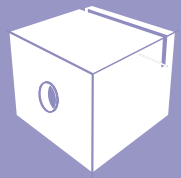
Published by:



EARLY VISUAL MEDIA LAB

CICANT

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The authors **acknowledge** the support of three research projects:
Curiositas: *Peeping Before Virtual Reality. A Media Archeology of Immersion Through VR and the Iberian Cosmoramas* (PTDC/COM-OUT/4851/2021). Fundação para a Ciência e a Tecnologia, Ministério da Educação e Ciência. Scientific Research and Technological Development Projects. 01-01-2022 to 31-12-2024. PIs: Victor Flores / Susana Martins.

Analytical Networks for Dissemination and Applied Research (ANDAR) (PDC2022-133355-I00. Ministry of Science and Innovation. R&D+i Proof of Concept Projects 2022. University of Salamanca. 01_12_2022 to 01_12_2024. PI: Modesto Escobar Mercado.

MAGICA | Magic Lantern – Study, Safeguard, Uses and Reuses in 19th-Century Portugal, financed by The National Science Foundation (PTDC/ART-PER/1702/2021). PI: Márcia Vilarigues

EXPLORING THE ARCHAEOLOGY OF IMMERSIVE VISUAL MEDIA IN SPAIN (1822–1872)

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INTERNATIONAL JOURNAL ON STEREO & IMMERSIVE MEDIA, Vol. 7 No. 1
pp. 158-185
DOI: 10.24140/ijsim.v7.n1.08
ijsim.ulusofona.pt

Abstract

This paper presents an exploratory study aimed at advancing the identification, analysis, evaluation, and dissemination of documentary evidence related to immersive visual media in Spain between 1822 and 1872. The relevant references for this research were obtained from cultural testimonies found in online historical press advertisements and news housed in Spanish digital newspaper libraries. The main objective of this study is to highlight the obscured history of early immersive optical performances, thereby enhancing our understanding of the archaeology of audiovisual media. In pursuit of this, we have striven to address the following research enquiries: What were the most frequently represented immersive visual media in the Spanish territory between 1822 and 1872? In which Spanish cities were these immersive visual media exhibited between 1822 and 1872? Where were the immersive shows located within Spain between 1822 and 1872? To accomplish this, the research was structured around two fundamental tasks. The first task involved delimitation, identification, inventory, cataloguing, and registration of information found in the documentary sources. The second task involved mapping and visualising the records located in primary sources, such as local Spanish newspapers through network graphs and visualisations. This study has important implications for understanding the early use of immersive visual media technology in Spain and offers new perspectives for future research on the topic.

Keywords: *Media Archaeology; Immersive Visual Media; Optical Spectacles; Reticular Analysis of Coincidences; Audiovisual Heritage*

1. INTRODUCTION

Artificial intelligence technologies are rapidly developing, and their presence is being integrated into all areas of scientific knowledge, especially in the field of technologies that use Virtual Reality (VR), which have created and generated a huge market and public interest. Likewise, VR technologies are maturing in increasingly rich application scenarios, penetrating people's daily lives and providing greater scope for creativity.

This creativity is served by immersive art to connect viewers with their 'works' in the same virtual space that personalises and adapts the environment, either functionally or visually.

In this way, the audience, much like the sensory experience prompted by the metaverse, can interact, and achieve an immersive sensory experience that helps them to transcend to a distinct plane than they normally perceive with their senses, allowing the proposals to come to life through the use of sound, light, and colour in a specific space where a scene different from reality is recreated. This simulation is generated in a three-dimensional environment in which the user perceives different sensory stimuli generated by the facilitating and transformative capacity of new technologies used by VR, mixed reality, or large immersive audiovisual installations.

This process is generally directed by projections that eliminate physical space and immerse the user in a computer-generated environment, while other types of methodologies take advantage of real space to generate immersion. This 'immersive experience' is not something that has spontaneously emerged and is being introduced for the first time in the current era. Before the development of VR as we know it today in connection with new technologies, the use of optical devices – known since the 18th century – such as the *mundonuevo* or the *titilimundi*, were long-standing spectacles that provided a popular media practice, introducing and offering their viewers the enjoyment of these sensations.

Fig. 1 *Cuenca, (2020, 16, 24), created by Mireia Blanca is a recreation of a cosmorama. Inside, you can see an optical view from the 19th century featuring the Arch of Titus.*

Fig. 2 *Cuenca, (2020, 16, 24), Arc of Titus c.1850, measuring 36.5 x 49.5 cm. It is an opaque optical view located at the Museo del Cinema, Registration Number 03480.*

Fig. 3 *Ortego plate painter and engraving by E. Skill*[1]

1. In the tuti-li-mundi, published on July 28, 1861, in the Spanish magazine the Museo Universal, p. 30.

Throughout history, the world has been presented through various devices made of wooden boxes that incorporated one or more lenses to arouse astonishment and seduce the public who viewed them. These optical 'toys' exhibited engravings or photographs that, when viewed through a small peephole or magnifying lens, transported viewers to distant scenes that often represented historical events, contemporary spectacles, engineering feats, and even foreign or imaginary landscapes. This reality is part of an immersive media culture that is still prevalent today.

According to Erkki Huhtamo (2006, pp. 111–112), the concept of "furtive observation" has been a recurring theme throughout the cultural history of popular media, from peepshows, also known as peep boxes or raree shows, to devices such as the panoptic poliorama, megaletoscope, stereoscope, kinora, and others. In the 19th century, numerous optical toys and *souvenirs* emerged encouraging individualised viewing, such as kaleidoscopes, alabaster *peep eggs*, paper *concertinas*, peepshows or tiny stanhope scopes. Alongside these private or domestic use devices, there were all sorts of public entertainments, from old-style peepshows, which were already in decline, to novel attractions such as the cosmorama, kaiser panorama, and, finally, the kinetoscope and mutoscope. These latter two were found in permanent public venues called cosmorama rooms, kinetoscope parlours, or penny arcades, reflecting the institutional consolidation of technology-based entertainment, particularly in urban areas.

Devices such as the camera obscura, the magic lantern, the phenakistoscope and the stereoscopic viewer, the zoetrope and the praxinoscope, the thaumatrope, the solar microscope and the kinetoscope, together with anamorphic mirrors, dioptric and catoptric games, the *mundonuevo* and cosmoramas, not to mention polyoramas, cut-out theatres, dissolving views, panoramas and dioramas, and stroboscopic toys represent only a small sample of the media artifacts that were developed in terms of potential and communicative capabilities. These artifacts supported thriving equipment industries that catered to a varied demand for consumer practices. Developed between the 16th and 20th centuries, these devices currently inscribed in what has been called 'media archaeology' formed a universe of optical devices that perfected the use of narratives, expressive and symbolic systems, imbuing them with meaning, and whose cultural importance today has not yet been adequately assessed (Frutos, 2010, p. 89).

The aim of this research is to explore and review records of immersive visual media dating from 1822 to 1872 using digital media and different transcultural perspectives present in collections of local historical press located in Spanish digital newspaper archives accessible online. As pointed out by Marieta Cantos (2013, p. 106) "A review by the newspaper headlines from the Romantic period reveals that a significant portion of them reflect the emergence of optical devices and spectacles based on their operation". The main goal is to strengthen knowledge of the archaeology of visual media in Spain by identifying, recording, inventorying, and cataloguing information contained in primary sources such as Spanish local newspapers. Additionally, the research aims to analyse, map, evaluate, and disseminate the documentary evidence found in these sources through the visual representation of network graphs using Network Coincidence Analysis (NCA)

techniques. The expected outcomes of this study include a more in-depth understanding of the historical and cultural significance of immersive visual media and their impact on Spanish society during the 19th century.

2. THE ARCHAEOLOGY OF IMMERSIVE VISUAL MEDIA

2.1. Terminology

The archaeology of social media is presented as a way of investigating new media cultures by understanding the past, often emphasising forgotten apparatuses, practices, and inventions (Parikka, 2013). By bringing the past to the present and the present to the past, both can inform and explain each other, raising questions and pointing towards futures that may or may not exist (Huhtamo & Parikka, 2011).

Huhtamo's media archaeological approach has two main objectives. Firstly, it aims to study cyclically recurring elements and motifs that underlie and guide the development of media culture. Secondly, it delves into how these traditions and discursive formulations have left their mark on specific media, such as machines and systems in different historical contexts, contributing to their identity in terms of socially and ideologically specific networks of meaning. This approach emphasises the cyclical nature rather than chronological development and repetition instead of unique innovation (Huhtamo, 1997).

When media archaeologists say they are 'deepening' their exploration of media and culture phenomena, the term should be understood in a particular sense, as they delve into and unearth text, visual or auditory archives, as well as collections of artifacts, with an emphasis on discursive and material manifestations of culture. These explorations fluidly traverse disciplines, even if they do not definitively settle within any one of them. This "nomadism", far from being an obstacle, is precisely what allows them to achieve their goals and methods of work, moving through the landscape of the social sciences and humanities and occasionally leaping into the arts. Nevertheless, amid this variety, there is a need to define approaches and perhaps even crystallise them into 'methods', at least in a local and tactical sense.

Thus, quoting Huhtamo (2011), media archaeology can be understood as the collection of parallels and recurrences that, gathered around certain themes, persist throughout the history of modernity. In this way, the past is brought into the present, and the present into the past; they inform and explain each other, raising questions and pointing the way to futures that may or may not exist (Huhtamo & Parikka, 2011). According to them, the challenges posed by contemporary media culture are complex, and there was even a notion that the past had little to contribute to its understanding. Thus, new mass media were configured as a 'closed' and 'timeless' entity that could be self-explanatory.

In his research, Martínez Luna (2021) examines immersive visual technologies in the context of media archaeology, exploring the connections between past and present visual technologies. This approach allows for the construction of a non-linear history of media that is not dependent on a discourse of progressive sophistication and hyper-realistic image representation. By reconnecting with nineteenth-century

panoramas, one of the earliest forms of immersive image technology, Martínez Luna's work sheds light on current developments in virtual, augmented, and mixed reality. Moreover, his research highlights the cultural and socio-economic forces that condition these immersive devices and their specificity as autonomous media.

The universe of optical devices that emerged between the 16th and 20th2 centuries, now encompassed within the field known as 'media archaeology', holds a cultural importance that has yet to be fully appreciated. This diverse array includes, among others, the camera obscura, the magic lantern, the phenakistiscope, the stereoscope, the zoetrope, the praxinoscope, the thaumatrope, the solar microscope, the kinetoscope, anamorphic mirrors, dioptric and catoptric games, *mundonuevos*, cosmoramas, and *polioramas*, cut-out theatres, melting images, panoramas, dioramas, and stroboscopic toys. These terms represent only a small selection of media artifacts that fully realised their communicative potential. They thrived by supporting robust equipment industries and satisfying a diverse range of consumer demands. They achieved this by developing expressive and symbolic systems rich in meaning. These visionary inventions, rooted in principles from various disciplines, including mathematics, particularly descriptive geometry, and physics, especially instrumental optics, were closely intertwined with the 'secret' of mimetic image representation. They also played a pivotal role in recording and projecting images, thereby enabling the creation and widespread adoption of numerous optical devices for both public and private consumption.

How should such a numerous and diverse quantity of collections of media artifacts currently linked to the international historical and cultural heritage be valued?

This article aims to enhance the value of a large and diverse number of media artefact collections currently linked to international cultural-historical heritage by focusing on the study of 'immersive visual media'. The research described is limited spatiotemporally to the Spanish territory in the period between 1822 and 1872. During this time, 'optical machines' toured Spain in search of an audience eager to experience new emotions. These machines were known by names derived from Italian words such as *mondo nuovo* and *tutti gli mondi*. Modified versions of the former were referred to as *mundinovi*, *mondinovi*, *mundinuevo*, *mundinovo,* and *mundonuevo*. Variations of the latter were known as *totilimondi*, *tutilimundi*, and *titirimundi*.

The term *mundinovi* or *mundinuevo* (1734, p. 631) was first included in the *Dictionary of Authorities of the Royal Spanish Academy* (*DRAE*) in 1734. The entry describes the term as it follows:

2. On the other hand, in the last decade, several international projects have been initiated, focusing their research on the field of media archaeology. It is interesting to take them into consideration when framing this article since they serve as references in the field. These projects include *A Million Pictures. History, Archiving, and the Creative Re-use of Educational Magic Lantern Slides*, https://a-million-pictures.wp.hum.uu.nl/, *B-Magic: The Magic Lantern and its Cultural Impact as a Visual Mass Medium in Belgium*, https://www.uantwerpen.be/en/projects/b-magic/, *MAGICA. Magic Lanter: Study, Safeguard, Uses and Reuses in 19th Century Portugal*, https://www.magica-project.com/, and *Curiositas: Peeping Before Virtual Reality. A Media Archeology of Immersion Through VR and the Iberian Cosmoramas*, https://curiositas.ulusofona.pt/about/.

Fig. 4 *Drawing by Francisco de Goya, c. 1824–1828, Mirar lo que no ven, G notebook Bordeaux*[3]

3. Available at: https://fundaciongoyaenaragon.es/obra/mirar-lo-que-no-ven-g-2/1628

> A certain ark in the form of a showcase brought by the Savoyards. The ark opens in three parts, revealing movable wooden figurines inside. By putting a key in a hole in the back, an iron is turned, causing the figurines to move and a little song to be played. There are also other versions that can be viewed through a graduated glass, which increases the size of the objects and provides various perspectives of palaces, gardens, and other scenes.[4]

In 1899 its definition was consolidated as it appears in the current edition of the *DRAE* (1899, 682): "a box containing a portable cosmorama or a collection of mobile figures that is carried through the streets for the amusement of the people". For its part, the definition of *totilimundi* refers directly to the identical 'optical machine': "the same as the *mundinovi*" (1739, p. 310).

In Spain, a detailed description of dioramic devices and the new inventions associated with them was compiled in the *Semanario Pintoresco Español* on July 8, 1838. The publication gathered the names used by entrepreneurs, writers, or journalists. According to Bernardo Riego (2006, p. 60) these devices were described as utilising the "changing property of light" and were composed of a "translucent sheet painted on both sides, which, depending on the opening and closing of various colored windows, allows for a gradual transformation of the image". The weekly magazine further explained that:

> […] Panorama derives from the Greek words *pan* (all) and *horama* (view) and originally referred to a view of an entire city. Subsequently, the *cosmorama* was developed, derived from *kosmos* (universe) and *horama* (view of the universe), which was a collection of optical views of various landscapes and towns around the world. Other inventions followed, including the *panstereorama*, a topographical gallery in relief of various cities; the *alporama*, or view of the Alps; the *cosmomechanicos*, a spectacle of experimental physics and phantasmagoria; the *diaphanorama*, or transparent views of picturesque sites; the *pyrrorama*, an exhibition of transparent glasses with a unique music mechanism; the *diorama*, from *Dio* (God's light) and *horama*, which offered immersive scenic views, the *uranorama*, which depicted the movement of all celestial bodies; the *europorama*, providing views of Europe; the *georama*, from *ge* (earth) and *horama*, or view of the earth, which featured a colossal sphere of over one hundred feet representing all parts of the world, turned by a circular gallery; and the *neorama*, from *neos* (temple) and *horama*, or view of the interior of a temple.

Considering the interest generated by these attractions, Françoise Beudant made an initial effort to classify them based on their etymology. In his *Tratado elemental de física*, specifically in the *Adiciones to the 1841 edition* – under number 21 on optical instruments (476) – he documented the origins of two recreational functions based on optical

4. Translated by the authors.

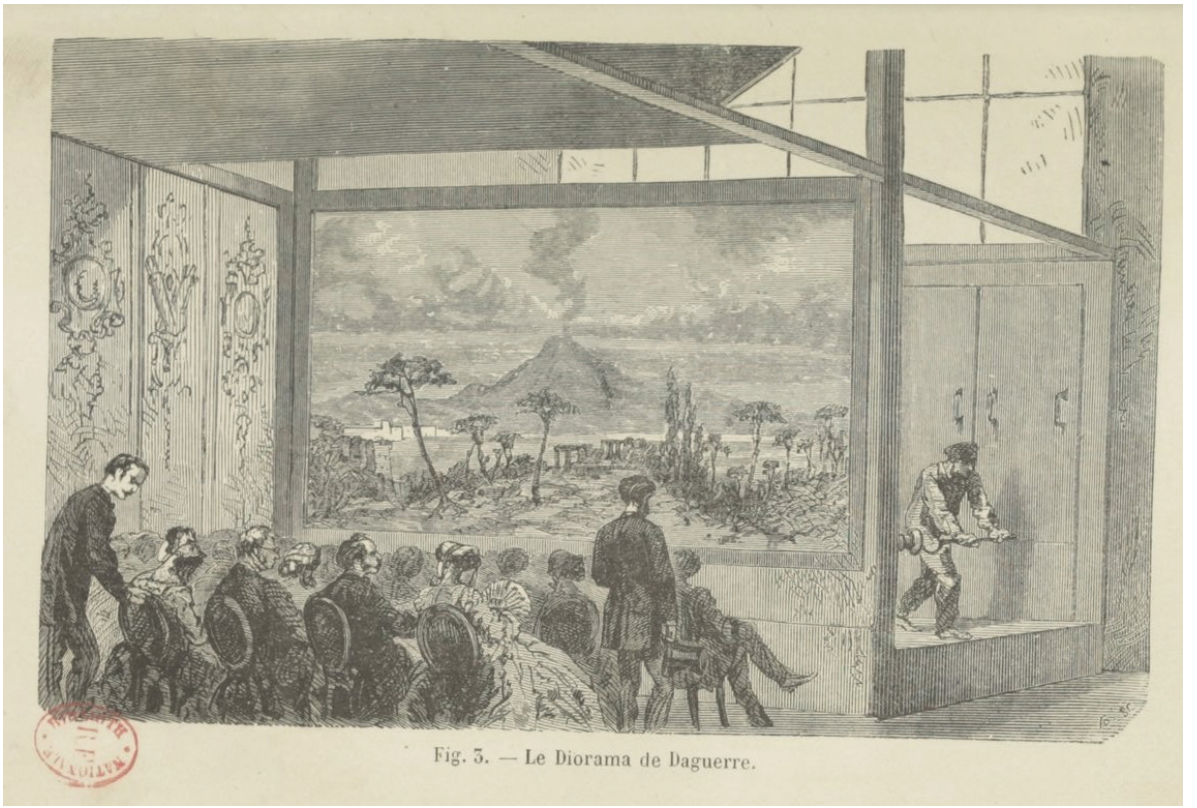

Fig. 5 *Tissandier (1874, 21). Engraving where the audience observes the Daguerre's diorama*[5]

boxes. The first of these, the cosmorama, as previously argued, derives its name from two Greek words, *cosmos* and *orama*, meaning view of the world or view of various points of the world. And the second, when maritime views were presented, he called neorama, also taking the word from Greek words *neus*, *neos*, *nave*, and the suffix *orama* or view. However, *neorama* can also mean view of temple or temples, with its origin in the noun *neos* and temple, and it can also mean new view, using the adjective *neo*, which means new or recent.

5. Available at: https://gallica.bnf.fr/ark:/12148/bpt6k64587896/f33.item.zoom

Fig. 6 *Robert Barker (1792). Cities of London and Westminster. Panorama*[6]

In the 1869 edition of the *Dictionary of the Royal Spanish Language Academy*, the popularity of these devices was reflected by including their two most popular names: the cosmorama, defined as an "optical device used to enlarge objects through a camera obscura", and also referred to as "the place where for recreation, towns, buildings, etc. are represented in this way" (p. 217). The second term is *neorama* and is described as "a kind of panorama drawn on a cylindrical surface that represents the interior of a temple, a large building, etc." (p. 536). Both terms refer to a receptacle, box, drawer, or case containing different views or to a portable optical device housing a collection of optical views and even a repertoire of moving figures that could be found on streets or avenues and whose function was to entertain people.

The term panorama was added to the *DRAE* in its 1852 edition, where it was defined as an "optical device consisting of a view of a town or country, viewed from a central point and revealing it on all sides". Additionally, it was described as a "complete or perfect view of something" created from "a circular picture without beginning or end". In such a picture, "the entire horizon is represented in its natural magnitude", and the viewer is positioned in the same location as the painter's viewpoint.

According to Martínez Luna (2021, p. 143), the Panorama invented by Robert Barker in 1787 played a pivotal role in the emergence of geographic and touristic awareness. The panoramic concept, initially derived from landscape observation, entered the public domain in 1792 with a view of London and Westminster. The purpose of panoramic painting was to expand and intensify the imitative and illusory effects of painting, using techniques such as trompe l'oeil and the search for a sensation of circumvention. The Panorama aimed to overcome the limitations of painting and its models of representation, striving to achieve a form of perception that was apparently more in line with the natural capabilities of the human eye. Drawing from a range of visual culture elements, the Panorama sought to return them to an imaginary natural state, before their subjection to the representation systems that emerged with the consolidation of geometric perspective. The 360º vision, immersed in the environment, to which this invention invites us, is closer to the natural way human beings perceive reality, move, and act in it, once freed from the pressures of theoretical and technical mediations.

The diorama, developed by Daguerre in Paris in 1822, utilised techniques from theatrical decoration and lighting to create

6. Available at: https://www.360cities.net/pt/image/robert-barker-s-london-panorama

a large-scale stage that aimed to push the boundaries of the illusion of reality as the panorama does. It combined painted canvases with large scenes that could be illuminated from the front or back, thus creating an immersive and visually stunning experience. The 1869 DRAE definition of the diorama described it as an "optical device that consists of seeing pictures illuminated by natural light from darkness" and referred to it as "the place designated for this recreation". Similarly, the 1884 definition defined it as "the optical spectacle consisting of an exhibition of one or more paintings on vertical canvases, depending on the illusion of diversity in the play of light" and as a "place designated for recreation" (Catalán, 2013, p. 213). Furthermore, Beudant (1841) explained that the etymology of the word diorama meant "divine, magnificent, grand, sublime view".

To enhance knowledge about the archaeology of immersive visual media in Spain between 1822 and 1872 and gain a deeper understanding of this topic, this study poses the following questions (referred to as Q.):

> Q.1: What were the most frequently represented immersive visual media in the Spanish territory between 1822 and 1872?
> Q.2: In which Spanish cities were these immersive visual media exhibited between 1822 and 1872?
> Q.3: Where were the immersive shows located within Spain between 1822 and 1872?

3. IMMERSIVE VISUAL MEDIA IN SPAIN BETWEEN 1822 AND 1872: RESEARCH METHODOLOGY

In order to achieve the specific objectives of this study, namely, to explore the forgotten history of immersive optical shows and enhance knowledge about the archaeology of audiovisual media in Spain by valuing and answering the questions posed in the previous section, two tasks were undertaken. The first task involved cataloguing and inventorying the available resources, followed by mapping the records found after reviewing local newspapers from various Spanish provinces.

The process of cataloguing involves classifying the obtained records, followed by developing an inventory or ordered list of these records in a database. For this study, Microsoft Excel was utilised for data collection, resulting in a documentary corpus (a collection of documents, records, or sources that are used as the basis of research) functioning as a catalogue. Initially, a qualitative search of the research object was conducted, and a list of terms was selected based on the keywords of our research, including: *mundonuevo*, *mundinovi*, *tutilimundi*, *tutti gli mondi*, *tutti li mondi*, *cosmorama*, *diorama*, *neorama*, *panorama*, and *poliorama*. Subsequently, sampling criteria – the specific keywords, a limited time frame, and the use of various digital newspaper archives located in Spain – were established to obtain a minimum of 400 to 500 records from digital collections of historical Spanish newspapers. The search was limited to the time frame from January 1, 1822, to December 31, 1872. Information was gathered from various digital newspaper archives located in Spain.

The digital newspaper archives used in this study include state libraries such as the *Biblioteca Nacional de la Prensa Histórica* (https://prensahistorica.mcu.es/es/inicio/inicio.do) and the *Hemeroteca Digital de la Biblioteca Nacional* (http://hemerotecadigital.bne.es/index.vm), as well as those of the autonomous communities and provinces of Spain such as the *Biblioteca Digital de Castilla y León* (https://bibliotecadigital.jcyl.es/es/inicio/inicio.do); the *Biblioteca Virtual de Andalucía* (http://www.bibliotecavirtualdeandalucia.es); the *Biblioteca Virtual del Principado de Asturias* (https://bibliotecavirtual.asturias.es/); the *Biblioteca de Catalunya* (https://arca.bnc.cat/arcabib_pro/ca/consulta/resultados_ocr.do); the *Biblioteca Dixital de Galicia* (http://galiciana.bibliotecadegalicia.xunta.es/gl/inicio/inicio.do) and the *Hemeroteca Región de Murcia* (http://hemeroteca.regmurcia.com/).

In order to carry out a representative printed corpus of Spain, the guideline followed in this study was to select a maximum of four relevant periodical publications from each city. The number of cities and publications sampled may vary – being higher or lower – depending on factors such as the life span of each newspaper, the materials found, and the search method applied. A database was then created by entering the records found in the database including the following fields: keyword; cataloguing code (newspaper initials and publication date); newspaper title; country; autonomous communities; province; type of information (advertisement, news, chronicle); image of the advertisement/news; day, month and year of the announcement; exhibition title; street name where the show was performed; street number where the show was performed; floor where the show was performed; city where the show was performed; place of origin of the show; price of the show; show time; show advertised, and any additional remarks. This methodology allowed for systematic and rigorous data collection for the subsequent analysis and study of the archaeology of immersive visual media in Spain.

The research process entails the mapping of data, involving digital and graphical representation of the information obtained from the inventory of evidence related to immersive visual media in Spain between 1822 and 1872. To achieve this task, we used the R packaged netCoin, which is based on Network Coincidence Analysis (NCA), also known as the *Análisis Reticular de Coincidencias* (ARC) in its original Spanish version, (Escobar & Tejero, 2018). The main objective of this analysis is to detect events, characters, objects, attributes, or characteristics that tend to appear together within a given set of scenarios. Its most outstanding feature is the combination of traditional multivariate statistical analysis and network analysis supported by topological graph theory, offering the opportunity to interactively analyse and visualise complex datasets (Escobar & Martinez-Uribe, 2020). This allows for an exploratory and confirmatory analysis of significant amounts of information, which help us achieve our research objective of determining the historical and cultural value of the archaeology of immersive visual media in Spain. The generated graphs provide insightful information, and the results obtained from the data mapping can contribute to future research in this area.

The NCA enables the identification of various degrees of coincidence among the events studied, ranging from lack of coincidence to total coincidence, as well as statistically probable coincidences with a predefined level of confidence. These degrees of coincidence can be identified through statistical

methods and visually represented using a digital, dynamic, and interactive graph. In our study, we applied this analysis to map the information, with the specific aim of identifying associated events and situations, understanding the distribution of immersive media in the territory, and identifying their consumers. This approach allowed us to gain a more significant understanding of the data, providing a more comprehensive insight into the archaeology of immersive visual media in Spain. Moreover, this study's significance lies in its ability to provide new insights into the distribution and consumption of immersive media, which can serve as a foundation for future research in this area.

4. RESULTS

A total of 541 records related to immersive visual media in Spain between 1822 and 1872 were selected from the Spanish digital newspaper archives, meeting the previously specified conditions. These news or advertisement records served as the key information source for this study, completing the database used in our research. To address the research questions raised in Section 4, we used the R's netCoin package to load the records, representing the information through distribution graphs and analysis, providing the necessary data visualisation. The results obtained from this analysis are presented below.

The graphs allowed for the clear visualisation of the data, aiding in the identification of key variables such as autonomous communities (*C.A.*), keywords (*Type*), cities (*City*), and street names (*Place*). To improve the clarity of data visualisation in graphical representations, abbreviations were utilised for some of the variables. These abbreviations will aid in the better visualisation of nodes and links.

Q.1: What were the most frequently represented immersive visual media in the Spanish territory between 1822 and 1872?

To address this issue, a sample of immersive media events held in Spain was located and compiled. To obtain a comprehensive view of the structure, four relevant variables from the database were selected: the type of immersive visual media available, the autonomous communities where the events were held, the place of origin from which the events were registered to have moved, and the year in which each event took place. Using this information, a graph was constructed that shows each node representing the values of the variables, and links representing the potential relationships between them, as shown in Fig. 7. It should be noted that the size of the nodes adjusts based on the degree, enabling the establishment of a proportional relationship between the number of coincidences and the node's magnitude.

As can be observed in both the graph and the headmap (Fig. 8), although in terms of frequency the Spanish regions where most cosmoramas appear are Andalusia (191), Madrid (45) and Catalonia (29), this type of spectacle has a network link with the Valencian community within the network based on Haberman's residuals, which indicates the relative strength of association. This indicates that the occurrence of cosmoramas in the Valencian Community is significantly higher than expected when compared to their distribution in other communities. Cosmoramas are also the medium that stands out in the greatest number of years: 1835, 1862, 1867 and 1871, demonstrating their extensive temporal reach. Dioramas, on the other hand, are linked to the Andalusian community and to a French origin, specifically the city of Paris, which also stands out among the spectacles found in the Cantabrian community.

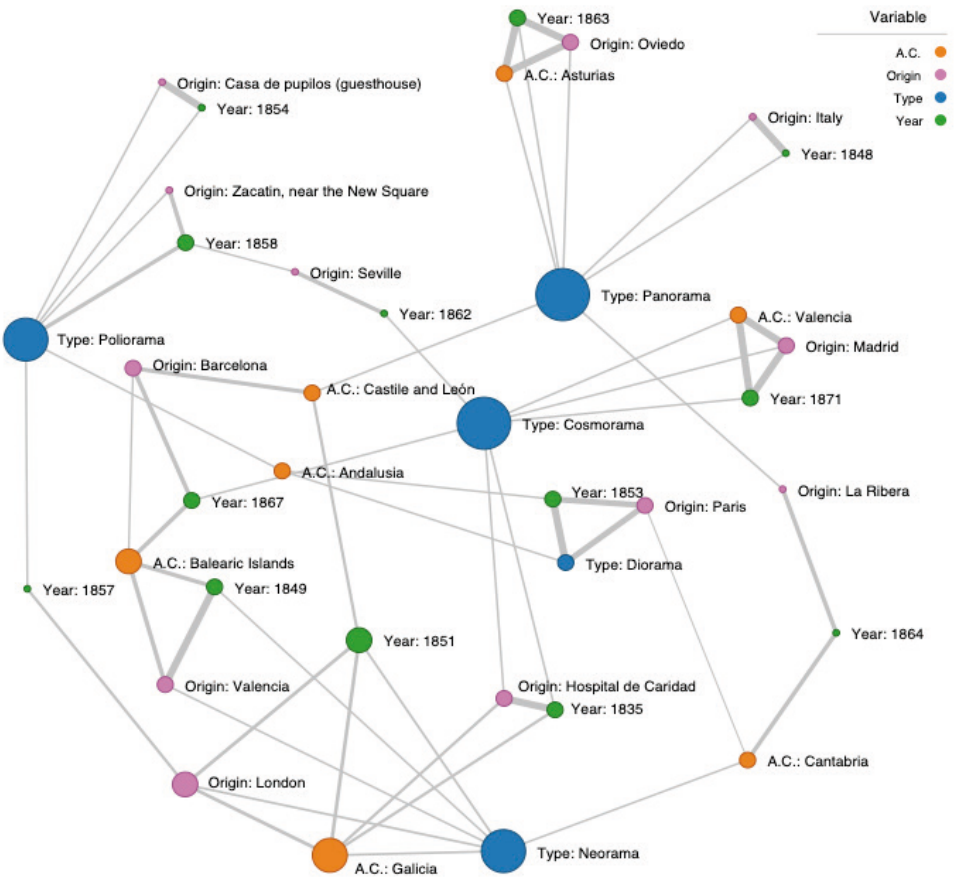

Fig. 7 Reticular Analysis of Coincidences of Immersive Visual Media. Source: Prepared by the authors[7]

However, what has a greater tendency in the areas of Cantabria, as well as in Galicia, are the neoramas, predominantly in the years 1849 and 1851. Regarding panoramas, we find links with the Castilian-Leonese and Asturian communities. The last type of medium, polioramas, appears to have occurred differentially between in the late 1850s (1854, 1857, and 1858).

7. The weight and width of the links correspond to the Haberman residue. The size of the nodes is equal to the degree and their colors to the variables in the caption.

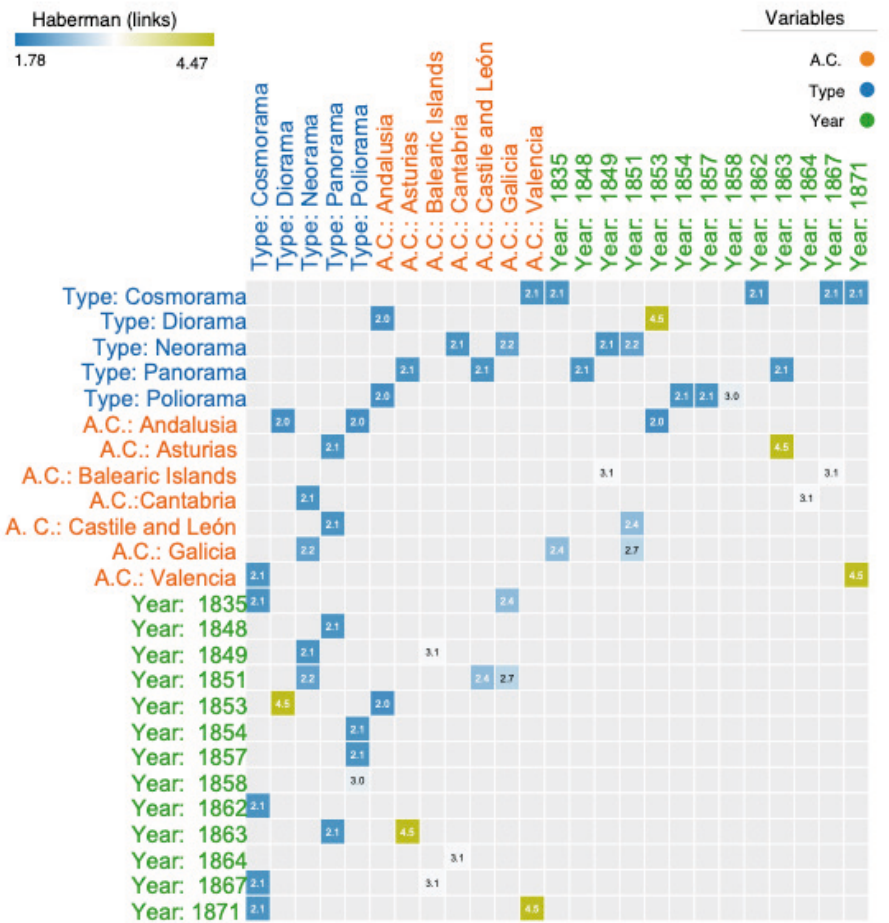

Fig. 8 Heatmap of coincidences of immersive visual media. Source: Prepared by the authors [8]

8. The heatmap visualizes the Haberman residuals derived from the NCA performed in Figure 6. Greener shades indicate stronger positive associations, suggesting a higher-than-expected match rate, while bluer shades suggest a lower match.

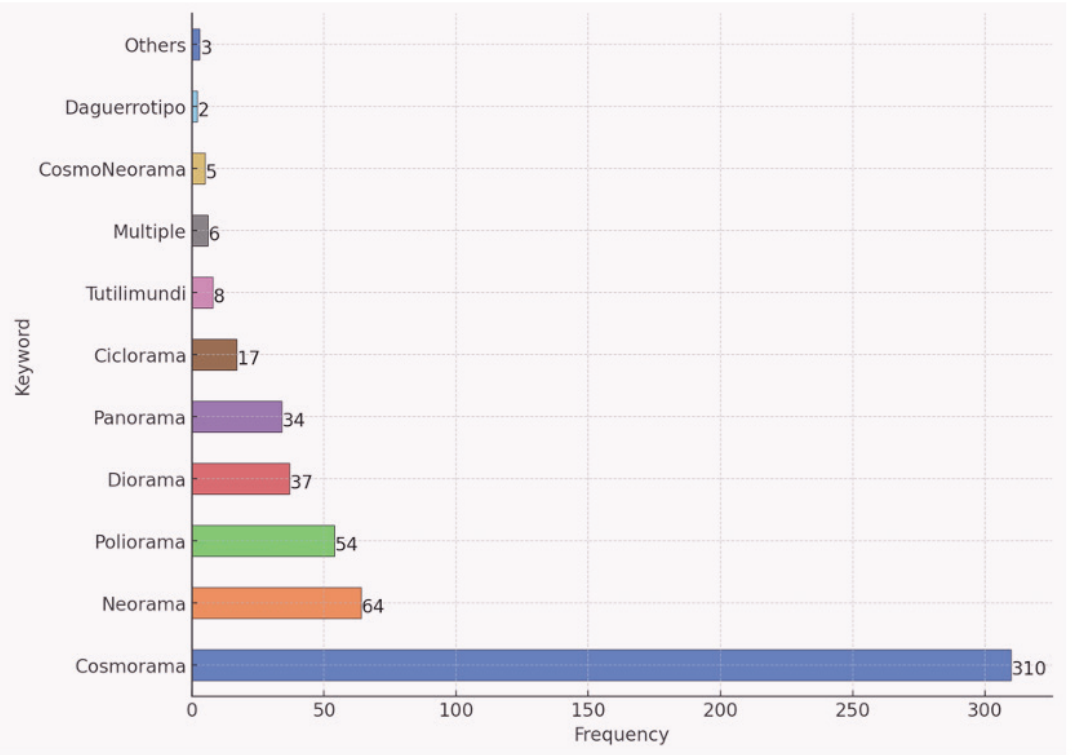

Fig.9 Distribution of records according to the type of immersive visual media. Source: Prepared by the authors

Through the statistics, we can observe that a total of eight types of immersive optical spectacles are identified in the news and advertisements of the Spanish press consulted between the years 1822 and 1872. In decreasing order, the number of records found are 310 cosmoramas, 64 neoramas, 54 polioramas, 37 dioramas, 34 panoramas, 17 cycloramas, 8 tutilimundis, and 5 cosmoneoramas, not mentioning the types with a frequency of less than 5 cases.

It can be observed from the records that cosmoramas were the most frequently represented optical spectacles in Spanish territory during the period from 1822 to 1872. Additionally,

9. The graph shows the frequency of all show types available in the data collected. The category "Multiple" groups those shows where more than one type is advertised at the same time. The category "Other" groups the types with a frequency of less than two.

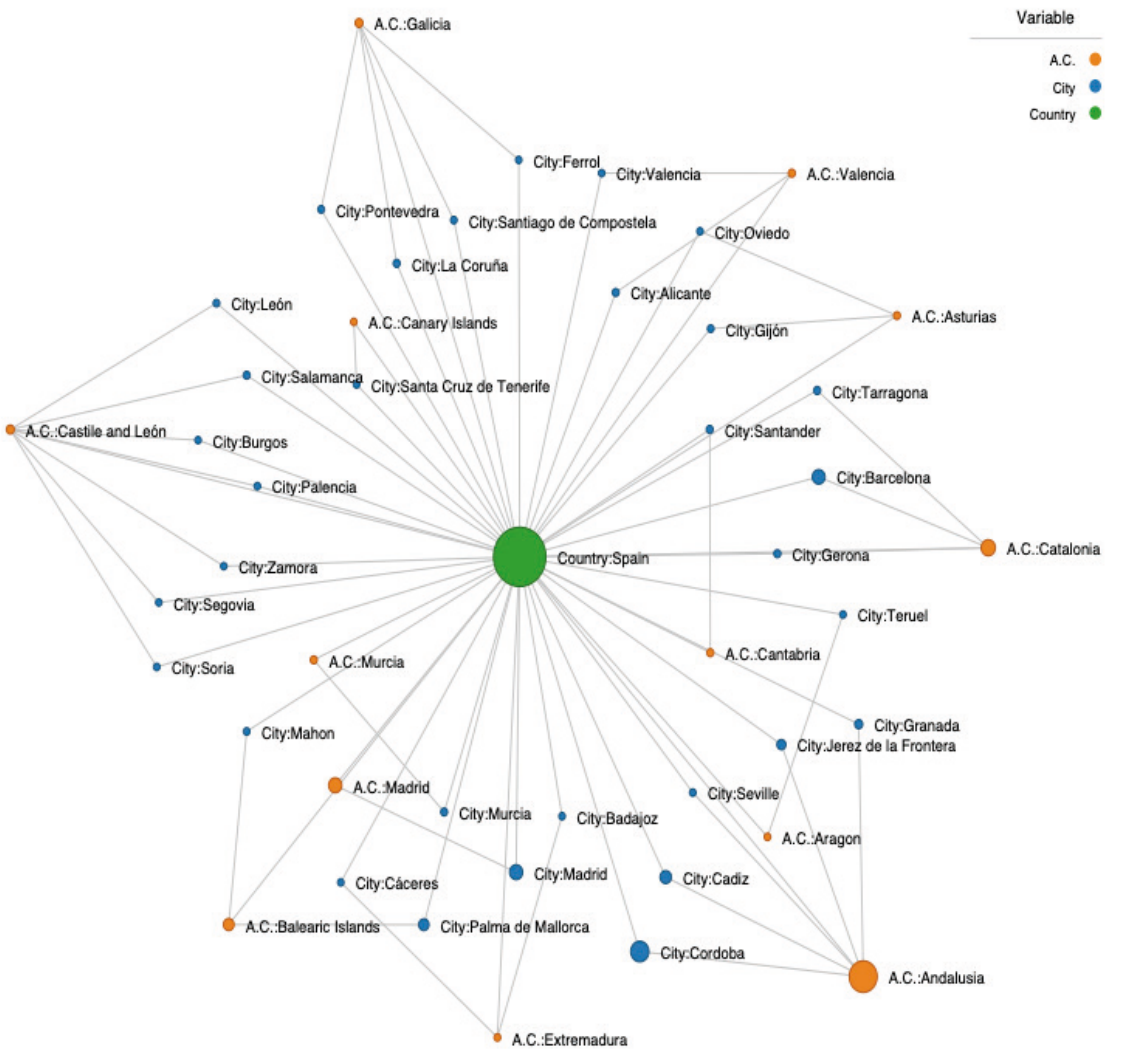

Fig. 10 Network representation of places. Source: Prepared by the authors

advertisements for polioramas, dioramas, neoramas, and panoramas were also regularly printed in newspapers of the time. These data suggest that these public spectacles were a common option for daily entertainment. In contrast, spectacles such as the tulilimundi, totilimundi, mundonuevo, or mundinovi were less common in newspaper advertisements, suggesting that they were possibly gradually replaced by newer immersive optical media. Furthermore, we know that in 1825, the Secretary of the Department of Grace and Justice determined that "His Majesty [...] has been pleased to decide that no other spectacles are allowed in Madrid except those of the theatres" (document nº 155). This concession reflects the Royal Order communicated to the Corregidor on March 31, 1825, in which it was ordered "that no licenses should be granted to perform in the Court any comedy, phantasmagoria, or any similar show, allowing only those at the Tívoli theatre, vocal and instrumental music concerts, and other equivalent performances". "[...] From that date, puppeteers had to always make an arrangement with theatre entrepreneurs". "[...] The same happened in other cities, as can be inferred from document nº 175". In addition to reaching an agreement with the entrepreneurs, the puppeteer at that time had to prove that they belonged to the *Brotherhood of the Novena* (Varey 1972). 36).

Q.2: In which Spanish cities were these immersive visual media exhibited between 1822 and 1872?

To address this issue, three variables from the database were selected: country, autonomous communities, and cities, in order to represent the different places where immersive spectacles took place. The result is a graph that shows the nodes corresponding to each of the variables, and their size is related to the number of records in which immersive spectacles appear in each place, as shown in the following figure.

Through the statistics obtained from the database, it can be observed that records related to immersive visual media in Spain are distributed across a total of 13 autonomous communities: Andalusia, Catalonia, Madrid, Balearic Islands, Castile and Leon, Valencia, Galicia, Murcia, Cantabria, Asturias, Aragon, the Canary Islands, and Extremadura. Of all the analysed records, the Autonomous Community of Andalusia had the highest percentage of exhibitions of immersive optical spectacles, accounting for 46.7% of the total, which corresponds

Autonomous Communities	Frequency	%
Andalusia	253	46,77
Catalonia	92	17,01
Madrid	80	14,79
Balearic Islands	50	9,24
Castile and Leon	17	3,14
Galicia	16	2,96
Valencia	8	1,48
Cantabria	7	1,29
Murcia	7	1,29
Asturias	5	0,92
Extremadura	3	0,55
Aragon	2	0,37
Canary Islands	1	0,18
Total	541	100%

Fig. 11 *Distribution of registries according to autonomous community. Source: Prepared by the authors*

to a total of 253 news pieces and advertisements. The second region with the most news and advertisements related to the study topic is Catalonia, where 92 records were found, representing 17% of the total. It is followed by the Autonomous Community of Madrid, where 80 news pieces and advertisements were recorded, equivalent to 14.8% of the total, and the Balearic Islands, with 50 records (9.2%). In the rest of the autonomous communities, the number of cases is less than 20.

According to the obtained data, a total of 31 Spanish cities were identified where immersive visual media shows were recorded. The cities that top the list, in descending order of the records found, are Cordoba (140), Madrid (80), Barcelona (76), Cadiz (59), Palma de Mallorca (47), Jerez de la Frontera (31), and Granada (20). In the cities of Girona, La Coruña, Tarragona, Alicante, Murcia, Salamanca, and Santander, between 5 and 19 records were found, while in the rest of the cities, fewer than five pieces of documentary evidence related to immersive media were found.

City	Frequency	City	Frequency
Córdoba	140	León	3
Madrid	80	Mahon	3
Barcelona	76	Santiago de Compostela	3
Cadiz	59	Sevilla	3
Palma de Mallorca	47	Badajoz	2
Jerez de la Frontera	31	Palencia	2
Granada	20	Soria	2
Girona	8	Teruel	2
La Coruña	8	Burgos	1
Tarragona	8	Caceres	1
Alicante	7	Ferrol	1
Murcia	7	Oviedo	1
Salamanca	7	Santa Cruz de Tenerife	1
Santander	7	Segovia	1
Gijon	4	Valencia	1
Pontevedra	4	Zamora	1
		Total	**541**

Fig. 12 *Distribution of registries according to the city/town. Source: Prepared by the authors*

These findings demonstrate that immersive visual media shows had already been exhibited in several Spanish cities during the period 1822 to 1872. Advertisements and promotions for these optical devices could be found in newspapers from various locations, suggesting that their consumption was in vogue in the society of the time. Additionally, the obtained records indicate that immersive shows were more frequent in major urban centres such as Cordoba, Madrid, and Barcelona.

Q.3: Where were the immersive optical shows located within the Spanish cities between 1822 and 1872?

A total of 133 advertisements containing information on the location of immersive visual shows where located. To investigate their location, two variables were chosen from our database: the city and the name of the street where the shows were exhibited. This results in a graph where nodes representing the city and street name are shown (as depicted in Fig. 13), with size proportional to the number of occurrences.

The most frequent immersive visual spectacles were held in five different locations, three of which have detailed descriptions. These events were carried out in the most important and crowded streets, squares, and promenades of the cities, indicating that they were events that attracted a large audience. The Calle Ancha in Cádiz, which has been the nerve centre of the city since the 18th century, was also the site of the

Fig. 13 Network of cities and places. Source: Prepared by the authors

City	Known places	Unknown places	Total	City	Known places	Unknown places	Total
Alicante	5	2	7	Murcia	3	4	7
Badajoz	1	1	2	Oviedo	0	1	1
Barcelona	51	25	76	Palencia	0	2	2
Burgos	0	1	1	Palma de Mallorca	21	26	47
Caceres	0	1	1	Pontevedra	1	3	4
Cadiz	54	5	59	Salamanca	2	5	7
Córdoba	123	17	140	Santa Cruz de Tenerife	0	1	1
Ferrol	1	0	1	Santander	2	5	7
Gijon	4	0	4	Santiago de Compostela	0	3	3
Girona	2	6	8	Segovia	0	1	1
Granada	14	6	20	Sevilla	1	2	3
Jerez de la Frontera	10	21	31	Soria	0	2	2
La Coruña	4	4	8	Tarragona	4	4	8
León	0	3	3	Teruel	0	2	2
Madrid	43	37	80	Valencia	0	1	1
Mahon	1	2	3	Zamora	0	1	1
				Total	**347**	**194**	**541**

Fig. 14 *Distribution of registries by the location of the show. Source: Prepared by the authors*

Cortes of Cádiz. This walking and gathering space remains very popular today. The Calle Ancha features late Baroque, Neoclassical, and Isabelian style palatial houses, as well as casinos, banks, corporate offices, and stores (Holgado, 2021). On January 14, 1850, the Cádiz newspaper *El Comercio* announced the exhibition of a panorama at number 62 on Calle Ancha. Additionally, from October to December 1853, shows that included a cosmorama were held in the same location. According to the *Diario Mercantil de Cádiz* on December 24, 1853, a diorama was presented after the cosmorama.

The Rambla, one of the main avenues of Barcelona and one of the most emblematic places in the city, was built in 1766 following the path of the old medieval wall, which had been demolished six years earlier due to the urban expansion plans of the city. Since its opening, the Rambla quickly became one of the nerves centres of the city, a place where all kinds of people met due to its width and difference from the narrow streets of the old neighbourhoods. With a length of 1.3 kilometres, it is an ideal street for strolling and enjoying the atmosphere. The *Diario de Barcelona* advertised a large number of optical

shows located on this avenue. Among the most notable examples are the neorama spectacle on September 16, 1843, the poliorama on December 26, 1845, and the cyclorama on May 8, 1864, among others.

In Granada, according to the newspapers *El Granadino* and *La Alhambra: diario granadino*, optical shows such as cosmoramas, panoramas, and polioramas were frequently held on Carrera de Genil. This is a central and important street where the Basilica of Angustias is located, connecting Paseo del Salón with Puerta Real. Puerta Real was also a street with representative spaces to hold different types of optical shows, and it is a crossroads for many passages. On March 30, 1851, *El Postillón: periódico político y de avisos de la provincia de Gerona* reported on a poliorama show that took place in Plaza de la Constitución, while on October 23, 1867, *La Correspondencia de España: diario universal de noticias* presented a cosmorama show at Puerta del Sol in Madrid. The same newspaper in the same city presented a poliorama show on Paseo de Atocha, which is also a very relevant street in the city centre. Shortly after, on August 11, 1870, *El Eco popular: periódico radical de Salamanca* reported on a panorama show in Plaza Mayor in the city.

Through observation, it can be noted that optical shows in Spain were mainly concentrated in venues or halls located on important streets, as well as in promenades and squares in the cities. These places were considered as main meeting points for citizens and were usually very crowded, which gave them greater visibility and attractiveness for the public.

5. CONCLUSIONS AND DISCUSSION

The proposed investigation, based on the analysis of records from various Spanish digital newspaper archives, has revealed the existence of a wide diversity of news pieces and advertisements related to immersive visual media between 1822 and 1872. The study shows that the optical devices present in the Spanish territory, such as the cosmorama, diorama, neorama, cyclorama, poliorama, panorama, and many others, constituted a powerful network that attracted a huge crowd of viewers, forming a fundamental part of popular entertainment during that period. The optical devices could be found in busy street locations or public squares where people gathered, arousing curiosity for the different spatial and temporal themes reflected in their views, for the sensations they perceived, for their affordable prices, and for the publicity made about them in the written media of the time. Their diffusion encouraged the public to attend these magical spectacles that offered a new way of understanding the world, breaking the limits of time and space. They managed to satisfy the interest of those present by providing a timeless journey through the views shown as if they were introduced into a visual encyclopaedia. They allowed many people to travel to places they could never have known if they had not attended these immersive optical exhibitions.

For a significant period, the emphasis of society was placed on the expression of written texts, and the cultural significance of images was overlooked. Certain forms of image expression have been viewed as marginal or uninteresting from a historical research perspective. In nineteenth-century

culture, optical shows, despite their persistence and diversity, have been one of these cases where the cultural significance of immersive visual media as part of virtual heritage has not been valued, as pointed out by Bernardo Riego (2004). The Isabeline era was a key period in the shaping of the new society in 19th-century Spain, in which the tension between tradition and modernity was constantly revealed in cultural manifestations, as pointed out by Riego (2004). The emergence of immersive visual media with great potential for communication enriched the way in which people received information, as these media even allowed illiterate people to connect with the world. Optical shows and visual experiences opened a wide window to the world of their time, helping to forge the elements of the audiovisual culture to which we are heirs today.

According to Frutos et al. (2019), any form of social media in its historical context would not be perceived as a synthesis or a pinnacle of prior arts and media, but rather as a medium for continued analysis of cultural heritage. News pieces and advertisements in old newspapers have recorded much of the history of immersive visual media, and fortunately, they allow us to conduct a historical and cultural review of social communication media. Through their study and revaluation, we can verify the impact that these media have had, and which has remained ignored or overshadowed for a long time by other types of media, such as the cinematograph.

This review is crucial in the current digital era. The audiovisual culture that we enjoy today and that continues to transform is the heir to these primitive audiovisual devices that are now preserved in museums and collections, both public and private. These humble and, in many cases, strange mechanical machines, full of ingenuity and engineering, are the starting point for many of the ways of looking that we have inherited, reflected in our current technologies, and constitute the support of an entire culture of vision (Bernardo, 2015). This research highlights the importance of studying historical media and their impact on society and culture. By recognising the cultural value of these early audiovisual devices, we can better understand the evolution of our current media landscape and appreciate the rich history of visual culture in Spain and beyond.

As a direction for future discussion, the following questions merit exploration: Why were Cosmoramas more prevalent during this period? What factors contributed to their prevalence, and can this be applied to other immersive media? Can the press advertisements studied here be considered indicative of all forms of immersive media in the 19th century, or are there distinctions to be made between them? Furthermore, how accurately can newspapers provide us with a portrayal of these media, and what are the potential limitations? Lastly, the use of visualisation tools has provided us with valuable insights and novel perspectives, and future research could delve deeper into the advantages and challenges associated with this approach.

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