a starting point for determining what core characteristics of storytelling transcend all media and which are unique to VR. Cognition theory, specifically focusing on embodied and situated cognition, underscores the possibilities and limitations of VR as a communications channel that is potentially more powerful than other media. Finally, professional journalistic standards and ethics should be examined given the theories of presence that emphasize illusion. Accuracy, fairness, thoroughness and transparency will likely have to be redefined for immersive journalism applications.

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