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EXPLORATION JOURNALISM:

proposal from experiences in virtual and augmented realities

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ABSTRACT – From a perspective on technical and academic productions based on the premises of immersive journalism, this work observes the limitations of the concept. It suggests new ways to articulate agency relations with the spatialities of virtual environments. Its development is based on an epistemological approach to the Immersive Journalism field, moving to a theoretical view of the issues involving and problematizing the overflows of the original concept. The research discusses reconfiguration needs, not only of structures but of traditional journalism practices. This allows the development of a new concept, exploration journalism. Finally, we suggest the adoption and mastery of new technology platforms aimed at the development of journalistic experiences through the use of game engines.

Key words: Immersive journalism. Virtual reality. Augmented reality. Game engine. Exploration journalism.

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JORNALISMO DE EXPLORAÇÃO: proposta a partir de experiências em realidade virtual e realidade aumentada

RESUMO – A partir de uma perspectiva sobre as produções técnicas e acadêmicas baseadas nas premissas do jornalismo imersivo, este trabalho observa as limitações do conceito e sugere novos modos para articular as relações do agenciamento com as espacialidades dos ambientes virtuais. Seu desenvolvimento está baseado em uma abordagem epistemológica do campo do Jornalismo Imersivo, passando a uma visão teórica das questões envolvendo e problematizando os transbordamentos do conceito original. A pesquisa discute necessidades de reconfiguração, não apenas de estruturas, mas de práticas tradicionais do jornalismo. Isto permite desenvolver um novo conceito, o jornalismo de exploração. Por fim, sugerimos a adoção e o domínio de novas plataformas tecnológicas voltadas para o desenvolvimento de experiências jornalísticas através da utilização das *game engines*.
Palavras-chave: Jornalismo imersivo. Realidade virtual. Realidade aumentada. *Game engine*. Jornalismo de exploração.

PERIODISMO DE EXPLORACIÓN: propuesta a partir de experiencias en realidad virtual y realidad aumentada

RESUMEN – Desde una perspectiva sobre producciones técnicas y académicas basadas en las premisas del periodismo inmersivo, este trabajo observa las limitaciones del concepto y sugiere nuevas formas de articular las relaciones de agencia con las espacialidades de los entornos virtuales. Su desarrollo se basa en un enfoque epistemológico del campo de lo Periodismo Inmersivo, pasando a una visión teórica de las cuestiones que involucran y problematizan los desbordamientos del concepto original. La investigación discuten las necesidades de reconfiguración, no solo de las estructuras, sino de las prácticas periodísticas tradicionales. Esto permite el desarrollo de un nuevo concepto, periodismo de exploración. Finalmente, sugerimos la adopción y dominio de nuevas plataformas tecnológicas orientadas al desarrollo de experiencias periodísticas a través del uso de motores para producción de videojuegos.
Palabras clave: Periodismo inmersivo. Realidad virtual. Realidad aumentada. Motores de videojuegos. Periodismo de explotación.

1 Introduction

This paper reflects on the limits of the concept called immersive journalism (IJ) (De la Peña et al, 2010) to propose a new approach to these formats through the definition of exploration journalism. In addition to this conceptual tension, the article evaluates how journalism can and should seek adaptations to new virtual reality (VR) technologies to allow users to explore the events reported more profoundly and reflectively.

More than ten years after the publication of De la Peña's pioneering article on this new genre determined by VR, we evaluated the relevance of the original concept to understand the possibilities of technologies to create more immersive, engaging, and reflective

experiences of journalistic stories. We hypothesize that the technical approach determined by the seminal article implies a non-utilization of all the potential characteristics offered by contemporary VR technologies. These fissures become more evident when both the original article and the scientific production derived from it fail to account for the various elements involving more than immersion, but the senses of agency that are determined no longer by a spectator, reader, or listener but by an operating agent. In this new approach to thinking about journalistic narratives, new platforms for producing these contents are also evoked.

After the introduction phases and methodological processes, the article's structure is composed of four more sections that address different aspects of exploration journalism. The third section introduces the topic and presents an epistemological view of the field of immersive journalism to discuss the limitations of the concept. The fourth anticipates the discussion of the need to reconfigure the traditional practices of journalism when opting for VR. It presents examples of journalistic experiences based on our concept proposal. The fifth proposes the basis for a new approach and deals with the importance of adopting and mastering new technological platforms aimed at developing journalistic experiences through game engines (GE). The last section discusses the implications for journalistic production and suggests possible directions for future research.

Another important aspect is the temporal factor. This is not a question about the relevance of the original paper but about how its observations were transformed into practical advances or derived in just over a decade. Therefore, the methodological option addressed is a review of the literature produced on the treadmill, not observing one object or another. This look also allows us to understand how important the initial production was through those who quote, question, and expand it.

2 Methodological process

The methodology uses a predominantly theoretical bias, which resorts to the literature review on the subject, where we seek, from the observation of the resurgence of VR, to develop a panorama to understand the impact of De la Peña's original article, its academic and development advances as a journalistic product. This

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bibliographic path also produces a state-of-the-art on the subject. This approach condenses the review of the arguments presented by the researcher and by those who started from her gaze to expand research on the IJ.

> Bibliographic research is carried out from the available records resulting from previous research in printed documents, such as books, articles, theses, etc. It uses data or theoretical categories already worked out by other researchers and duly registered. The texts become sources of the themes to be researched. The researcher works from the contributions of the authors of the analytical studies contained in the texts. (Severino, 2007, p. 122).

From the question involving the solidity of the article by De la Peña, we review the literature on the concept of IJ in the third stage of the work. The articles were selected not based on a specific journal or database but on internet searches of the terms "immersive journalism", "virtual reality" and their translations into English and Spanish. Along with the stage of collecting these studies and owning the primary VR devices launched between 2015 and 2020, such as Google Cardboard, Oculus Rift, Go, Quest 1 and 2, PlayStation VR, and HTC Vive, the authors began a search for VR experiences in distribution environments, highlighting the location of artifacts with journalistic aspects not in traditional press vehicles, but in virtual stores of digital interactive content. The appropriation, analysis, and experimentation of the qualities of these artifacts occurred from direct observation and correlation with the constant elements of the reference matrix in the work of Rocha (2020). As we will try to develop, still in the third stage of the article, we identified that the academic literature that discusses the work of De la Peña did not address, in its majority, contents similar to those that the authors located in these distribution environments, but that they are present in works prior to that of De la Peña, such as Biocca and Levy (1995) and Pryor (2002a, 2002b, 2004), which address other forms and possibilities of the use of VR in the encounter of journalism.

The critical analysis and its subsequent conceptual proposal were based on bibliographic references of journalistic works that go from theoretical bases, such as the one developed by Genro Filho (2012), to corporate journalistic manuals, such as Bonner (2009) and Folha (2010). Along with observing these patterns, we used the work's central question about the impact and solidity of De la Peña's concept to demonstrate that there is a limitation to the agency of

users when using VR technologies. Moreover, it extends already in the principles of De la Peña's IJ to Pavlik's experimental journalism (2019, 2021). What the developer industry has chosen to simply call a documentary, the authors conceptualize in another way: the journalism of exploration, explained in the fifth stage of the work, also from a bibliographic reference.

From the sixth stage, the authors return to focus on bibliographies in the field of computing, computer-mediated interaction, and game development to introduce an essential element of the concept of exploration journalism: game engines (GE), a term almost absent among the bibliography consulted in the third stage of the work.

3 A decade of immersive journalism: achievements and limitations

In 2012, a series of events transformed VR technology. It launched on the Kickstarter platform, a campaign to raise $ 250,000 to produce a prototype, the Oculus Rift, aimed at the community of those interested in this technology, stagnant in the computational limits of the late 1990s and called by simulator pioneer Tom Furness as "the winter of VR" (Jerald, 2016, p. 27). In the same year, the first VR experience was screened at the Sundance Film Festival (De la Peña, 2019; Frontline, 2019). *Hunger in Los Angeles*' pioneering spirit catapulted De la Peña and his IJ into the media spotlight (Goodman, 2012; Kavner, 2012) even before the Rift emerged. Among the technology's developers, its importance has earned De la Peña the nickname "godmother" of VR (Volpe, 2015; Helmore, 2015; Knoepp, 2017). Unfortunately, this credit was not valued in two essential accounts of the current history of VR. Lanier (2017), recognized for coining the term RV (Rheingold, 1992; Sherman & Craig, 2003; Ryan, 2001), does not mention De la Peña in his anthology of stories about technology development. Harris (2019) mentions her work only in a small excerpt of his book about the revolution started by Oculus and Facebook that transformed VR. He discusses the participation in Sundance but without also mentioning De la Peña. For some reason, De la Peña's (2019) thesis, which has 137 mentions of the VR theme, does not mention the names of Lanier and Palmer Luckey, the intern who worked with the researcher at the University of Southern

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California and founded Oculus. While Lanier chose to devote efforts to social media criticism (Lanier, 2018) and Luckey focused on developing the Oculus Rift, De la Peña continued the development of content involving journalism and VR. Three years after *Hunger in Los Angeles*, De la Peña and Emblematic, the company created to develop IJ's content, have created a new application, *Project Syria*. Again the reviews were highly favorable, and the main highlight was the possibility of generating empathy. As much as Lanier reinforced his protagonism in the 1980s with this concept, it is more likely that the term empathy towards VR was influenced by the work *Clouds Over Sidra*, a 360º video produced by audiovisual producer Chris Milk in 2014 in the Za'atari Syrian refugee camp in Jordan, and the subject of a high-profile TED event. With this approach to Milk's work, there was no lack of relations between the potentiality of VR to place itself in the vision of the other. Constine (2015), in a report for TechCrunch, described that, in essence, a VR device is an empathy machine. Garling (2015), for Wired, highlighted the relationship between VR, empathy, and journalism. In this whirlwind of ideas, few saw VR as "the future of news" (Goodman, 2012; BBC, 2014; Carson, 2015; Watson, 2017).

In the academic field, De la Peña's work has also received significant attention from female authors (Aronson-Rath, 2015; Kool, 2016; Slater & Sanchez-Vives, 2016; Sirkkunen, 2016; Uricchio et al., 2016; Longhi, 2017; Herrero & Garcia, 2017; Jones, 2017; Nakagawa, 2017; Niblock, 2015; Seijo, 2017; Sánchez Laws, 2017; Sundar et al., 2017; Watson, 2017; Shin, 2018; Shin & Biocca, 2018; Mabrook & Singer, 2019; Paíno-Ambrosio & Fidalgo, 2020; Kukkakorpi & Pantti, 2020; Irigaray & Lovato, 2021; Lima, 2021; Rocha & Rocha, 2021; Lima & Barbosa, 2022; Rodrigues et al., 2022; Vallance & Towndrow, 2022). While the research of 2013-2019 are focused on the analysis of the concepts, the research from 2020 onwards seem to operate in mapping and categorizing these studies. However, it is possible to notice that the approach of the concept of IJ has spilled over into modes of immersion to which they are not part of the author's initial proposal, not only in the research already mentioned. The works of Uskali et al., (2020) and Sánchez-Laws (2023) are some of the examples that expand IJ to 360º video, augmented reality, cinematic reality, and mixed reality. Watson (2017), in a significant report developed by the Reuters Institute, reports that, after all, what traditional news organizations have primarily produced are 360-degree videos. The

term VR has also been adapted for uses other than eye devices. CNN, for example, perhaps out of a need to demonstrate the novelties of the spherical video feature, highlighted that VR was potentially allowed to any technological device, from monitors to cell phones, as shown in figure 1.

Image 1

CNN Guidance for VR Content Access

Source: CNN.com[1]

Janet Murray (2016) identified the confusion of terms, highlighting two main errors: 1) VR is not a film to be watched but a virtual space to be visited and browsed, and 2) empathy is not something that automatically happens when a user puts on a VR device. What Murray addresses is no different than De la Peña's conceptualization. In the article where he coined the term, De la Peña does not mention the use of 360º videos, and neither can we observe them in his productions. This can be confirmed from the only environment in which it is possible to access the contents developed by her and her team at Emblematic Group. We will not find De la Peña's works on YouTube or another audiovisual platform but on Steam. This digital gaming platform gathers more than 132 million users interested in interactive content every month. This application belongs to Valve, a game developer with titles such as *Half-Life*, *Portal*, *Counter-Strike*, and *Dota* franchises.

Thus, the first consideration is that traditional journalistic companies explored the essence of De la Peña's IJ without depth. Works

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such as those of Sirkkunen (2016) and Mabrook (2019) demonstrate among the analyses 360º video content. Few works developed within the premises of virtual environments allow more than interactivity, but the agency, which Murray (2003, p. 127) understands as the "rewarding ability to perform meaningful actions and see the results of our decisions and choices". Consequently, there would be a gap in the research since many studies addressing the IJ ended up dealing more with the use of 360º video than the central basis contained in the origin of the concept, the essence: "The fundamental idea of IJ is to allow the participant actually to enter a virtually recreated scenario representing the news. (...) The application of interactive digital media to journalistic practice spans a broad spectrum, from illustrations and infographics to 3D experiences embedded in video games" (De la Peña et al, 2010, p. 292).

This phenomenon of deviation of the route between the theoretical proposal and the corpus of analysis can be observed even in researchers of important journalism references, such as those developed by Pavlik (2019). Even when referring to VR to build elements that make up his experimental journalism, Pavlik proposes the analysis in ten experiences that he calls i-Docs, and not VR, produced between 2009 and 2015. Pavlik's corpus involves materials developed before the launch of the primary VR devices: Oculus Rift, PlayStation VR, and HTC Vive, all released in 2016, called the year zero of technology (Alpeyev, 2016) and considered the first commercial generation of VR. Along with these devices, in the same year, we had the launch of devices for the use of AR, such as the Microsoft Hololens.

In 2019, Google released the source code of the Cardboard platform, the most common VR access model through the coupling of the smartphone to the eye device, for unrestricted use by developers. Robertson (2019) considered that because VR in smartphones cannot provide the same experiences as more advanced systems, "as developers began learning what really worked in VR, the gap became increasingly obvious". In Robertson's view, VR through smartphones "is already part of the past".

However, just as the 360º video does not seem to define the initial purpose of De la Peña, the closure of Google Cardboard does not decree the end of IJ since the contents of IJ did not operate on Google Cardboard. Again, content developed by De la Peña, *Kiya* (2015), *One Dark Knight* (2015), *Project Syria* (2016), *Hunger in Los Angeles*

(2017), *Air Rage* (2017), *Across the Line* (2017), *After Solitary* (2019), and *Greenland Melting* (2017) is only available for access through Steam, requiring a device like the Oculus Rift or HTC Vive.

In this stage, we seek to make an introduction to the theme and present an epistemological view of the IJ field to discuss the limitations of the concept. Next, we will discuss the need to reconfigure traditional journalism practices when choosing to use VR, as well as examples of journalistic experiences developed based on our concept proposal.

4 Journalism and the VR ecosystem: challenges from device consolidation to interactive narratives

The emergence of the VR economy has brought a set of different electronic devices in the consolidation phase, competing among several factors to reach a preference among users of this technology. All devices released from 2014 onwards have had their handsets discontinued or have undergone upgrades. According to Steam's data, as of March 2023, nearly 50% of users who own VR devices had the Oculus (Meta) Quest 2 model. Launched in 2021, it was the fifth device developed by Facebook and is the successor to the Oculus Rift (2016), Oculus Go (2017), Oculus Quest 1 (2019), and Oculus Rift S (2019) models.

Quest 2 has reached essential milestones of popularity for the technology. At Christmas 2021, specifically between December 23 and 29, the application necessary to allow the startup of the device that needs to be installed on the owner's smartphone reached the mark of approximately 2 million downloads. The installation of this app, which indicates the launch of new VR devices, has surpassed the download of apps like TikTok, for example (Perez, 2022).

In this sense, it seems fundamental to reflect on the IJ, according to the premises of De la Peña, along with the development of the technology industry that moves its fundamental support: VR devices. Furthermore, when we look at the potential of VR devices, such as hand and head tracking, flexibility for development based on Android and Windows systems, and wireless operation capability, we identify some technical and dynamic limitations to which it was developed. In the materials produced by De la Peña, users are free to choose what to look at and, depending on the type of content, move in the virtual environment. However, it is not allowed to affect

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the linear nature of the non-fiction narrative of traditional media. This absence was even a highlight in the premiere of *Hunger in Los Angeles*, as De la Peña herself reports:

> Despite having been built on a gaming platform, Hunger in Los Angeles offered little agency to the participants. They could not affect the linear nature of the narrative, which unfolded much like the real events of the day and no intervention could have shifted time or the events in the physical world from which it was captured. There were no levels, no points. This was part of the design; after all, one cannot change events that unfold in the real world. Like a news or nonfiction story, participants were simply witnesses. This lack of being able to control or affect what was happening was registered in both the survey data and noted repeatedly participants' comments. "I did feel disempowered about being unable to get help or speed up the process to getting the man help." Finally, in a comment that in many ways summarizes the overall experience of immersion, empathy and frustration, a participant said, "I did feel bad I couldn't help the seizure victim. I felt like I was really there. Made me understand what They went through [...]" (De la Peña, 2019, p. 43).

This frontier that involves the limits of watching and witnessing is one of the points that this work intends to begin to question. This limitation of the JI in not allowing the audience's participation in the conduct of the narrative goes against one of the primary potentialities of digital interactive artifacts. As the simulations developed for VR operate from the same software used in the production of digital games, there is the technical possibility of producing paths and outcomes that depend on the actions taken by users. Janet Murray (2003, p. 46) projected something in the early 1990s.

> [...] we can see that the originality of the story also lies in its dramatization of the narrator's position in the audience as he attempts to turn a linear, passive medium into an interactive one. The question that is tormenting him is not whether he can bear to witness the past by watching the painful film unroll, but whether he would choose to change it if he could (Murray, 2003, p. 46).

Among the VR productions, a good variety of titles already allow for the narrative characteristics envisioned by Murray. In this sense, there is a need for research interested in the relations between journalism and VR to turn attention to works such as *Harvest of Change* (2014), *I am a Man* (2018), *Chernobyl VR Project* (2016), *Blindfold* (2017), *Home After War* (2019), *Greenland Melting* (2019), *National Geographic Explore VR* (2020), *The Choice* (2022). Considering productions between 2014 and 2019, this gap in the research is

justified since it has already been observed here the different VR systems available since the year 2016. However, with the expansion of access and an inevitable consolidation of a device, in this case, the Meta Quest 2, it is suggestible to consider the potentiality for a new observation of these pieces and what they represent, no longer for the IJ and its limitations, but for a new way of thinking and producing journalism for VR and augmented reality (AR) technologies.

Looking at the developers of this content, what can be seen is that the idea of a type of content similar to De la Peña's IJ was realized, but not by traditional journalistic companies. It was structured by independent producers, or indies, following a common logic of the games industry. Another observation is that we will not see descriptions related to journalism in any of them but in the documentary. Regardless of the framework defined for these contents, it is possible to confirm that VR development environments present themselves as a fertile field for the exploration of new narrative models aimed at the participation no longer of users but within what Galloway (2006) calls operators. An operator is an agent that recognizes the ability to exploit and react to the simulation of the virtual environment.

5 The constitution of an exploration journalism

The ability not to compel the linearity of content but rather the act of exploring interactive elements and environments suggests a model of journalism that we will conceptualize here as exploration journalism. The characteristic of exploration requires that sometimes it is necessary to lose oneself to know different paths to reach a goal or conclusion about an act. It is also the attempt to develop an understanding of a type of phenomenon determined and benefited by the spatial construction of virtual environments, where there are no guarantees of a conclusion of the facts. This is because discoveries in exploration open doors not allowed by journalistic objectivity. On the contrary, it will enable new ways of understanding the world because it acts in a field of the intelligibility of the events of the journalistic narration from a speed the operator determines.

From this proposal, the constitution of a mode of journalism opposed to the practice of a traditional element emerges potentially: conciseness (Bonner, 2009; Leaf, 2010). It results from the technique

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that facilitates understanding through a refined system and is always limited to time and space. Exploration journalism proposes an opposite path without temporal or spatial limitations. It operates at the pace of what belongs to the digital and within the characteristic defined by Manovich (2002) as a space journey, in which navigation through 3D space is an essential, if not the main, gameplay component. This characteristic blur accuracy and ends the brevity of practices such as lead and inverted pyramid (Genro Filho, 2012). In the virtual environments of exploration journalism, understanding occurs through the collection and manipulation of objects, information, and resources that allow the operator to understand the small elements that define the journalistic event represented.

Exploration journalism exercises what Biocca and Levy (1995), and Pryor (2002a, 2002b, 2004), pioneers of the potentialities between journalism and VR (Rocha, 2020) signaled to us about the interaction with the news. The role of this agent, which determines the progress of the narrative, is one of the main points of reflection about this new mode of expression. This new set of possibilities for action, which transforms the condition of the audience for interagents of the plots (Vázquez-Herrero et al., 2020, p. 73), demonstrates that the new forms of consumption of information and entertainment arising from technological advances in the field of interactivity and audience participation require new technical, aesthetic and narrative skills of content producers. And it seems fundamental that journalists know their capabilities, demands, and responsibilities. It is expected that with each coupling of new technologies to traditional modes of journalism occurs a series of events involving elements of risk to the flexibilization of journalistic ethics. This was the case with the adoption of computers in journalistic making, digital photographic editing (Goldberg, 2016), the use of computer graphics (Tomlinson, 1992), simulation (Friendly, 1989; Randolph, 1989; Weinstein & Haithman, 1989; Powell III, 1998, p. 95) and interactivity (Katz, 1992).

On the use of VR for journalism, Pavlik (2019, 2021), for example, divides the problem of these ethical issues into three areas. First, while he thinks immersive media can promote greater user engagement and increase empathy, it can also lead them to believe that the virtual is real, contributing to the increasingly fine line between fact and fiction. Second, immersive media can negatively affect user privacy. Traditional cameras restrict to a limited range what can be recorded and seen, and individuals physically present

at a news location can readily see and appreciate if they are being captured by a camera. VR cameras, or 360-degree cameras, can have an entire panoramic view, and people may not realize that they are being observed, recorded, or even broadcast. Third, the use of immersive media in reporting can change the story, possibly affecting the behavior of news sources or core subjects of a story.

It is possible to note that the second question listed by Pavlik is related to 360º video and not to VR developed from computer graphics. On the other issues, it is possible to consider some elements. Perhaps the most important of these is that immersive technologies amplify journalism's ethical responsibilities. This proposal does not relax any of the ethical issues. On the contrary, they confirm Pryor's (2002a) point that new technologies increase the journalist's role.

Just as film, television, comics, and video games classify the type and age groups to which content is broadcast, these principles should serve as the basis for producers of exploitative journalism. The simulations must know how to measure the recreation of the scenes and use elements that can impress, in a traumatic way, if, for example, in stages with the use of blood or resulting from representations about any violence. The operator should even be allowed to control the visual and sound levels of the experiments.

VR journalism aims to offer a new, perhaps unique, way to understand events. More important than the embarkation of the operators in the narratives developed by exploration journalism is the result at the end of the experience. The operator must understand a more complex world, with nuances that allow him to relate the various contexts represented. Exploitative journalism doesn't replace reality; it helps explain existence.

Another goal of exploration journalism is to enable a vital feature of this interactive digital environment: repetition. The production of experiences should seek to develop plots inviting the operator to repeat and experiment with the content as often as possible. Each experience should present a previously unnoticed detail. But to meet this approach, it seems mandatory to adopt new perspectives for the relationship between entertainment and information, an articulation in which the limits generate heated debates in journalism's theoretical fields and practices (Dejavite, 2007).

The new narrative languages require updates of practices and new professional qualifications. In the case of the journalistic industry, both for companies and especially for journalists, there is

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a unique opportunity to choose between mastering a new language or letting computer professionals, for example, continue not only determining the production processes but producing proper symbolic elements with the public. In the view of Manovich (2013), in this "age of software", the "computer moved from the 'culturally invisible' to be the new engine of culture". It is necessary to consider the "visible" software, operated by users, and the gray software, which manages all the systems and processes of contemporary society.

And among the various layers that constitute the production of exploration journalism, after the consolidated elements of the area, we also need to understand one of its particularities. This layer of software fundamental to this practice brings Communication closer to digital games by using its production tools to develop experiences in three dimensions and new devices.

6 Introduction to the production of exploration journalism: potential and challenge of game engines

Graphics, user experience, interfaces, interaction, gameplay, mechanics, artificial intelligence. These are some of the words that have migrated from the domain and vocabulary of players, developers, and researchers of content involving Human-Computer Interaction (HCI) and Three-Dimensional User Interfaces (3DUI) (LaViola et al., 2017; Ortega, 2016) and now compose central elements to communication researchers in their analyses involving products such as immersive experiences. However, it is critical to understand the architecture of the layers that operationalize this set of elements.

Starting at the end, what the user sees, or the operator controls is termed as content given to the interface. Johnson (2001) briefly highlights the different degrees of this element and considers that among the highest representations of interface, would be the pioneering VR installations in its emergence in the 1990s. The author corroborates what Foley (1987), in one of the pioneering works to present artificial realities, a concept before VR and AR (Krueger, 1991; Lanier, 2017), highlighted that in its origin, the first objective of VR was to allow more visual programming, with more intuitive interfaces than the heavy and expensive lines of code that, even today, are perhaps the main obstacle to the development of applications. In the view of Galloway (2012, p. 33), "an interface is not a thing, an

interface is always an effect. It is always a process or a translation". Also, according to Galloway (2012, p. 24) an interface is an ideological set. Our proposal does not aim to discuss this.

Regardless of approaches to interfaces, what's key is that this layer of VR applications is underpinned by a set of codes and mechanics generated by a GE, or game engine, a platform on which the 3D elements of an application can be manipulated. Atkins (2012, p. 230) states how we see and what we see on the screen is controlled and determined by GE. Among developers, it is common to associate GEs with the idea of a sandbox, a sandbox in translation, a place that refers to the activities of the imagination in childhood for the creation, without limits, of castles, tunnels, and all kinds of themes and adventures (Hoecke et al., 2015, p. 103). When we have previously observed the journalistic productions that we consider practical examples of exploitation journalism, we will locate many characteristics among these productions. But there is a fundamental similarity. All were developed from the Unity and Unreal GEs. While operationalized content in web environments is based on HTML, the GEs in the development of journalistic content in VR and AR are almost unanimous (Jungherr & Schlarb, 2022).

Much of this software in its origin was created for a specific game or product and was later transformed into development platforms, but it is essential to differentiate GEs from the content they produce. According to Freedman (2020, p. 12), "GE is a data-driven architecture, a software framework, while a game contains coded logic or special case code to render specific types of assets", varied elements that make up a game. GEs are complex systems that can carry numerous editors, from writing code in the programming language to producing and rendering videos that will be used in the commercial dissemination phases of these products. Its use is not determined only by industry professionals, called AAA, and responsible for large franchises. From the popularization of GEs, in the 2010s, the development studios now known as indies emerged.

> With the release of powerful game engines such as Unity and Unreal, the average person can develop video games using the same tools and technologies as the big studios. Also, with the rise of digital delivery mechanisms, it is easier for a small studio to get their games to market and find buyers, especially with the rise of the mobile systems as a gaming platform. (Miles, 2016, p. 7).

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Among the main characteristics of GEs is the streamlining of digital content development processes. The contents coming from this type of platform are mostly called games. Still, the penetration of GEs in architecture, artificial intelligence, manufacturing, and production activities for shows, cinema, television, and audiovisual derivatives is increasing. Freedman (2020, p. 13) points out the importance of understanding the role of GEs in the digital economy:

> Engines are transforming the commercial landscape of film and television, and becoming central to new media economies and new experiences in augmented and virtual reality. Game engines are responsible for running most simulated environments, and while they may be complexly layered software development tools, composed of multiple subsystems, many have become so visually oriented that they allow content developers to avoid the complexities of code.

By carrying a vast set of libraries that prevent developers from having to reconstruct elements related to the entire structure necessary to build a simulation environment, GEs aim for creators to focus more on the dynamics of artistic and programming content than on bureaucratic and repetitive tasks, such as physics attributes and graphics rendering. It is from GE that a developer will be able to simulate the effects of gravity, fundamental in racing games, for example, or generate movements in three-dimensional images based on a map determined by two-dimensional images, a command called unwrap, or the "wrapping" of a 3D object by textures determined by a photograph. It is also by GE that the complex behavior of light can be represented, as well as relationships with the possible collisions of this object in a virtual environment.

GEs are about simulating the laws of the world in a digital environment. As Millington (2010) points out: "When we talk about physics in a game, we are referring to classical mechanics, that is, the laws that govern how large objects move under the influence of gravity and other forces". Also, according to Millington (2010), more than knowing how to guide physics only by describing mathematical variables is required. It is necessary to understand the elements of the physical world to seek a satisfactory representation: "The physics engine is a big calculator: it does the math necessary to simulate physics. But he doesn't know what needs to be simulated. In addition to the mechanism, we need game-specific data representing the objects at our level".

In this sense, those interested in developing journalistic content from VR must understand basic notions of the stages

of programming events and actions of the content. A resource to expand the power of development not determined exclusively by the areas of programming.

> We have entered a phase where physics simulation is a commodity in game development. Almost every game needs physics simulation, and every major development company will have an in house library, or license one of the major middleware solutions. Physics, despite being more common than ever before, is still somewhat of a black box. The physics developers do their stuff, and the rest of the team relies on the results. (Millington, 2010, p. 18).

It is standard that among the first decisions of a digital product is the definition of which GE will be used. From this choice occurs the sequence of decisions that will dictate which other software will be used in the development of the work. The selection of GE and its development align with Manovich's (2013, p. 337) meta-middle proposal, where permanent extensibility is a key characteristic. In this format, algorithms and techniques that operate with shared data, text, photo, and video work harmoniously and can undergo changes anytime by anyone with the necessary skills, the open source format or open source. This transfer occurs exclusively digitally, driven by project-sharing platforms, such as GitHub, for example, determined most of the time in the free-to-use format. Freedman (2020) adds to the upgrade mode of these tools the characteristics of modularity, efficiency, adaptability, expandability, and reuse. They are guiding principles of GEs aimed at a higher life cycle.

Before we move on to the final considerations, mentioning some elements necessary to formalize the difference between newsgames and exploitation journalism is essential. Although they may share some similarities, especially in the production stage, they are distinct concepts. The difference between the two occurs already in the work of De la Peña et al (2010, p. 292), in which he already mentions the differences involving levels of immersion in newsgames limited by the conventional model of relationship with the contents, such as the use of mouse and keyboard, for example. Newsgames are electronic games that can use scoring systems, time to perform tasks, and other dynamics more related to the scope of gamification or serious games (Michael & Chen, 2005, p. 27) than the exploration of objects and environments. They can be used to explain complex concepts, illustrate social or political trends, and even simulate real situations, but they lack immersive elements and agency.

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7 Final remarks

As a problematizing issue, the need to adapt journalistic practices to the new tools for producing experiences in VR, our proposal identifies the environment of the dynamics of digital games as a fertile field for the exploration of new narrative models aimed at the participation of users. But the notes raised here seek to find ways to ensure the maintenance of journalism as a protagonist agent, of reflection, and with the capacity to attract new audiences. However, this involves new technical capabilities and the dissolution of concepts that reduce these narratives and their enabling technologies as inferior, distracting, or simplistic means of understanding. Finally, we do not assume that incorporating any new capacity for narrative production involves abandoning technical and ethical practices.

Exploration-based journalism proposes understanding new formats of creation and other ways to sensitize the public about a message. As in the productions mentioned earlier, inserting the public in a synthetic environment allows them to go to other domains or insert objects in the surrounding context to use notions of production of spatial sensations and, thus, produce a sense of immersion whose audience experiences and reflects on a fact or an issue without leaving its place, but producing this sensation.

To this end, Communication must intensify its dialogue with similar areas, especially with digital games. Both seek the attention and interaction of the audience to convey narratives. Game design professionals understand not only the tools, such as the GEs but also storytelling principles that mainly involve acting in a digital space and dialoguing with other digital characters. In this way, the interagent (a word used in Portuguese) or operator is invited to investigate a scene or a scenario presented before him, which demands initiative for the plot to proceed.

Presenting a narrative proposal in VR makes it possible to go beyond the sensation of immersion from the production of presence. Exploration journalism seeks to aggregate knowledge from other areas to contribute to new ways of raising awareness. Thus, in addition to bringing new audiences together, it contributes to others understanding of how to use different devices inclusively and interactively. Therefore, exploration journalism seeks to explore the narrative possibilities offered by VR technologies to overcome the limitations of the technical approach of immersive journalism. Its

main characteristics are the production of a narrative determined by the operator's curiosity and the invitation to repeat and try the content as many times as possible, presenting previously unperceived details. In this sense, each user produces their own informative and reflective experience. It is not about reinventing journalism but updating it to take advantage of the integral possibilities of VR, here treated as a new medium of communication support.

NOTES

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