Enhanced Experiences in Interactive Nonfiction:
An Experimental Study on the Effects of Nonlinearity and Interactivity

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The evolution of digital media has been accompanied by new ways of telling stories. Interactive nonfiction includes works that represent reality and employ interactive technology. This field has been studied from the perspective of production, especially in journalism where there is an emergence of interactive and immersive formats, but there are still questions about its value from the point of view of reception. The aim of this study is to identify the effects of nonlinearity and multimedia-interactive attributes on the user experience. The research is based on an experimental design ($N = 110$) with an interactive documentary in webdoc format. The results indicate that nonlinearity and multimedia-interactive attributes have positive effects on perceived levels of engagement and immersion. These contributions can be applied in digital journalism, where publishers seek to engage new audiences, and other fields, such as education and health, with the effect of transforming viewing into an enhanced experience.

Keywords: interactive documentary, nonlinearity, engagement, immersion, reception study, digital journalism

The evolution of the digital environment and its resulting transformations have facilitated new methods of production, distribution, and consumption. Convergence (Jenkins, 2006) shows its greatest development in the context of the network society (Castells, 2001), a space where we enjoy considerable innovation in how stories are told. This is not exceptional as we are in the early years of digital history and, as Janet Murray (2017) says, storytellers have barely scratched the surface of new media. However, the need to investigate the user experience in interactive formats arises.

In the 30 years of the World Wide Web as the main digital platform, we have witnessed the emergence of legacy, adapted, and new formats, following the postulations of the theory of remediation (Bolter & Grusin, 1999) and mediamorphosis (Fidler, 1997). In other words, the birth of new formats is neither isolated from its predecessors, nor from the habitat into which it is introduced as a new species—to

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the point of being affected by other species that cohabit the same space—and these previous species, in turn, are also affected, as is well explained by media ecology (Scolari, 2015).

In this context, numerous forms of expression have appeared and developed with different outcomes. Some industries have found very favorable conditions for their evolution, while others have faced greater difficulties but have eventually found their digital models, which now coexist with the analogue ones.

Journalism is still in a state of change (Franklin, 2016) and is looking for a sustainable model with constantly evolving strategies. Transformation is the inevitable result when new technologies enter media ecologies (Robinson, Lewis, & Carlson, 2019). In parallel, media are trying to innovate (Salaverría, 2015; Storsul & Krumsvik, 2013) and position themselves as differentiated brands in both production and circulation, both of which are essential fields in journalism studies (Carlson, 2020).

After an initial phase of imitating newspapers and the first experimentations with the Web's functionalities, digital journalism has entered a phase of significant multimedia and interactive innovation since 2010, including multimedia reporting, data visualization, microformats in social media, podcasting, and immersive journalism. The rise of innovation in platforms and narratives demonstrates the medium's interest in finding new ways to tell stories (Aitamurto, 2019; Ball, 2016; De la Peña et al., 2010; Hiippala, 2017) in an environment of news producers and products that is "immersive, iterative, and interconnected" (Singer, 2018, p. 209).

One of the most singular cases, because of its intense exploration of new media, is the documentary that, since the 1980s, has taken shape in pioneering electronic and optical media right up until the emergence of the Web, and always with the purpose of representing reality through available means and devices. Since 2008, the so-called interactive documentary, webdoc or i-doc, has shown a degree of expansion and global experimentation, constantly linked to emerging technologies: "The interactive documentary has emerged in the 21st century as an increasingly widely used non-fiction story form in journalistic work around the world" (Pavlik & Pavlik, 2017, p. 394). Reference media in different countries have bet on the production of interactive documentaries in the last decade, such as *The New York Times*— involved in the Highrise Project; *The Guardian—First World War*; the Spanish public service media *RTVE— Guerra a la mentira, Montelab*; the French-German *Arte*—a pioneering organization in this field with *Alma A Tale of Violence* or *Réfugiés*; and *AlJazeera*—as a producer of different projects, such as *Pirate Fishing* and *Hacked*, among others. Its high degree of adaptation has led to the implementation of diverse multimedia and interactive functionalities in all types of media to tell stories of "the real." These are expensive, technologically sophisticated projects, but at the same time are good examples of the interactive possibilities that have resulted in the redefinition of the author-text-user relationship and in new participatory, gamified, and immersive approaches to reality.

Recent studies point to the urgent need to study new audiences and their relations with interactive nonfiction narratives (Vázquez-Herrero & Gifreu-Castells, 2019), and to tackle the so-called "Shiny Things Syndrome" (Posetti, 2018, p. 7) in order not to fall into the trap of technological determinism. In the face of striking innovation and research that has previously tended to focus on production, a turn is needed to focus both on the user and on his or her reception. Today, academics and professionals pay more attention

to the audience (Van Damme, All, De Marez, & Van Leuven, 2019), and this is demonstrated by research that has addressed aspects such as interactivity and the flow of the narrative (Jacobson, Marino, Gutsche, & Reynolds, 2018), user experience with data visualizations (Anderson & Borges-Rey, 2019), or the effects of immersion (Shin & Biocca, 2018) in journalism. In this sense, research on reception should contribute to an innovation-oriented mindset in the field (Gynnild, 2014) to improve journalism's connection to society.

This study focuses on the user experience in interactive nonfiction through an experimental design based on an interactive documentary, a project designed and made specifically for this research. With the participation of 110 subjects and through multiple techniques, answers are sought about the perception of this interactive format and its contribution, considering that the results can be extrapolated to other fields in the context of nonfiction, including journalism, education, scientific, or museum communication, and even in some areas of fiction, including transmedia and interactive TV productions, gamification, or interactive film. Therefore, the following research questions are expected to be answered:

RQ1:   What is the effect of nonlinearity and multimedia-interactive attributes of the documentary on the experiences of the user?

RQ2:   What are the key features for the design of interactive documentary experiences based on their effects?

RQ3:   Is there an effect of nonlinearity and multimedia-interactive attributes on the evolution of interest and acquired knowledge?

The aforementioned research on the effects of the characteristics of digital journalistic projects focuses on very specific aspects, such as the interface, the device, or the narrative flow. In this study we approach two specific features of interactive documentaries—nonlinearity and multimedia-interactive attributes—to test their contributions to the user experience, delving into a field of reception studies where some authors carried out explorations (Ducasse, Kljun, & Čopič Pucihar, 2020; Gantier & Labour, 2017; Nash, 2014). In this way, we hope to advance both the production and research of interactive digital communication and longform digital journalism from the analysis of user experience in interactive documentary. A better understanding of the effect of this format on the audience seems to be a fundamental need to support the development of costly and sophisticated interactive projects: "User research should be considered as a fundamental element of the methodological toolkit that journalism scholars dispose of to understand what the experience of journalism will be in the future" (Picone, Courtois, & Paulussen, 2015, p. 36).

Literature Review

Interactive Nonfiction

The innate need of the human being to tell stories has caused narratives to evolve through all the means it has had at its disposal, from cave paintings and oral tradition, to songs, theatre, and movies. Narrative is universal: It is present in all times, all places, and all societies (Barthes, 1966). The evolution it has undergone—regardless of the historical moment, technique, or culture—means, consequently, that

the digital medium is also a propitious environment for narrative and has been intensely explored in its first decades. Digital literacy and access to communication devices and infrastructures have led to more complex developments through the most differentiating feature of digital media: interactivity. Thus, interactive narratives allow us to take control of or influence a nonlinear narrative (Green & Jenkins, 2014; Roth, 2015). Progressive experimentation in this area of intersection between technology and storytelling (Dunford & Jenkins, 2017) has resulted in the globalization of its production, targeting a wide and diverse audience (Miller, 2014).

This research focuses on a kind of interactive narrative that represents a fragment of reality and establishes a truthful contract with the user: *interactive nonfiction*. Its implementation has been defined in areas such as documentary (Choi, 2009), journalism (Sizemore & Zhu, 2011), education, and museography (Gifreu-Castells, 2016). The origin of the term interactive nonfiction derived from the need to group a series of heterogeneous forms of expression that share common characteristics because they are created in an interactive medium—generally on the Web, but also through applications or installations. There is significant difficulty in analyzing an emerging and changing field such as this, so research is mainly progressing in specific formats. From an academic and professional perspective, the conscious approach to interactive nonfiction narratives as a diverse group in a common space strengthens the value of specific format studies. In this way, research and production can contribute to greater knowledge or improved performance in other formats, channeling their results into similar areas and sectors.

Interactive Documentary

In the convergence of documentary filmmaking with interactive media exists the interactive documentary: a singular format beyond the evolution of the audiovisual documentary (Aston & Gaudenzi, 2012), although it maintains continuity characteristics (Nash, 2012) such as production context or purpose. It comes from the context of the network society (Dovey, 2017), with interactivity as a central element (Galloway, McAlpine, & Harris, 2007): An interactive documentary is "any project that starts with an intention to document the 'real' and that uses digital interactive technology to realize this intention" (Aston & Gaudenzi, 2012, p. 125). The interest it has aroused is reflected in research and conversation worldwide, especially in centers such as the MIT Open Documentary Lab and i-Docs at UWE Bristol.

Also known as an i-doc, webdoc, or docuweb, an interactive documentary is free to use different platforms, media, and languages (Gaudenzi, 2013), and its definition is based on three ideas (Gifreu, 2013): (1) an open and complex nature; (2) ambivalence between the cinematographic and interactive fields; and (3) discourse linked to reality. In practice, such projects are technically sophisticated (Cucinelli, René-Véronneau, & Oldford, 2018) and are based on the multimedia and visual construction of the story from elements such as video, photography, audio, maps, and graphics. They have an interactive development across nonlinear and fragmented narratives, in which the user makes decisions and participates in the narrative. Gaudenzi (2013) uses the term "living documentary" (p. 83) to refer to a project that is alive.

Interactivity transforms properties of the audiovisual documentary and creates new ones by expanding hybridization areas (Sucari, 2015). The relationship between author, content, and user, traditionally stable and delimited, takes on a new perspective and generates new tensions, in which the

author cedes some control to the public and the unidirectionality is broken. Interactivity involves the audience in the process of representing reality (Nash, 2014) through actions and roles as observer, player, apprentice, and prosumer (Gifreu-Castells & Moreno, 2014). Although all types of text—linear or interactive—require an actor, interactive texts intentionally allow the user to be involved in advancing the story. The development of the interactive dimension leads to collaborative creation initiatives (Rose, 2017) with the introduction of multiple voices (Dovey & Rose, 2012; Green, Bowen, Hook, & Wright, 2017) and projects with a social and political impact (Nash, 2017).

The interactive documentary has found an appropriate climate for its development in journalism, where this participatory, immersive, and experimental format finds an ally "to reach new audiences, to enhance the relevance of their reporting for an informed, engaged citizenry, and to make better use of the interactive and collaborative potential of today's mobile technologies" (Uricchio, 2015, p. 5). It is a complex, hybrid, creative, and technically sophisticated format that integrates in the same place the functionalities that digital journalism uses and experiments with hypertext, multimedia, interactivity, immersion, gamification, personalization, and social media. In this regard, it is part of slow and transmedia journalism, taking advantage of the possibilities of the digital environment (Rampazzo Gambarato, 2016) and contributing to the user involvement with news content.

In the interactive documentary, the story must determine the format, and this places the user at the center of the experience, generating emotion and immersion. It has been presented in multiple formats that combine platforms, types of interactivity, interface design, and agency: webdocs, virtual reality, data visualizations, geolocated experiences, installations, and myriad computer-based works. Each specific format must respond to the story and demands quite different inputs from the user.

Consequently, there is no standard objective for measuring the success of these productions: They are generally based on quantitative measurements (pageviews, unique users) and each project takes advantage of its innovation with different reference data (level of participation, new audience reached, geographical diversity). Therefore, experience is a relevant aspect for evaluating the interactive documentary, but knowledge about user experiences is still incomplete.

The changing state of the interactive documentary is also subject to debate, with new perspectives and creative disruptions, such as personalization through procedural storytelling (Moskowitz, 2017), the influence of machines and networks (Miles, 2017), algorithmically generated documentaries (Uricchio, 2017) and the risks associated with devaluing the author's position (Forceville, 2017). The future of such documentaries is promising as an interactive narrative in journalism and in other nonfiction fields, as well as for the characteristics it can yield to other emerging formats, while exploring the application of new technologies to the representation of reality.

Experiences in Interactive Storytelling

Having knowledge of the perceptions and responses of audiences to an interactive narrative becomes crucial when the objective is to generate an experience through active and participatory consumption. The growing interest in this field has led to research on experience in interactive narratives, paying attention to the

engagement (O'Brien & Toms, 2008) and the measurement of continuation desire (Schoenau-Fog, 2011), the qualities of agency, immersion, and transformation (Roth & Koenitz, 2016), and the proposal of objective and automatable indicators (Szilas & Ilea, 2014), which set a precedent in terms of parameters of interest, since most studies focus on theoretical and methodological proposals.

The user experience has been studied in video games (Fox & Brockmyer, 2013; Springett, 2008), in some aspects of Web design (Wang & Sundar, 2018), digital longforms in journalism (Jacobson et al., 2018), data visualization (Anderson & Borges-Rey, 2019), and immersive journalism (Shin & Biocca, 2018; Van Damme et al., 2019) to some extent. The results of this research generally indicate the positive effects of the interactive/immersive nature.

In contrast, there have been very few previous studies that have addressed the multimodality of the interactive documentary and how its characterization contributes to user experience. Kate Nash's (2014) study on *Bear 71*—a webdoc with specific features, such as a linear audio narration and a free navigation map—focuses on the link between user interaction and reception. The researcher points out that the "interactive documentary invites new forms of engagement and pleasure" (Nash, 2014, p. 232), although the results depend strongly on individual interests and inclinations. Gantier and Labour (2017) start from the comparison between a model user and an empirical user to define an evaluation model of the user experience, with the purpose of improving the design of i-docs. A recent study based on iOtok (Ducasse et al., 2020) highlights the serialization as a positive attribute, as well as the use of multiple media to reach and engage the audience. The producers analyze their results—although in most cases the reception data is reduced to length of user stay or number of visits, with some exceptions that include a qualitative approach such as a pretest or considering alternative parameters to standard Web metrics (i.e., *Quipu* or *Pirate Fishing*). Analysis of the factors that contribute significantly to the experience is relevant because of its application to interactive nonfiction, including the various related developing areas such as journalism or education.

From Interactivity Toward Immersion: A Research Model

Existing analysis of interactive nonfiction and, specifically, of interactive documentary has made it possible to identify its key characteristics for addressing audience perceptions. Thus, it is necessary to consider the current perspectives that define an arts and journalism continuum (Postema & Deuze, 2020) in which forms and values from both spheres converge, placing value on aesthetics. In the same way, the emotional turn (Beckett & Deuze, 2016) affects the role of emotion in production, texts, and audience engagement (Wahl-Jorgensen, 2020), supported by the emergence of digital and social media, to reconnect with disenfranchised and fragmented audiences (Lecheler, 2020) calling for more audience-centered research. To address this challenge, convergence with human-computer interaction is proposed, responding to the needs of designing and understanding the impact of new technologies to inform and engage people (Aitamurto et al., 2019).

A model is proposed that unites the ideas that emerge from the definition and characterization of interactive documentary—within interactive nonfiction—with the methods of experience in interactive

narratives and contemporary conceptions of the emotional turn in journalism and its aesthetic value in the search for an engaged audience.

On the one hand, the main quality of the interactive documentary is interactivity, which is reflected in features such as nonlinearity and user action (at different levels, toward participation and through agency). On the other hand, the multimedia nature is frequently a part of interactive documentaries—for example, in webdocs that incorporate video, photos, voice, graphs, maps, and more—although it is not a mandatory requirement and there are outstanding cases that focus on one element (data visualization, illustration, audio). These factors can be represented in two independent variables: (IV1) nonlinearity/linearity—the narratives can be fragmented, and the user can make decisions about the progress and control the rhythm and order; (IV2) multimedia-interactive attributes—the project is built from a combination of media and languages and incorporates functionalities that allow the user's interaction and participation, or it is built only from video footage.

From the user-system interaction, a key quality of the user experience appears: engagement, which is linked to flow, aesthetics, play, and information interaction (O'Brien & Toms, 2008). Throughout the engagement process, a series of attributes come into play and characterizes the experience: Indicators such as perceived control, the degree of novelty, or aesthetic assessment denote user perceptions during the interaction and connote the state experienced by the user. The model proposed by O'Brien and Toms (2008) is used to detect the dependent variables that make a significant contribution to the effect of the independent variables (product qualities), incorporating Schoenau-Fog's (2011) indicator of continuation desire as an indispensable condition for maintaining engagement and producing cyclical reengagement in this process. For engagement, the following hypotheses are proposed:

H1:   Nonlinearity has a positive effect on engagement.

H2:   Multimedia-interactive attributes have a positive effect on engagement.

Previous research suggests that the qualities of interactive documentary favor elements of the engagement process and, consequently, the user feels more engaged in the consumption process. Empirical research should identify the key variables for the present case study.

Immersion is a result that emerges from the experience perceived by the user. It is equivalent to the level of presence experienced and represents an unguaranteed outcome. It can occur or not, but if it does, it reflects a fully engaged experience and feeds back into the whole process by encouraging interaction at more intense levels of participation and agency. Immersion is not exclusive to nonlinear and interactive media forms; in fact, a novel or a movie can be highly immersive and allow us to get away from the reality around us.

In this case, I evaluate how choices and actions allow a higher degree of personalization, involvement, and control that causes a state of immersion, also taking into account that it can pose difficulties depending on quality or the complexity of the interaction system. Immersive audience perception is measured based on Jennett and colleagues' (2008) scale, which links immersion to flow and cognitive absorption, together with the empathy scale of IJsselsteijn, de Kort, & Poels' (2013) GEQ model and items

of assessment of perceived immersion designed for this research. For immersion, the following hypotheses are proposed:

H3:   Nonlinearity has a positive effect on perceived immersion.

H4:   Multimedia-interactive attributes have a positive effect on perceived immersion.

As a result of the user experience, perceived immersion is expected to be higher under the conditions of nonlinearity and the multimedia-interactive attributes, following the research model (Figure 1) that was already described. The user can perceive a higher level of presence, and it is necessary to detect the variables that make the difference through the case study employed in this research.
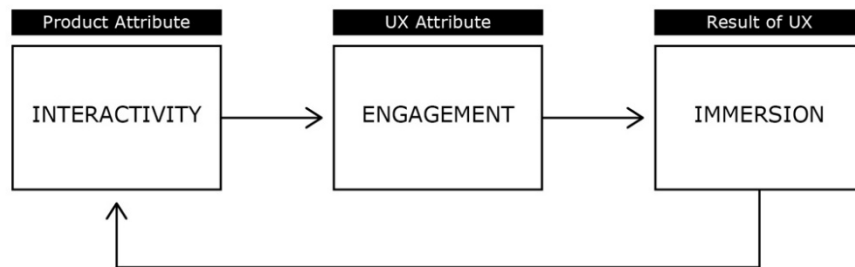

Figure 1. Interactivity-engagement-immersion research model. Own elaboration.

Methods

For this research, a custom-made project was used: An interactive documentary about people living in unique ways and away from urban spaces, made for keeping their stories alive and for provoking reflection on subjects such as heritage, native language and culture, landscape, and rural environments. I created four versions of the documentary and showed it to 115 users, aged 17 to 30, providing them with questionnaires about the experience before and after the viewing, along with several other data collection methods. The main objective of the statistical analysis is to test whether there are significant differences between the four versions grouped by two independent variables: nonlinearity and multimedia-interactive attributes. The study also relies on previous research findings on interactive documentary analysis and interviews with producers (Vázquez-Herrero & López-García, 2019).

Experiment

To evaluate the reception of an interactive documentary, focusing on the effect of nonlinearity and multimedia-interactive attributes, an experimental method has been designed that combines quantitative and qualitative techniques. The study is made up of several phases: (a) previewing survey; (b) viewing of the project, monitoring, and observation; (c) postviewing survey; (d) a recall test; and (e) discussion groups—developed with the Phillips 66 technique to obtain an open-ended qualitative approach.

Experimental research involves the systematic manipulation of one or more independent variables to examine causal relationships (Ruble, 2018), thus an interactive documentary was created for the case study. It was manipulated to obtain four versions based on the two independent variables and their possible values: (IV1) nonlinearity/linearity; and (IV2) multimedia-interactive/only-video. By having four versions (Table 1) resulting from the combination of the two independent variables—a 2x2 matrix—each group of participants will see a different version.

Table 1. Experiment Design.

	Multimedia-Interactive	Only-Video
Nonlinearity	Version 1	Version 3
Linearity	Version 2	Version 4

Version 1 (IV1=0; IV2=1); version 2 (IV1=1; IV2=1); version 3 (IV1=0; IV2=0); version 4 (IV1=1; IV2=0).

The documentary[2] was developed with HTML5, CSS3, and JavaScript, which facilitates access to the multimedia product on the Web. It presents alternative navigation modalities—through menus, by characters, and by places. Its visual design is based on parallax, which animates the entry of layers with photographs and videos, as well as sound that varies with the vertical scroll. The stories also incorporate brief texts, complementary audiovisual content, maps, and galleries. In addition to facilitating free navigation, customized data by geolocation and participatory features are offered. These features fit with the several life stories focused on unique places, where the location is one of the important factors, as well as the participation when dealing with a relevant topic for the society in which it is framed. However, the interactive documentary can take many different forms, and, in this case, it is oriented to decision making in navigation, to personalization and to participation.

Among other tasks carried out, mechanisms were implemented to measure actions and consumption time through Google Analytics events, as well as through flow visualization, monitoring variables that affect the user experience. Direct observation was carried out to identify anomalous behaviors.

Survey

An analytical survey is the main technique to find out how interactive documentary is perceived through structured data collection (Hansen & Machin, 2013). In addition, it is developed as a panel where the participants themselves respond in various time phases: before viewing, immediately after viewing, and a recall test two weeks later.

For the design of the questionnaires,[3] a reference was made to the previous work on reception in interactive narratives (Gantier & Labour, 2017; Nash, 2014; Roth & Koenitz, 2016) and to other more developed works in human-computer interaction, which are set out below. The questionnaires have different

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[2] Specification sheet of the experimental product is available at
https://doi.org/10.6084/m9.figshare.13649747.v1

[3] The postviewing questionnaire is available with the list of questions asked to the users after seeing the project: https://doi.org/10.6084/m9.figshare.12721358.v1

structures according to the phase in which they are used. Taking the postviewing questionnaire as a reference, there is a first section on usability (Gediga, Hamborg, & Düntsch, 1999; Laugwitz, Held, & Schrepp, 2008) to identify the level of efficiency perceived and to detect possible difficulties that might affect the result of the experiment—no such difficulties were detected. A second section focuses on the evolution of user interests and knowledge acquisition. The third is on engagement (O'Brien & Toms, 2008; Schoenau-Fog, 2011) as a quality of user experience and process. The fourth section addresses immersion (IJsselsteijn et al., 2013; Jennett et al., 2008) as a level of presence and outcome of the experience, as developed in the research model.

The construction of the questionnaires began with an extensive battery of questions, following the proposal of Brooke (1996), and was submitted to a panel of six experts for filtering and validation in two phases. A pretest was also carried out with 12 users who viewed the project, answered the questionnaires, and participated in a subsequent discussion. The final versions were implemented on the website created for the experiment. The questionnaires (Table 2) were made up of closed questions, mostly with a Likert scale of 1 to 7. The Cronbach's α was calculated to estimate reliability for the sections of usability, engagement and immersion of the questionnaire, and positive results were obtained that guaranteed the reliability of the instrument used. In the usability category, the set of 12 items presents α = 0.85, higher than 0.70, which is the common acceptability level in social sciences. The 12 questions focused on engagement were also considered acceptable (α = 0.774), while the 12 questions on immersion reached a very good reliability (α = 0.888). Therefore, the questionnaire was considered valid and presented acceptable levels of internal consistency for its purpose.

Table 2. Structure of the Questionnaires.

	Section	Number of questions
Previewing	Sociodemography	3
	Thematic interests	8
	Study area interests	4
Postviewing	Perceived usability	12
	Thematic interests	8
	Deepening and knowledge	5
	Engagement	12
	Immersion	12
Recall test	Knowledge	11
	Theme and message	2
	Engagement	2
	Immersion	2

Sample and Execution

The experiment was carried out under laboratory conditions, through a website that included all instructions, and was accessed by each group according to the randomly assigned version of the documentary. Of the 115 participants, the valid sample was $N = 110$. This is a nonprobabilistic convenience sample (Hansen & Machin, 2013) of communication students including 44 men (40.0%) and 66 women (60.0%) aged between 17 and 30 years old ($M = 19.21$; $SD = 2.299$). This range of years is interesting for

its potential in the near future, because the users' current consumption habits will determine the scenario in the medium term as adult users.

The experiment was developed in five two-hour sessions in which the random assignment of participants to each group ensured homogeneous representation, altering the distribution only in the case of a person with a disability. Given the two independent variables (nonlinearity; multimedia-interactive attributes), two groups were constituted for the analysis of each variable. The 30 cases per group were exceeded, which allows for assuming the normality of the sample by the central limit theorem. In addition, the equality of variances was tested by the Levene test with the purpose of applying parametric tests in all possible situations. In this way, the main mechanism of analysis was the comparison of means with the student's t-test, in such a way that a $p < 0.05$ allows for the conclusion that there is a significant difference between the two groups analyzed based on the independent variable with a 95% confidence level. For the analysis of mediation models, the macro PROCESS for SPSS was used, following Hayes (2009), with the application of bootstrapping.

The research has some limitations that should be recognized, although they have been reduced as much as possible. The experiment was developed under laboratory conditions and therefore not in a natural consumption situation. Furthermore, the sample was small and does not represent the general population, although it does represent a singular demographic group. About the interactive documentary used in the experiment, it should be noted that the results would differ depending on the case, since a particular approach to interactivity is analyzed; however, clearly differentiated versions were developed to ensure that the comparative analysis from the independent variables is valid. We must also consider that different creative approaches and audience expectations could influence the results.

Results

Engagement

In the evaluation of engagement, as a process and quality of user experience, the experimental groups that viewed the nonlinear version and the multimedia-interactive version obtained higher results in 10 of the 12 variables measured.

The difference in terms of nonlinearity has been statistically proven across three variables (Table 3), always with a positive effect on the nonlinear format.

Table 3. Variables with Statistically Significant Differences on Engagement.

Independent variable	Dependent variable	Student's t	p
Nonlinearity	Control over the story	6.999	< 0.001
	Appropriate viewing duration	2.381	< 0.05
	Novelty	1.898	< 0.1
Multimedia-interactive attributes	Novelty	−3.856	< 0.001
	Aesthetics	−3.381	< 0.01
	Control over the story	−1.869	< 0.1
	Continuation desire	−1.846	< 0.1

First, control over the story, which is the degree to which the user perceives that he or she manages the progress, the rhythm, and the path of the story. Second, appropriate viewing duration, which indicates that the user perceives that he or she has spent the right amount of time on the project without it becoming overlong. Third, the degree of novelty shows the perception as innovative or unusual.

When the study variable is the multimedia-interactive attributes, up to four differences are statistically proven, always with a positive effect on the multimedia-interactive format. The degree of perceived novelty clearly depends on these attributes. The aesthetic evaluation corresponds to the perception of the design and the artistic features, which is a significant aspect for the engagement. Finally, a p-value < 0.10 identifies control over the story and the continuation desire as influencing factors.

Therefore, four statistically significant differences at the $p < 0.05$ level and another three with $p < 0.10$ allow us to affirm that nonlinearity (H1) and interactive multimedia attributes (H2) have a positive effect on engagement with no variable proven to have a negative effect. In the recall test, the desire to continue based on the attributes reaches the significance level ($t = 2.511$, $p < 0.05$), with a positive effect on the multimedia-interactive format.

The perceived experience is greater through the control over order, the capacity of selection and participation, and is also influenced by the degree of novelty and the aesthetic evaluation. In short, the engagement process is an enhanced quality of the experience in view of the characteristics of the interactive documentary.

Immersion

In the analysis of immersion—as an outcome of the user experience—the experimental groups that viewed the nonlinear and the multimedia-interactive version obtained higher results in 11 of the 12 variables measured.

In terms of linearity, two statistically significant differences were found (Table 4), with a positive effect on the nonlinear format. On the one hand, the degree of involvement in the story is reflected in the desire to talk to the characters. On the other hand, the perception of immersion shows the user's sense of presence. Both describe the user's immersion in the narrative.

Table 4. Variables with Statistically Significant Differences on Immersion.

Independent variable	Dependent variable	Student's t	p
Nonlinearity	Perceived immersion	2.158	< 0.05
	Involvement	2.031	< 0.05
Multimedia-interactive attributes	Feeling of traveling	−3.431	< 0.01
	Empathy	−2.540	< 0.05
	Design and visual content	−2.211	< 0.05
	Enjoyment	−2.091	< 0.05

The statistically significant difference according to the multimedia-interactive attributes has been proven on four variables, always with a positive effect on the multimedia-interactive format. First, the feeling of traveling indicates a high level of immersion of the user. Second, empathy indicates affective participation in the represented reality. Third, the assessment of the design and visual content responds to positive aesthetic perception and enjoyment links to the perception of satisfaction and entertainment in the experience.

Therefore, six statistically significant differences suggest that nonlinearity (H3) and multimedia-interactive attributes (H4) have a positive effect on immersion, with no proven variable having a negative effect. The recall test has not yielded new evidence, either positive or negative.

The experience is enhanced in terms of immersion, through the feeling of traveling through the documentary, in the empathy perceived, in the assessment of the design and the visual content, as well as in the experience of enjoyment. Finally, the immersion is greater when the characteristics of interactivity are present in the documentary.

Mediation

The analysis of mediation carried out is based on regression analysis and the proposals of Hayes (2009), which uses the bootstrapping technique to calculate the mediation of a variable. The indirect effect is the coefficient that arises from the direct relationships between the independent variable and the mediating variable, and from this with the dependent variable. Mediation is considered to exist when the indirect effect is statistically significant (i.e., the confidence interval is nonzero). Figures 2 and 3 show all identified indirect effects, with the magnitude above the dashed lines also indicating their level of significance. With this statistical technique we will know how some variables—mediators—influence others, after having identified that they are statistically significant in the preceding sections.

In terms of nonlinearity (Figure 2), the control mediates in four effects: on the perception of appropriate duration, on the degree of novelty, on the expectation of recall, and on the immersion; and the involvement mediates on the latter. In other words, when faced with a nonlinear format, the perception of control and involvement are higher and, in turn, have a greater effect on the aforementioned variables, with a proven indirect effect.
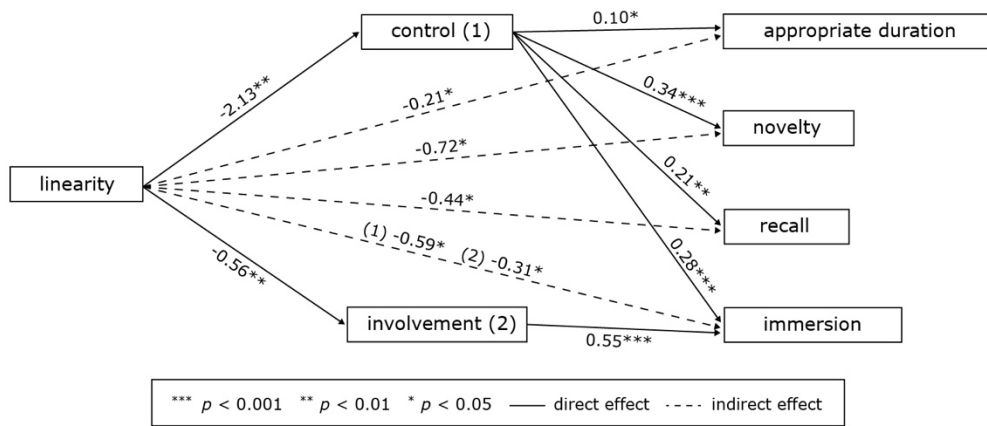
Figure 2. Indirect effects of linearity.[4]

According to the multimedia-interactive attributes (Figure 3), aesthetics is mediating in four effects: on the continuation desire, the degree of novelty, the enjoyment, and the feeling of traveling; the empathy mediates in the effect on enjoyment and feeling of traveling; and the assessment of the design also on the latter. Therefore, in a multimedia-interactive format, the perception of aesthetic dimensions and empathy are higher and make the effect greater on the aforementioned variables, there being a proven indirect effect.
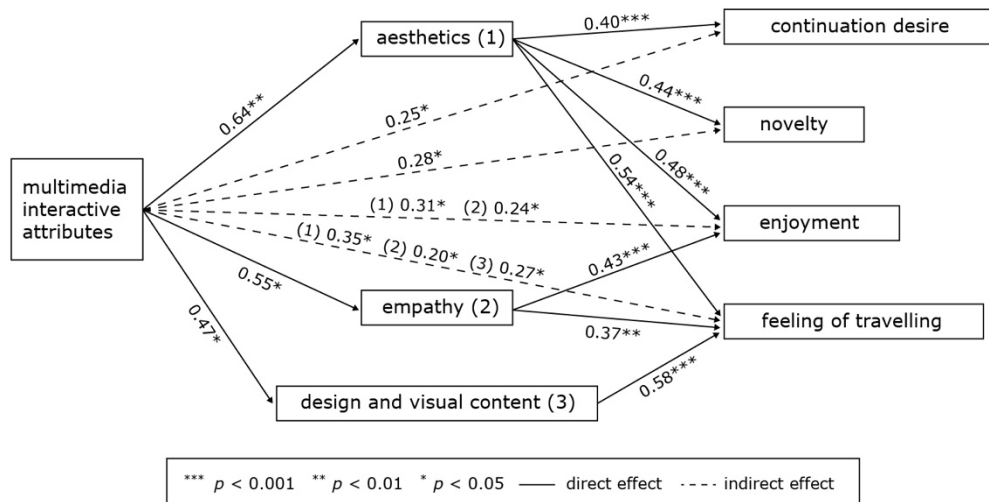

Figure 3. Indirect effects of multimedia-interactive attributes.

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[4] The graph is shown from linearity because this is when IV1 (nonlinearity/linearity) takes the value 1.

In short, a series of key characteristics and variables predicting the effect of engagement and immersion in interactive nonfiction narratives are identified as mediators: the perception of control and involvement, the aesthetic dimensions, and perceived empathy.

Interests and Acquired Knowledge

The interest shown by users in the documentary's topics after viewing shows higher values than before watching the documentary. The longitudinal study (previewing/postviewing) shows statistically significant differences in the increase of all thematic areas. The means difference analysis according to the multimedia-interactive attributes indicates a positive effect with respect to the only-video version in two variables: cultural heritage ($p < 0.01$) and traditions ($p < 0.06$). It is not possible to prove that interest grows differently according to the version seen by the user, although a tendency is observed.

With respect to the knowledge acquired, tested in three objective questions about the documentary, no significant differences are evident according to the independent variables. However, the comparison between the only-video format and the multimedia-interactive format indicates a slight tendency of positive effect of the multimedia-interactive attributes. The recall test reports no new evidence.

Discussion and Conclusions

The search for new ways to tell stories in the context of interactive nonfiction has led to a proliferation of innovative media production. It happens particularly in journalism, where visual, interactive, and immersive formats are used to engage new audiences and enhance the use of digital media features in fact-based stories. However, an analysis of the contribution of these formats is needed from the perspective of the user in the face of technological determinism and against the unique purpose of novelty.

This study has presented the results of an experiment with a specific interactive documentary in webdoc format, a paradigmatic example in interactive nonfiction storytelling because of its degree of development, adaptability, and adoption in the media. Characterized by the break of sequentiality, usual multimedia construction, and implementation of interactive functions, the interactive documentary has allowed the evaluation of users' perceptions and the identification of key effects and features of such a format.

Nonlinearity and the presence of multimedia-interactive attributes in the format have positive effects on the user experience. This is consistent with the positive effects of interactive applications identified by Jacobson and colleagues (2018) in digital journalistic longforms, as well as Ducasse and associates (2020) concerning interactive documentary. In terms of engagement (H1, H2), the qualities of the interactive documentary favor the process because the user perceives greater control over the story—and consequently that its duration is appropriate—and considers it more innovative, positively valuing the form's aesthetic attributes. Therefore, the narrative fragmentation and the freedom of navigation, as well as the multimedia construction, lead to an improvement in the experience and cause the user to reach a higher degree of engagement.

Although the user remains in the process of engagement (O'Brien & Toms, 2008), driven by the factors indicated, the resulting immersion of that experience behaves like a virtuous cycle (Shin & Biocca, 2018) in which a series of significant variables have been identified. Both the nonlinearity (H3) and the multimedia-interactive attributes (H4) have positive effects on a constantly evolving immersion, which are reflected in enjoyment, the feeling of traveling, the involvement with the characters, the aesthetic evaluation, the empathy, and the immersion perceived by the user. Consequently, the distinctive features of the interactive documentary improve the experience for the user by achieving a greater immersion or level of user presence—results that were confirmed in the discussion groups.

The research carried out made it possible to detect the key variables through their effect on reception. In addition to those that present statistically significant differences (which I have already mentioned) the mediation models demonstrated the existence of predictors that are, therefore, key characteristics for the design of interactive documentary experiences (Figure 4). As Nash (2014) said, the interactive documentary invites new forms of engagement, and, in this case, it has been tested through a different experimental product and method, which has allowed us to identify other key elements of the design. However, the experiment focuses on a specific instance of interactivity, with a particular product and with limitations also in the sample and the execution, so these results are valid for this context, but further research is needed.
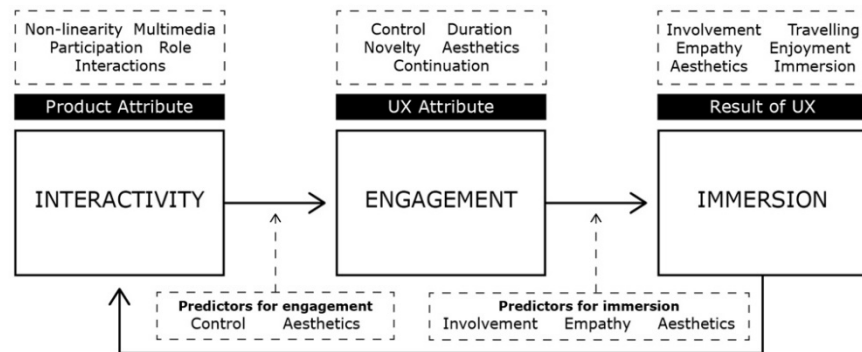

Figure 4. Interactivity-engagement-immersion relationship and key features to enhance the experience from the case study.

In practice, these results may have implications beyond multimedia and interactive journalism, where it is seen as part of the emotional turn (Beckett & Deuze, 2016), generating tensions in the author-text-user relationship (Vázquez-Herrero & López-García, 2019) or as a response to fragmented audiences (Lecheler, 2020). The production of interactive documentaries and the implementation of their characteristics in other journalistic formats can be improved based on these proven results to advance in the development and study of digital-native journalistic stories. Identifying that the nonlinear navigation and multimedia-interactive attributes contribute positively to the user experience sets the basis for further analysis. These findings also enhance the design of news-based projects to involve the user to a greater

degree in complex and distant stories, looking for deeper engagement and empathy as it is in immersive journalism (Sánchez Laws, 2020).

As a conclusion, this research has demonstrated the existence of positive effects of nonlinearity and multimedia-interactive attributes—fundamental characteristics of interactive nonfiction and, specifically, of the interactive documentary—on the user experience. It is a transition from the qualities of the product to the engagement process and, finally, to the resulting immersion. Feedback is produced, so that the greater the immersion, the more the user is involved and will reinforce the interactive condition of the product: a nonlinear, cyclical journey in constant evaluation, where meaningful interactivity transforms viewing into an experience.

For the future, it will be necessary to improve the measurement systems and the execution of experiments to assess in more detail the impact on these issues, especially in relation to interest and knowledge acquisition, as well as including other instances of interactivity. More research is needed to make meaningful generalizations, but at least we have taken a first step. Furthermore, this study should contribute to a breakthrough in reception research in the field of interactive nonfiction narratives with potential applicability in different sectors such as journalism, education, health, and interactive fiction.

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