DOSSIER

AUGMENTED REALITY IN THE PROGRAM 'UNA HORA MENOS' FROM RADIO TELEVISION CANARIA:

the eruption of the volcano Cumbre Vieja of the Palma (Spain)

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ABSTRACT – The main Spanish television channels have incorporated augmented reality into their information content. Radio Televisión Canaria (RTVC), in programs such as 'Una hora menos', significantly includes this narrative element in the news coverage of the eruption of the Cumbre Vieja volcano in La Palma (Spain). This research focuses on its use during the period of activity of the volcano, and designs a pattern of analysis to classify the broadcasted pieces. In-depth interviews with RTVC professionals and technology experts add value to this study. The results show that static and enveloping AR elements predominated. In the former, the informative function stands out, and in the latter, their didactic nature. The anchor's interaction was limited. Music was always present and sound effects were frequent. RTVC has won numerous awards for the best news coverage in 2021.
Key words: Immersive experience. New narratives. Radio Televisión Canaria. Augmented reality. 'Una hora menos' program. Cumbre Vieja volcano.

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REALIDADE AUMENTADA NO PROGRAMA 'UNA HORA MENOS' NA RADIO TELEVISIÓN CANARIA: a erupção do vulcão Cumbre Vieja em La Palma (Espanha)

RESUMO – Os principais canais de televisão espanhóis incorporaram a realidade aumentada em seu conteúdo de assuntos atuais. A Radio Televisión Canaria (RTVC), em programas como 'Una hora menos', inclui este elemento narrativo de forma significativa na cobertura jornalística da erupção do vulcão Cumbre Vieja em La Palma (Espanha). Esta pesquisa se concentra em seu uso durante o período de atividade vulcânica e projeta um padrão de análise que estabelece uma classificação das peças transmitidas. Entrevistas em profundidade com profissionais e especialistas em tecnologia da RTVC agregam valor a este estudo. Os resultados mostram que predominam as peças estáticas e imersivas. Na primeira, destaca-se a função informativa e, na segunda, sua natureza didática. A interação do apresentador é limitada. A música está sempre presente e os efeitos sonoros são freqüentes. RTVC ganhou inúmeros prêmios para a melhor cobertura jornalística em 2021.
Palavras-chave: Experiência imersiva. Novas narrativas. Radio Televisión Canaria. Realidade aumentada. Programa 'Una hora a menos'. Vulcão Cumbre Vieja.

LA REALIDAD AUMENTADA EN EL PROGRAMA 'UNA HORA MENOS' DE LA RADIO TELEVISIÓN CANARIA: la erupción del volcán Cumbre Vieja de La Palma (españa)

RESUMEN – Las principales televisiones españolas han incorporado la realidad aumentada a sus contenidos de actualidad. Radio Televisión Canaria (RTVC), en programas como 'Una hora menos', incluye este elemento narrativo de manera significativa en la cobertura informativa de la erupción del volcán Cumbre Vieja en La Palma (España). Esta investigación se centra en su empleo durante el periodo de actividad del volcán y diseña un patrón de análisis que establece una clasificación de las piezas emitidas. Las entrevistas en profundidad a profesionales de la RTVC y a expertos en tecnología aportan un valor añadido a este estudio. Los resultados muestran que predominan las piezas estáticas y las envolventes. En las primeras destaca la función informativa y en las segundas su carácter didáctico. La interacción del presentador es limitada. La música está siempre presente y los efectos sonoros son frecuentes. La RTVC ha obtenido numerosos galardones a la mejor cobertura informativa en 2021.
Palabras clave: Experiencia inmersiva. Nuevas narrativas. Radio Televisión Canaria. Realidad aumentada. Programa 'Una hora menos'. Volcán Cumbre Vieja.

1 AR in RTVC

On September 19th, 2021, the volcano Cumbre Vieja, located in the Canary Island of La Palma (Spain), erupted after half a century of inactivity, and the Spanish communication media profusely covered this unprecedented event. Among the information coverage, the one provided by the autonomous channel Radio Television Canaria (RTVC) stood out; more specifically, the coverage in its program 'Una hora menos'. This program, apart from offering direct coverage of the event, provided daily explanations of the volcanic phenomenon and

its possible evolution, through the use of augmented reality (AR). Our study is centered on the journalistic work performed by this program during the 85 days in which lava and ashes covered the Southeastern area of La Palma, by focusing on the use of AR as a new tool to tell the news.

This technology, which combines virtual and real elements (Parra et al., 2017), emerged on television in 2018, with the American channel specialized in weather information, The Weather Channel. That same year, the news programs from Antena 3 in Spain became the first to use it assiduously (Herrero & Jiménez-Narros, 2022), while other channels, such as La 1 from Radio Television Española (RTVE), Telemadrid, or Televisión de Cataluña (TV3), all of which are publicly funded, also wagered on this resource, mainly in special programs. Additionally, we also find the first use of AR in Europe (BBC, France 2, RAI, RTL) and other channels in the United States (CBS and NBC). The case of Eurosport is especially interesting, in which the participating athletes in any competition "materialized" in the set (La Vanguardia, 2020).

As all the channels that used AR up to this point were large and broadcasted nationwide, it was striking that a modest and regional channel, such as RTVC, would take part in this trend. This channel began broadcasting in 1999, more than a decade after the first public autonomous (regional) channels in Spain, following a 'mixed model' in which the Canary Islands government defined a budget, to be managed by a private entity. In 2010, the corresponding concession was granted to Videoreport, which expanded the installations and provided new equipment and personnel to the RTVC news programs, renewing the contract in 2018. The economic resources of the Canarian channel are less abundant than the rest of the autonomic channels, with a per capita investment of 22.47 Euros, as compared, for example, to 73 Euros per Basque citizen from the corporation Radio Televisión Pública Vasca (EITB) (García-González, 2021). Despite the limited resources, the work performed by RTVC has been awarded the Ondas Award (Premio Ondas) in 2021 to the Best program broadcasted by non-national radios or channels (elDiario, 2021), the Best Journalist Award in 2021, granted to its news programs by the Press Association of Madrid (Asociación de la Prensa de Madrid) (APM, 2022), and the National Television Award in 2022 by the Ministry of Culture and Sport (Ministerio de Cultura y Deporte, El País, 2022). These three are the highest awards that could be obtained by a television channel in Spain.

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The audience also awarded this news coverage, with a 14.9% share in September 2021, which has become a historical monthly record. The RTVC obtained the best result from all the channels that broadcast in the Canary Islands (Barlovento Comunicación, 2021a, p. 8). In October, it took second place in the list of channels with the best share (13.1%) (Barlovento Comunicación, 2021b, p. 8) and in November, it was also one of the most watched autonomic channels (8.6%) (Barlovento Comunicación, 2021c, p. 8). The audience in the first half of December reached 7.4%, still above the usual figures for this channel, which are usually 5% to 6% (Barlovento Comunicación, 2021d, p. 8). As for the program 'Una hora menos', between September 1st and December 30th, it obtained a share of 15.2%, with it being the second-highest most-viewed program in the Canary Islands in its daily programming, only two decimal points below Telecinco (Canarias7, 2021).

2 Television loses prominence: the new technologies as innovative elements for capturing the audience

The transformation of consumption habits has had a strong impact on the television medium, with a decrease in viewership observed in the last few years (Asociación para la Investigación de Medios de Comunicación, AIMC, 2022; Fundación Telefónica, 2021). The minutes of daily consumption have changed from 208.9 in 2020 a 207.7 in 2021, while for the internet, the number in the same period has increased from 181.6 to 215.4 (AIMC, 2022, p. 12). This change is particularly evident in the youth, with the mean age of television viewers being 50.3 years old. The attachment to the small screen as a function of age reaches its highest level from the age of 75 (93.2%), decreasing to 73.9% in the 25 to 34 age interval, in which the highest internet consumption is found (97.8%) (AIMC, 2022, p. 13).

Capturing the younger audience demands the production of new formats, for which technologies based on augmented reality could be useful. Concerning the news, Kasem and Wannet adopted the news snacking concept to refer to how new generations access information: "Reading the newspaper or watching TV has been replaced by clicking in social networks, applications, or websites. Even more so, current affairs do not have a separate status from the other content" (2015, p. 14). This approach coincides with the so-called "snack culture" proposed by Scolari (2020), centered on microformats. Nevertheless, the case of the

'Una hora menos' program shows us a change in the news discourse defined by AR. García-Avilés (2021), based on the itemization by Storsul and Krumsvik, point to technology as a key element in the innovation of the media. Likewise, Mabrook and Singer point to the role of the technological factor as an agent that "directly affects the creation and consumption of the journalistic product" (2019, p. 4).

There are consumption possibilities of AR that have not yet been explored by television channels. Users, as of today, do not enjoy an immersive experience, as they do not usually own specific interaction tools (goggles and gloves), and are thereby separated from that which they receive from the screen, which itself marks a physical line between the real world and the virtual one (Domínguez, 2015). In addition, the existing devices have not been explored either, such as smartphones or the 360º sound specialization systems, which can offer a more interactive experience.

3 Virtual reality and augmented reality

Virtual reality (VR) and augmented reality (AR), although related, are very different concepts. Thus, an in-depth analysis of their meaning is needed to better understand the connection between these two technological systems.

The definitions of VR in the scientific literature describe different aspects, with a special emphasis on the technological component. Lanier (1989) was one of the first to associate this tool with the stimulation of all the senses (not only sight) and with the use of artifacts that made it possible for the user to perceive the virtual world as a physical one (Paíno & Rodríguez-Fidalgo, 2020, p. 4). Brudniy and Demilhanova state that "it is the area created with computer technologies and perceived as real" (2012, p. 6), while for González-Zamar and Abad (2020) it is an immersive digital practice that substitutes the real environment with another. As for the tridimensional character of VR and its ability to nullify the surrounding real world, Cantero et al. (2018) point out that in this type of experience, the virtual becomes "everything that surrounds us" (p. 81). Immersion (multisensorial) and interactivity are fundamental when discerning what VR is, as they affect the way that users relate to the virtual world and become involved in this experience (Paíno & Rodríguez-Fidalgo, 2020). As Barreda concludes: "numerous media have seen in it [VR] the opportunity to develop innovative ways to tell stories" (2018, p. 1.107).

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The term 'augmented reality' appeared for the first time in a scientific publication in 1992, introduced by Caudell and Mizell. Both of these authors claim that it is a technology that "augments" the field of view of the user (1992, p. 660). Many authors point out that VR submerges users within a synthetic environment so that they cannot see the real world around them. However, AR allows users to perceive a real context with superimposed virtual objects. That is, "AR supplants reality but does not replace it completely" (1997, pp. 355-356). Parra et al. (2017) highlight the combination of the real and the virtual and consider this characteristic as the difference between AR and VR. Along this line, we find the definition by Tejedor et al. (2020), who identify AR as the "superposition, in real time, of virtually-generated images, signs, or information, on images in the real world" (p. 439).

Within the AR creations in the program 'Una hora menos', we find virtual elements with some movement that cohabit with the anchor, within the guidelines that largely respond to the formulation by Domínguez (2017): "The physical world is still the point of reference. The fluidity of movement in the scene, and the capacity to penetrate the image are inherent characteristics of this technology" (2017, p. 6). Caldera distinguishes, within the evolution in the use of AR in television, a third phase in which there is a reliance on "external devices to visualize AR" (2014, p. 646), which could transform how television is watched, to convert it into an interactive experience. For this, additional elements are added, such as mobile phones, which allow accessing complementary content on different devices. This last stage is still in its initial steps, but a turning point must be assumed, as previously mentioned, in the consumption of television, corroborating the assessment provided by Pavlik and Bridges (2013), on the new narrative possibilities that AR brings to the journalistic discourse.

3.1 AR and immersion: towards immersive journalism

The factor of immersion is present in AR, but the degree of immersion can vary. Darley (2002) believes that certain devices, such as goggles or gloves, are necessary for having an experience in which the representation of the reality created by technology envelops the user. De la Peña et al. (2010) delve into this idea, as they understand immersion to be an essential factor for understanding reality, and conclude that traditional media, in some way, under-represent it.

The application of some technologies (AR, VR, 360º video, binaural audio) to current affairs has resulted in immersive journalism, which consists of "recreating the people's feelings of being in a place, in which a credible action takes place, which they perceive as truly occurring, and where their body is involved in the event, which is the most important aspect" (De la Peña et al., 2010, pp. 299-300). This is then a different way to access the news, in which users disconnect themselves from the immediate context and transport themselves to the place where the events take place, with the possibility of interacting with them and the protagonists. This is the so-called "narrative transport theory" (D'Haenens et al., 2022, p. 342).

Immersive journalism can support itself in virtual and real elements. Its fundamental characteristics have been formulated by De la Peña et al. (2010) as the "confluence of three elements: the illusion of presence in the narrative or news stage, the plausibility, and the possession of a virtual body, that is, of an avatar for accessing the reality represented" (Pérez-Seijo & López-García, 2018, p. 289).

Among the most interesting components of immersive journalism, we must underline the empathy that can be channeled when facing certain situations. The users feel as if they are participating in the event and place themselves in the shoes of the affected individuals. When dealing with the current information saturation, and the resulting indifference, the immersive experience can serve to "restitute the emotional involvement of the audience" (De la Peña et al., 2010, p. 298) and to fight against the loss of awareness and emotional exhaustion against the news (Kinnick et al., 1996). Along the same line, we find Aitamurto et al. (2020), who associate the capacity of AR to generate empathy with its immersive possibilities. But this involvement also brings risks related to the rigor and objectivity of the news content. Pérez-Seijo and López-García (2018) warn about "the manipulation of surroundings, the conditioning of sources of information, and the exposure to sensitive images" (p. 296) as the most relevant ethical dilemmas.

The risk of turning a real event into a spectacle is another of the concerns that have resulted in criticisms against immersive journalism. The use of moving images (the capture is simulated through the use of a "hot head" camera, a drone, or any other resource that intensifies the action), the possibility of resorting to striking light and color aesthetics, or the accompaniment of music, could excessively bring the narration of news closer to what could

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be considered a videogame. The media should avoid trivialization of dramatic situations and users must be aware that a news item is still a construction by a journalist who tries to explain an event from his or her point of view (Nash, 2018). Similarly, Kool (2016) adds: "Under the realism of the VR experiences, it is easy to forget, as a spectator, that history is intentionally being told and constructed" (p. 7). Beyond the technology factor, journalism still needs rigorous and responsible journalists: "The format and tasks change, but not the social function, nor the enunciative act of providing information about relevant facts and pertinent objectives" (Karam, 2017, p. 66).

4 Objectives

The general objective (GO) of the present study is described below:

GO1. To analyze the addition of AR as a resource to support television content, specifically in the program 'Una hora menos', from Radio Television Canaria, by delving into how this technological tool is used for the news coverage of the eruption of the volcano Cumbre Vieja located in La Palma island (Spain), which occurred between September 19th and December 14th, 2021.

To reach this general objective, the following specific objectives were defined:

SO1. To verify the main functionality of the AR elements in the broadcasts of this program, by assessing the prevalence of its informative, informative/aesthetic, or aesthetic character.

SO2. To define the elements and the typology of the AR creations, in the following dimensions: aesthetics, mobile, and enveloping.

SO3. Discover the existing relationship between the duration of the news items that used AR, its type, and functions.

SO4. Identify the didactic character of the AR contents offered by this autonomic channel, and its suitability for explaining an unprecedented event such as the eruption of a volcano.

SO5. Reflect on the degree of interaction by the anchor.

SO6. Record the type of music and the sound effects that accompany the AR element and determine their narrative value.

5 Methodology

Considering the objectives described, the decision was made to use three methodological approaches: descriptive, quantitative, and qualitative. The first is based on a study of the primary and secondary sources that allow us to contextualize, on the one hand, the phenomenon of television, and on the other, the increasingly generalized use of augmented reality, trying to differentiate this technology from other disciplines such as virtual reality and placing it within the practice of immersive journalism.

The most quantitative approach is based on the content analysis of 117 news items on the volcano Cumbre Vieja located in La Palma island, which were supported by the use of augmented reality, and broadcasted for almost three months in the news program 'Una hora menos' of the RTVC. This information space is broadcasted every weekday at 21:30, but starting from the eruption of the volcano, the schedule changed, with its duration increasing (from the habitual 45 minutes, to more than an hour on many occasions), with additional programming on the weekend and some holidays (such as September 19th, 25th, and 26th, October 12th, and November 1st). The programs examined were broadcasted from September 19th to December 14th, 2021. The analysis encompasses the period in which the volcano was active and ended when the National Geographical Institute deemed the eruption to have ended.

To measure these news items, a coding table was created which included different variables relevant to the objectives of the study. The creation of this tool was based on the previous work by Azkunaga et al. (2019) and Herrero and Jiménez-Narros (2022).

The matrix starts with the registration data, indicating the following: subject of the item, type of information, broadcast date and duration, to afterward measure aspects that are more associated with augmented reality.

The following were determined: typology (static, mobile, or enveloping), functionality (informative, informative/aesthetic, and aesthetic), and didactic character. It must be indicated that when the content of the item explicitly provided new information data through AR, as opposed to the anchor, it was cataloged as having an informative function. As this criterion became diluted, we considered the informative-aesthetic option. When the AR did not provide data, but only contextualized the discourse of the anchor, it was decided

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that the function was more an aesthetic one. Also, we considered the degree of interaction of the anchor with the AR, to assess up to what point the anchor was immersed in the virtual recreation. We also observed the presence of numbers, signs, or other explanatory data in each case. Lastly, given the character of the sample, we believed that it was pertinent to record the sound elements, both the music (dramatic, emotive, and neutral), and the effects that were added. We believe that this set of variables and the relationships between them are pertinent for the object of study to be clearly defined.

Table 1

Analysis tool with the variables utilized

ANALYSIS MATRIX	
Registration data (SO3)	
The subject of the item	
Type of information	Current events
	Forecast, evolution and phenomena associated with the volcano
	Tribute pieces
Broadcast date	From September 19th to December 14th, 2021
Duration	Less than 1'
	1'01"- 1' 30"
	1' 31"- 2'
	More than 2'
Link to the item	
Type of AR element (SO2)	
Static	
Mobile	
Enveloping	
Content of the AR element (SO1, SO4, SO6)	
Functions	Informative
	Aesthetic
	Informative/aesthetic
Didactic character	
Presence of data	

Audio	Effects	
	Music	Neutral
		Dramatic
		Emotive
News anchor immersion and interaction (SO5)		
Immersion	Recreated scenario	
	Position on the set (left, right, center, and behind)	
Interaction	No interaction	
	Limited	
	High	
Focus of the AR	Location outside of the set	
	Virtual element on the set	
	Based on signs, numbers, and data	

After the recording and extraction of data, they were filtered and compared through the application of the variables found in table 1, according to the general and specific objectives proposed.

The third methodological approach was qualitative, and it was based on five in-depth semi-structured interviews starting from guidelines that openly discuss and propose a series of matters about the defined contents and objectives. The individuals consulted came from different professional profiles. Two of them were professionals from the 'Una hora menos' program, who cohabited with AR during their work day. More specifically, assessments were collected from the anchors Victorio Pérez, and Fernando García, in charge of the production and design of this television program. The other three were given to experts on new technologies and immersive narratives: Eva Domínguez, Manuel San Frutos and Miguel Oliveros. The table below summarizes the names and professional profiles of the interviewees:

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Table 2

Professionals and experts interviewed

Interviewees	Professional profile
Victorio Pérez Moreno	RTVC news anchor 'Una hora menos' anchor, RTVC
Fernando García Castellano	Professional technician at *RTVC* Producer and director of design of 'Una hora menos', RTVC
Eva Domínguez Martín	Augmented reality expert Professor and researcher from the University Pompeu Fabra (Barcelona). Consultant in new narratives.
Manuel San Frutos Forja	Augmented reality expert Professor at the Complutense University of Madrid. Director of the "Aula Transversal" and Editor at Albdedo.
Miguel Oliveros Mediavilla	Augmented reality expert Professor and researcher at the University of Nebrija (Madrid). His research is focused on the immersive experience applied to artistic creation.

To conclude, we must add that this is a case study, which, as we have explained, focuses on an important example of the use of AR in a television program from a Spanish regional channel that obtained good results without having, a priori, great resources.

6 Results

Before discussing the results, it must be pointed out that within the total sample, we found seven cases in which we found a recurring AR element. The most relevant sample was a news item (September 25th, 2021), that began with the volcano from La Palma as a static element in the set, to which we arrive as if flying on a plane (mobile component), and which ends in an enveloping space with the volcano's cone in the background.

Image 1

Audiovisual element with the three types of augmented reality

Source: RTVC

Another pertinent consideration is that some AR samples with a static element, for example, the map of the location of the La Palma volcano, included dynamic ingredients such as smoke, moving seawater, lava, and seismic waves, which added realism to the creation.

The Cumbre Vieja volcano erupted on Sept 19th, 2021. On this date, the television news program under study did not provide any news with AR, given the speed of the unfolding events. The mean number of these types of creations is normally two, but during the first weeks of the event, especially between the 20th and 26th of September, the number oscillated between three and four, with September 22nd highlighted, as the program on this date included five. When two daily AR news items are broadcasted, the first is normally a map of La Palma that includes the evolution of the volcano, and the second presents different subjects in an elaborate manner, with a more enveloping character.

6.1 Type of augmented reality and interaction from the anchor

The examples analyzed had a variable duration, with the shortest being 37 seconds, with some lasting slightly more than two minutes. The ones that lasted between one minute and a minute and a half were predominant (48%). Only six creations (5%) lasted longer

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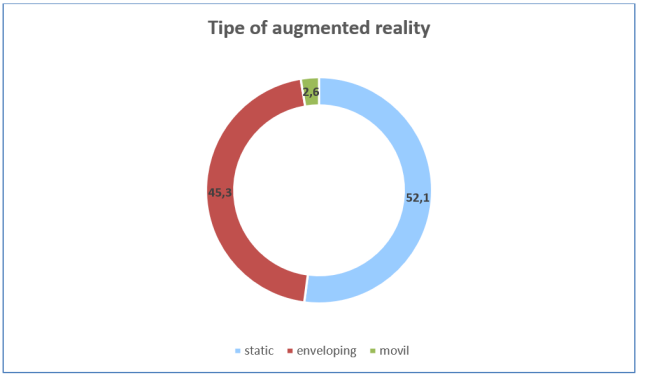
than two minutes, and the aspects that stood out were their didactic character (preview of the development of the natural phenomenon, types of volcanoes, consequences to the sea floor, etc.), and whose functionality was aesthetic or informative/aesthetic.

If we observe the relationship between the duration and functionality, we are considering SO3, and detect that the briefest (less than one minute) were mainly informative. The informative function decreases in percentage as the duration of the AR creations increases. When they are longer than two minutes, they provide analyses and predictions and lean towards an aesthetic functionality, followed by an informative/aesthetic one.

When examining the variable AR typology, SO2, we observe that half of the items analyzed contained a static element in the set (52.1%), closely followed by the most enveloping ones (45.3%), with only three of them being mobile (2.6%).

Figure 1

The static and enveloping AR predominate



When exploring the 61 static AR elements (52.1%), it was verified that the most utilized element was the La Palma island map (88.5%). Other fixed resources were only shown in exceptional cases, such as the earth's crust, a cross-sectional view of the volcano, or the lava tube (image 2). The current events news dominated in most of the cases (82%), while in 18% of them, aspects associated with the volcano were broadcasted in a didactic manner. As for the functions of the latter, 87% were informative, 11.4% aesthetic, and 1.6% informative/aesthetic. Concerning the position of the journalist

with respect to the AR, he was almost always to the left (93.4%). In this sense, the importance of monitoring the space in which the news item is presented was fundamental. Victorio Pérez, the program's anchor, pointed out that:

> We do not have any elements in the set. In the chroma where I move, there are only marks on the floor, which is the area where I walk. They serve as guides, because if I step over them, I go through the cone of the volcano, or the lava eats me. Ultimately, it is a matter of practicing, you have to be aware of many things, glance at the marks, that the story is coherent, and listen to the orders from the producer. (Pérez, personal communication, December 9th, 2021).

In this sense, Manuel de Frutos, an expert in new technologies, grants a great deal of importance to the audiovisual context in which we are still watching television at the moment.

> The one who is slightly more affected is the anchor, who has to manage the space (...). Any mistake could interfere with the narrative (...). We are used to immersive experiences being in the first person, and in this case, they are in the third person. (De Frutos, personal communication, July 30th, 2020).

Image 2

Static AR elements

Source: RTVC

As already mentioned, in second place, the number of enveloping pieces stood out, as almost half belonged to this category (45.3%). About 70% of the enveloping news items were didactic, and in this sense, function of 68% was informative/aesthetic, followed by aesthetic (26.3%). Eva Domínguez, one of the experts interviewed in the present study, indicated that screens will disappear, and for this, we will have to see what this implies to immersive technologies and informative and documentary narration. "A technology by itself does not guarantee and maintain immersion; it has to be accompanied

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by a narrative that is also immersive (Eva Domínguez, personal communication, July 29th, 2020).

The main environments recreated were associated with the area of the volcano, from the valley to the cone, or the crater of Cumbre Vieja. There were also many AR elements in which the anchor was placed on an island in the middle of the ocean. Also, enveloping scenarios were created that showed forests, banana plantations, lava flows, the interior of the sea, or roads that were affected.

Image 3

Scenarios of the enveloping AR elements

Source: RTVC

The creation of all of these immersive spaces is possible thanks to the technological investment made, and the wager on creativity and innovation. Fernando García, a RTVC producer, indicates:

> The models were created in 3D Max, and then there were moved to Unreal Engine. The engine used to bring it to the television and embed the chroma with the timed movements was applied with Pixotpe, a novel system with two tracked cameras in a chroma measuring eleven by seven meters, so that the anchor is free to move. (...) This technology requires a strong investment because it is useless to have programs such as 3D Max if afterward you don't have an engine that can support it for the rendering part. (García, personal communication, December 7th, 2021).

Miguel Oliveros, an expert in new technologies, positively assessed the application of AR, but also pointed to its limited use by the communication media, specifically television, in relation to the

possibilities of interaction. "As a user, you cannot interact with this reality, it is a cinematographic experience, you watch and that's it, you are not inside" (Miguel Oliveros, personal communication, July 17th, 2020).

As for the positioning, in the immersive objects, the anchor was usually in the center of the scene, or to the left, and on some occasions, to provide it with more realism, some elements were placed in front of him, such as rock, grass, or banana tree.

In the sample, only three creations were found with mobile AR elements: a helicopter, different types of volcanoes, and ashes that land on the set.

Image 4

Mobile AR elements

Source: RTVC

The interaction of the anchor with the AR points to SO5, with the predominance of news items in which the interaction was limited to lightly pointing (84.7%). In very few cases, it was high (8.5%), but there were also surprising examples in which we saw: picking up solid and smoky lava from the floor, piloting a helicopter, avoiding the falling volcanic debris, gesticulation before the sound of an explosion, or getting his hands dirty when touching ashes.

6.2 The functionality of the content, incorporation of data, didactic character, music, and effects

If we focus on the variable functionality of the augmented reality elements, we reach SO1 and verify that the informative category prevailed (47.9%), followed by the informative/aesthetic (33.3%), and aesthetic (18.8%). These informative pieces contained basic data (91.1%), such as numbers that indicate distances, numbering the

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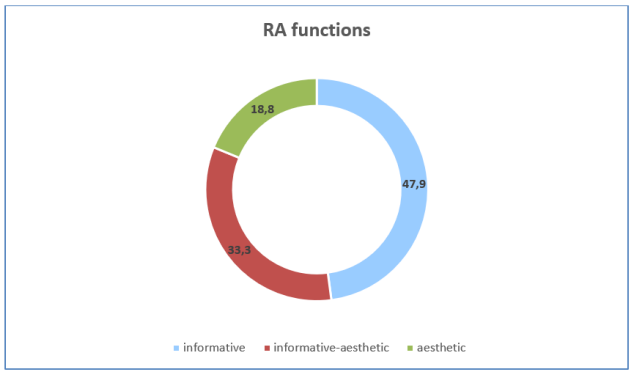
lava flows, or intensity of the seismic events, which were habitually presented as static elements added to the set, and which addressed the latest news.

Figure 2

Functionality of the AR in 'Una hora menos'



A third of the items (33.3%) also had an informative/aesthetic function. In 53.8% of the cases, they did not possess content with data. Also, concerning the typology, almost all of the creations were enveloping (92.3%).

When approaching purely aesthetic augmented reality, we detected that almost two-thirds of it (63.6%) did not show content with data. In addition, 63.6% of the items were enveloping, 31.8% aesthetic, and 4.6% mobile. Most of the AR pieces with an aesthetic function had a didactic aim (86.3%).

As our interviewees pointed out, when the aesthetic prevailed over the informative, we must be aware of not falling into spectacularization.

> I believe that everything that does not provide important data, is useless to the spectator (...). We do not make movies of the volcano, we offer dissemination and we enrich the contents through training. If we recreate a "fajana", we must know why we are doing it (...) It is not to show off or brag, especially since we are talking about a news program on a public television channel. We must be rigorous. (Pérez, personal communication, December 9th, 2021).

An important aspect was that 42.7% of the examples analyzed possessed a didactic character, as confirmed by the program's anchor:

"Our greatest challenge was to take advantage of this technology to educate the population. After the broadcast at 21:30, we believed that our main contribution was the augmented reality element, which explained, in a didactic and informative manner, what occurs above and below the earth" (Victorio Pérez, personal communication, December 9th, 2021).

Most of these educational pieces were enveloping (74%). As for their functions, most were informative/aesthetic (54%), followed by aesthetic (38%). This characteristic allows for dealing with subjects such as seismic events, volcanoes, craters, and lava; consequences of the volcanic phenomenon under the earth and on the seafloor; the origin of the Canary Islands, forecasting and the future of La Palma, among others. The data on the didactic character provided an answer to SO4.

The recording of the music and sound effects is associated with SO6. It was verified that music was added to every AR element in the sample. Dramatic background music was predominant (47%). Neutral music was also habitual (41%), with emotional melodies being less frequent (12%). The sound effects were present in almost all the AR creations (49.6%). Some of the most common were: water splashing, volcano roars, explosions, tectonic plates crashing, sounds of vessels, or the echo of the anchor who is in a cave.

7 Discussion and conclusions

AR is starting to become part of storytelling in current Spanish television. The present study focuses on an especially significant case, due to the technical, aesthetic, and narrative quality of the sample analyzed, and because it came from an autonomic channel, RTVC, which has little experience with the application of this technology in its programs. But the usefulness of AR as a resource for presenting news has already been demonstrated in different programs from public and private channels, both national and autonomic ones. This first conclusion is shared by the scarce academic works on this respect published until now, which stress its experimental character, although at the same time recognize its positive impact on the clarity of the informative discourse. Herrero and Jiménez-Narros (2022, p. 50) consider it efficient for "reinforcing, clarifying, and making the telling of the news more

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attractive". Gaztaka et al. (2020, p. 61) believe that AR has become a useful element for "explaining more complex information and concepts". On their part, Pérez-Seijo and Vizoso (2022, p. 42) believe that it has "an added value as compared to other types of conventional journalism".

A striking aspect of the present study is the capacity of the 'Una hora menos' team to include more than one AR element in each daily broadcast. The habitual mean was two AR creations: the map and an enveloping recreation. There was only one previous news coverage in 2019 by Antena 3 Noticias (Spain), about the Julen case[1], which involved the specific creation of up to four items about the same subject on the same day (Gaztaka et al., 2020, p. 60), although they were distributed in different news programs over a shorter period (thirteen days).

It was observed that the duration of the pieces determined the content, type, and function. The shortest ones lasted less than a minute, and were mainly about the volcano's day-to-day, with a fixed element on the set, and with mostly an informative function. The longer ones, lasting more than two minutes, were less focused on the current events, and addressed the evolution of the phenomenon, to explain its possible consequences. These were examples of enveloping AR, with an informative/aesthetic, or aesthetic function.

Continuing with the types of AR, the frequency of the static and enveloping elements was similar, while the mobile ones appeared occasionally. Within the fixed creations, the map of the island stood out, and was always reinforced with dynamic components, such as smoke, water, lava, or seismic waves. With respect to the enveloping pieces, they recreated a variety of locations, from the volcano's crater to the bottom of the sea. These AR items were visually attractive, and at the same time they complemented the news in a very interesting manner. In the specific case of the coverage by RTVC, Pérez-Seijo and Vizoso place value on "the contextualization of the news story" (2022, p. 43). This contextualization was made possible, at certain times, through the combination of different fixed and mobile AR elements in the same news item on the set, to afterward bring us to an outside location recreated in an enveloping manner.

One of the most striking aspects of the sample was its didactic vocation. Beyond the daily news, a great effort was detected to explain

what was occurring. Pérez-Seijo and Vizoso (2022) agree with this assessment, highlighting the information dissemination potential of AR, and how it eases the understanding of a natural phenomenon. The enveloping pieces contributed the most in this sense.

Aside from this characteristic, the function that most stood out was the informative one, followed by the informative/aesthetic. The aim was associated with breaking news. The informative component was also underlined in other studies (Herrero & Jiménez-Narros, 2022; Azkunaga et al., 2019).

Another fundamental aspect of our analysis was centered on the interaction of the anchor with the AR, limited in most news programs, and which consisted of lightly pointing. Although examples of high interaction were scarce, they were able to transmit to the audience a feeling of realism. This is a type of staging, in which the journalist does not experience an immersive experience. Nevertheless, his work is essential for guiding the narration. Gastaka et al. (2020) consider it as a nexus of union between AR and the spectators, while Pérez-Seijo and Vizoso refer to a "choreographed interaction" (2022, p. 42).

Music was present in all the examples examined, with dramatic melodies being more recurrent, followed by neutral ones. Almost half of them incorporated sound effects, from the splashing of water to a helicopter engine. Adding more subjective music could be associated with a more interpretive approach, which favors the immersion of the spectator, coming closer to one of the purposes of AR. The more informative pieces barely included these ambient sounds and were accompanied by harmonies with certain dramatic effects, or neutral ones.

AR provides new possibilities for enhancing the experience of users, but given its use until the present in most television channels, it does not yet provide an immersive experience to the audience. The possibilities for improving this aspect could be an interesting line of research, especially in relation to the younger audiences, who are used to interactive narratives such as those provided by videogames. As of today, there is no data about the impact (or not) of AR applied in television news programs, on these younger audiences. Similarly, future studies could compare the results obtained in the present study with the coverage by Antena 3, a private Spanish television channel, which stands out due to its use of AR in its news programs.

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It must be underlined that the example of 'Una hora menos' is a turning point in the use of AR as a support to the news discourse. It provides tri-dimensional effects that are not found in other visual resources, and eases the comprehension of news, aside from achieving an attractive aesthetic result. And this is done in a balanced manner, without crossing the red lines that could lead to the banalization of the contents.

NOTE

1 On January 2019, the Spanish communication media greatly covered the rescue of Julen, a two year-old child who fell inside a well with a depth of 107 meters in Totalan (Malaga, Spain). Given the complexity of the operation, it lasted for almost two weeks.

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