INTRODUCTION

VIRTUAL, AUGMENTED AND MIXED REALITIES IN JOURNALISM:

theory, practice, critique

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1 Introduction

The dynamic development of the internet and the emergence of new digital technologies made possible the beginning of a new era for communication in general and journalism in particular. Digital journalism, which has just completed its first quarter of life, has overcome and undergone profound transformations since its emergence. The magnitude of the changes that occurred during the last 25 years of digital journalism has given way to a new communication scenario full of opportunities but also professional and ethical challenges (Salaverría, 2019). Technology is behind many of the transformations that have taken place during this time and that have had an impact on the models of production, distribution, and even consumption of information.

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The metamorphosis experienced, as referred to by certain authors (López-García, 2010; Vázquez-Herrero et al., 2020), has led to the current scenario: convergent, mobile, and now also ubiquitous (Pavlik, 2001; Salaverría, 2015).

News media organizations are currently witnessing the introduction of a set of high-end technologies in our daily lives: 5G, the internet of things (IoT), blockchain, virtual reality (VR), augmented reality (AR), mixed reality (MR), intelligent virtual assistants, among others (López-García & Vizoso, 2021; Mosco, 2017). Its introduction in journalism practices has given way to what has been named Hi-tech Journalism (Larrondo & López-García, 2020; Murcia & Ufarte, 2019; Pérez-Seijo et al., 2020; Salaverría, 2015; Ufarte et al., 2020). This label encompasses different trends that shape the "journalism that will tell the future" (López-Hidalgo, 2016, p. 255): use of drones to cover news (Fischer, 2019); automated, robot or algorithmic journalism (Caswell & Dörr, 2018); use of conversational bots – chatbots – in news websites (Ford & Hutchinson, 2019; Jones & Jones, 2019); virtual reality and 360-degree video Journalism (Mabrook & Singer, 2019), also referred to as immersive journalism (De la Peña et al., 2010); and, among others, augmented or mixed reality for news (Aitamurto et al., 2020).

These cutting-edge and disruptive technologies are creating a new communication scenario in which journalism becomes more automated (Carlson, 2015), personalized (Thurman & Schifferes, 2012; Thurman, 2019), and also immersive (De la Peña et al., 2010; Domínguez, 2013, 2017), while new narrative formats (Salaverría & De-Lima-Santos, 2020) and innovative products (Pérez-Seijo et al., 2020) are surfacing and seek to capture the attention of a fragmented audience and connect with younger users in a more visual, interactive, gamified (López-García et al., 2020) and even experiential way (Pavlik, 2018).

In particular, in this issue, we pay special attention to the fluid relationships between journalism, immersive media, and virtual or augmented worlds, particularly to the progressive hybridity of the relationships between the physical and tangible worlds and the emerging forms of interaction and immersion through digital media.

Within a hybrid media culture, immersive technologies such as virtual reality, augmented reality, mixed reality, or even 360-degree video pose novel opportunities to tell stories and represent reality through an immersive user experience. Engberg

and Bolter (2020) proposed these extended reality technologies as part of what they called "reality media", audiovisual media forms "that explicitly interpose themselves between us and our visual, auditory, or tactile perception of the everyday world and in this sense seek to redefine reality itself" (p. 85). But they have also been termed "experiential media" when applied to journalistic storytelling because they enable "the user to experience stories as a participant in a first-person narrative, rather than merely watch, listen or read the story from a third-person voyeuristic vantage point" (p. 48).

2 A brief history of the use of immersive media for news stories

At the beginning of the 1990s, virtual reality received a significant boost, particularly in terms of commercialization and popularization. This surge of interest sparked investigations into its effects beyond the realms of entertainment and video games. It is actually during this period that researchers started delving into the possibilities of immersive technologies for communication in general and for journalism in particular.

Frank Biocca and Mark R. Levy, authors of *Communication in the Age of Virtual Reality* (1995a), stand out as pioneers in this field. In their work, they carefully consider the potentials that these technologies could unlock for news production and consumption. With a visionary outlook, they propose that virtual reality, as a mass medium, could empower journalists to overcome the barriers of time and space once and for all: "virtual news environments would invest journalists with the ability to create a sense on the part of the audiences of being present at distant, newsworthy locations and events" (Biocca & Levy, 1995b, pp. 137-138).

On a practical level, U.S. universities were among the first to explore the potential that virtual reality, omnidirectional sound, augmented reality, and spherical photography or video could have in their application to journalism. For example, in 1997, a team of students under Professor John V. Pavlik at Columbia University used the camera invented by the also Professor Shree K. Nayar to cover the Irish Lesbian and Gay Organization (ILGO) protest during the St. Patrick's Day parade on the streets of New York. Its members were

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marching because they were banned from participating due to their sexual orientation. The students filmed both the protest and the subsequent arrest of the participants by the police (Pavlik, 2001). The result was a sort of 360-degree video documentary, a completely innovative format at the time.

Two years later, Pavlik and his students collaborated with journalists from APBnews.com, an online news service specializing in crime coverage, to investigate the murder of Amadou Diallo in the Bronx. The result was a 360-degree photo report of the crime scene, which APBnews.com published on its website (Domínguez, 2013).

Using augmented reality, they created multiple situated documentaries about past events that occurred at Columbia University. A format "that embeds a narrated multimedia documentary within the same physical environment as the events and sites that the documentary describes" (Höllerer et al., 1999, p. 79). With mobile augmented reality technologies, a group of students created a situated documentary dedicated to the 1968 student revolt on their own university campus (Pavlik, 2001, 2009).

Professor Pavlik (1999) has also theoretically analyzed the implications of new media for the future of journalism, including emerging formats such as 360-degree video: "omnidirectional video news will enable viewers to navigate by panning, tilting or zooming anywhere throughout a 360-degree video, either live or from recorded and edited news reports" (Pavlik, 1999, p. 56). In subsequent works, the scholar delves into the evolving landscape of digital technologies and their impact on information narration and presentation. Notably, he highlights how the conventional inverted pyramid structure was being displaced by interactive and immersive multimedia reporting, offering readers and viewers an unprecedented sense of presence in news events (Pavlik, 2000). Later, in the book *Journalism and New Media*, Pavlik (2001) further explores the concept of virtual or immersive news. This novel approach entails presenting and interacting with news through three-dimensional representations of the actual locations where events occurred.

Around the same time, Larry Pryor (2002) reflects on the potential implication of what we refer to as immersive digital technology in the realm of journalism. Specifically, he highlights the significance of digitally recreating real events and how this approach to storytelling empowers viewers, as it "puts control of news coverage in the hands of viewers" (Pryor, 2002). He also introduces the term

immersive news experience, which would precede the emergence of the actual concept of immersive journalism.

In 2010, Nonny de la Peña, then affiliated with the Annenberg School for Communication and Journalism at the University of Southern California, alongside a multidisciplinary research team, published the seminal article titled *Immersive Journalism: Immersive Virtual Reality for the First-Person Experience of News* (De la Peña et al., 2010). In this pioneering work, they presented and defined what they referred to as immersive journalism for the first time: "the production of news in a form in which people can gain first-person experiences of the events or situation described in news stories" (p. 291).

In later works, De la Peña (2011, 2014) continues her exploration of immersive non-fiction, emphasizing the goal of enabling users to enter virtual environments or scenarios where stories and news events are recreated. Considered a pioneer in the use of virtual reality technologies for news stories, she founded the production company Emblematic Group in 2007, in which immersive productions have been showcased at prominent events like the South by Southwest Festival (SXSW) and the Sundance Film Festival, among others. The company has also participated in projects for media organizations such as The New York Times, The Wall Street Journal, Al Jazeera, and the Associated Press. While Emblematic initially focused on virtual recreations based on real events, the advancement of 360-degree video technology soon led them to incorporate it into their works as well.

In 2012, Van der Haak et al. (2012) published an article on the future of journalism and emerging practices where they point out that the use of virtual reality, 360-degree video, or 3D technologies enables the incorporation of new perspectives in visual storytelling: "immersive journalism emphasizes the first-person experience in a news story, and it is especially useful when images are lacking because access is denied. It also provides added engagement and the possibility of reflection through interaction and choice-making for the user" (p. 2.932).

The continuous advancement of immersive media, especially with the hype of virtual reality, augmented reality, mixed reality, and 360-degree video experiences in the 2010s, invites rethinking the original definition of immersive journalism proposed by De la Peña et al. (2010), which was initially associated with virtual recreations. While

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the concept has gained widespread acceptance in academia (e.g., Baía & Coelho, 2018; Barreda-Ángeles, 2018; Friedman & Kotzen, 2018; Kang et al., 2019; Nielsen & Sheets, 2019; Paíno & Rodríguez, 2019; Sánchez Laws, 2019, 2023), it has mainly been employed to describe the media's utilization of spherical, omnidirectional or also called 360-degree video since late 2015 and early 2016. The 360-degree video format was introduced in newsrooms and innovation labs as a more viable alternative compared to true interactive virtual reality, especially in terms of time and investment (Pérez-Seijo, 2021).

In this regard, scholars like Hardee and McMahan (2017) and Sánchez Laws and Utne (2019) proposed distinguishing between immersive journalism based on computer-generated content and 360-degree video-based immersive journalism. Some studies exclusively focus on the latter (e.g., Aitamurto, 2019; Benítez & Herrera, 2020; Palmer, 2020; Pérez-Seijo, 2023; Van Damme et al., 2019), meanwhile, other works use the term "virtual reality journalism" in a broader sense, referring to the use of diverse immersive media for journalistic storytelling (e.g., Frontline & Emblematic, 2018; Karlin et al., 2018; Owen et al., 2015; Sirkkunen & Uskali, 2019; Stubbs, 2018). Furthermore, some authors also include augmented and mixed reality within the scope of immersive journalism (e.g., Aitamurto et al., 2020; Doyle et al., 2016; Gynnild et al., 2020; Hardee and McMahan, 2017; Tejedor-Calvo et al., 2020), although this is still less common.

3 Main qualities of virtuality and immersive media: presence and immersion

Immersive journalism introduces an experiential dimension to the consumption of news stories. The first-person experience is key in the storytelling, as "the goal is not so much the presentation of 'what happened' but to give people experiential, non-analytic insight into the events, to give them the illusion of being present in them" (Slater & Sanchez-Vives, 2016, p. 32). Bearing this in mind, the senses of immersion and presence are among the main affordances of immersive media.

On the one hand, immersion can be approached from two different perspectives: (a) as psychological immersion, conceived as a sense of absorption induced by specific stimuli and experienced by

a user in a virtual environment or world (Witmer & Singer, 1998); (b) as technological immersion, understood as the property of a system that mediates the experience to display that world (Nilsson et al., 2016; Slater, 2003).

The concept of immersion is frequently linked to [the sense of] presence, to the point that their specificities are occasionally confused and mistakenly used interchangeably. However, presence here refers to the user's response to the immersive system (Sanchez-Vives & Slater, 2005; Slater et al., 2009). As a subjective reaction, "given the same immersive system, different people may experience different levels of presence, and also different immersive systems may give rise to the same level presence in different people" (Slater, 2003).

Under the domain of immersive media, presence is the perceptual illusion of non-mediation (Lombard & Ditton, 1997), the feeling of being in a concrete environment, world, or reality despite being physically located in a different place. Clearly, technology – or more specifically the virtual displays (De la Peña et al., 2010) – acts as a mediator: users can experience the illusion of presence, for example, by watching a 360-degree video with a virtual reality headset from the moment they gain control of the point of view in an immersive environment, and the resulting visual experience is, to some extent, natural and plausible. According to Suh et al. (2018), "HMDs [Head Mounted Displays] can effectively block information from the physical environment and provide more natural and intuitive interactions, which can engage viewers and provide the sensation of being inside the video scene" (p. 428).

The potential for experiencing an illusory sense of place and a sense of reality in the virtual environment is what distinguishes immersive media from purely interactive media. In the latter, the screen acts as a barrier between the user and the environment, preventing the individual from losing contact with their physical world. The first-person experience becomes a differential factor in immersive journalism, which drives a shift from storytelling to 'storyliving': "'telling' is less central to a virtual reality experience. The audience learns through engagement and embodiment, by entering into a scene, inhabiting a digital entity, and experiencing what it knows. Viewers experience the story as though they lived it" (Maschio, 2017, p. 9)

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In the specific case of immersive journalism, some scholars point out that the first-person witnessing of events or facts in the news story is what makes the user a more active participant in virtual environments (Owen et al., 2015). Given the properties of immersive media and virtual reality headsets, authors like Slater and Sanchez-Vives (2016) advocate discarding the labels of 'observers' or even 'users', relegating their use to interactive content consumed through non-immersive systems. Instead, they defend concepts such as 'participants' or 'consumer-participants', since viewers can experience the illusion that the ongoing factual events can affect them in some way: "the consumer of a news story in one medium becomes a participant in the virtual story in the other, the 'immersive journalism' that creates a scenario to represent aspects of the news story in VR" (p. 33).

4 User experience: what have we learned so far?

In terms of user experience, immersive media introduce significant changes in news consumption and the role of the user, as mentioned above. The viewing of this content, especially with virtual reality headsets, moves away from traditional consumption in which the user watches, reads, or listens to information and instead "news becomes an experience" (Kasem et al., 2015, p. 16). The traditional framing disappears, and the user can now choose the point of view within an immersive environment through a first-person perspective. However, when referring to the possibility of immersive media, almost all studies to date demonstrate that the more immersive the system the user employs to consume the news piece, the stronger the sense of presence experienced (e.g., Pérez-Seijo et al., 2023; Van Damme et al., 2019).

In this regard, a number of studies have delved into the actual human experience of immersive non-fictional storytelling in journalism. Regarding computer-generated or 360-degree video content, scholars have examined its impact on perceptions and cognitions in outcomes related to presence and embodiment: the sense of being there, the effects on the credibility of sources or the information, the empathetic and emotional response, the perceived realism and visual authenticity, the social interaction, the story-sharing intention, the engagement, the interest in the news story or

de feeling of enjoyment (e.g., Archer & Finger, 2018; Greber et al., 2023; Hendriks Vettehen et al., 2019; Kang et al., 2019; Slater et al., 2018; Steed et al., 2018; Steinfeld, 2020; Suh et al., 2018; Sundar et al., 2017; Van Damme et al., 2019; Wang et al., 2018).

On the other hand, Mañas-Viniegra et al. (2020) have studied the potential of violent immersive journalistic content as a tool for raising social awareness, while Ma (2020) has analyzed the effect of 360-degree video stories on pro-social attitudes and willingness to help and Steinfeld (2020) their use to promote knowledge, empathy, and change of opinions about sexual harassment. Other studies have investigated the effect of immersive media on attitudes toward human rights (Bujić et al., 2020).

But immersive journalism has also been examined from the perspective of uses and gratifications. Specifically, Nielsen and Sheets (2019) identified six gratifications associated with experience, affect, and agency during content consumption: immersion, transportation, emotion, empathy, information, and control. In the same study, Nielsen and Sheets (2019) concluded that virtual reality can be employed to build trust with audiences through a first-person experience, as a sort of immersive witness of the facts and events. Yet Sundar et al. (2017) warn that it can also produce the opposite effect: the feeling of being there can negatively affect trust in the news media. The authors suggest that this may be due to the 'bells and whistles' heuristic.

In the current digital landscape, immersive journalism has been introduced as an emotion-driven innovation to (re)connect with an increasingly fragmented audience (Lecheler, 2020). Thus, several authors have focused on analyzing the potential of immersive content to emotionally engage the user (Kukkakorpi & Pantti, 2020) or to evoke empathy (Clifford & White, 2020) toward other or distant realities. However, critical voices have also arisen, rejecting the assertion that virtual reality is an "empathy machine" (Gregory, 2016; Hassan, 2020), just as the industry has promoted technology (Milk, 2015). Some have even highlighted that it symbolizes technological utopianism (Ferjoux & Dupont, 2020).

While the main characteristic of virtual reality technologies is to isolate the user from their physical reality, transporting them to an alternate reality and providing the sensation of "being there", augmented reality merely enhances, reinforces, and/or complements the user's sensory perception of an actual physical environment by

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incorporating layers of supplementary information, namely digital content, in real-time (Azuma, 1997; Elmqaddem, 2019). The prevailing environment is the real one, albeit enriched or augmented in a manner that ensures it always remains the reference point (Domínguez, 2017). Thus, the user continues "to see and hear the surrounding world but with additional sights and sounds that are synchronized to the exact location relative to a user's three-dimensional (3-D) orientation to a geographic locale" (Pavlik & Bridges, 2013, p. 6).

In terms of user experience, Pavlik and Bridges (2013) highlight that augmented reality, as a mode of journalistic storytelling, enables users to engage more actively with the content. This involvement comes through the capability to interact in real-time and from a firsthand perspective with layers of supplementary information – graphics, videos, audio, etc. –. Furthermore, based on the outcomes of an experimental user study conducted by Aitamurto et al. (2020), the immersive attributes of augmented reality "can contribute to journalism's dual goals of informing and engaging people" (p. 18), although in terms of knowledge gain, no significant differences were found compared to other types of visualizations.

On the other hand, the findings of a research by Tejedor-Calvo et al. (2020) indicate that augmented reality, when used for journalistic purposes, "enables greater interactivity with information, through both immersion and augmentation, taking advantage of the elements of portability, ubiquity, geolocation, and connection offered by mobile devices such as smartphones, tablets, and phablets" (p. 6). In fact, Pavlik and Bridges (2013) have previously stressed portability as one of the advantages of augmented reality: "news AR worlds would enable anyone to engage the information through their smartphones in multimedia story formats from wherever they are located" (p. 41).

5 An analytical look at theory and practice and a hint of critique

This special issue on virtual, augmented, and mixed realities in journalism is part of the growing and continuing effort to delve into the potential of immersive media and virtual worlds for non-fictional storytelling and user experience. These technologies pose novel forms of telling the news and representing reality based on

a first-person perspective and technological and narrative agency. However, there are also ethical debates about their boundaries, purposes, and applications. Also, the viability and future of this immersive journalism, especially through virtual reality and 360-degree video, is discussed since the tech industry stopped funding projects (Sirkunnen et al., 2020) in light of the low returns of investment, the small audience figures, the high costs associated to its production and the reduced penetration of VR headsets in households, among other reasons (Pérez-Seijo, 2023). By contrast, augmented and mixed realities emerge as a more viable proposition (Wu, 2023) due to their greater potential for portability, ubiquity, and mobility. And, at the same time, the concept of the metaverse is portrayed as a blank canvas, offering opportunities to experiment with the potential of immersive media and extended reality for journalistic purposes.

The articles in this special issue contribute to the large literature on immersive media and journalism and enhance the understanding of the emerging forms of interaction and immersion through digital media. The theory and practice of immersive journalism are reviewed through new approaches and perspectives, while authors apply a critical viewpoint to examine its most compelling implications and challenges. Among the questions addressed are the alleged paradoxes of legitimizing immersive journalism, the user perceptions of sense of presence and credibility in 360-degree video reporting, the affordances and gratifications of immersive non-fiction stories, the main features of immersive journalistic narratives, the hybrid nature of immersive media content production, the constraints impeding the early adoption of these technologies in newsrooms, the use of augmented reality for political news coverage on television, and a state-of-art on what we have learned about immersive journalism during the last years.

All in all, the study of immersive journalism is a continually evolving area that demands careful and critical research into the potential and challenges posed by virtual, augmented, and mixed realities.

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