

Exoplanets and their increasing visibility as news items in the newspapers ABC and El Mundo (1990-2018)

Los exoplanetas y su visibilidad creciente como piezas informativas en los periódicos ABC y El Mundo (1990-2018)



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Abstract:

The Internet is involved in an ongoing reconfiguration of new spaces for communication and fresh opportunities for scientific divulgation. The national press, such as ABC and El Mundo, have managed to migrate together towards the digital environment. This environment offers greater prominence to issues related to the discovery of extrasolar planets. This research demonstrates that these planetary objects are the protagonists of the great discoveries that Astronomy made in the last decade of the 20th century, from the discovery of the first being published in the press to the over 4000 extrasolar planets known today. The media, in their work to communicate these astronomical discoveries, have developed their capacity to provide greater news coverage. This paper studies the changes in news items on exoplanets published in the print editions of the newspapers ABC and El Mundo, from 1990 to 2014, and compares this coverage with that which can be counted in the digital editions of these same media on extrasolar planets from 2001 to 2018. These newspapers are found to have increased the number of items published on exoplanets in

Resumen:

Internet sigue reconfigurando un nuevo espacio de comunicación y de nuevas oportunidades para la divulgación científica. La prensa nacional ha sabido converger hacia el entorno digitalizado. Este entorno ofrece una mayor notoriedad a los temas relacionados con el hallazgo de los planetas extrasolares. Se demuestra que estos objetos planetarios son los protagonistas de los grandes descubrimientos realizados en Astronomía en la última década del siglo XX, desde que se publicase en la prensa el primero hasta los más de 4000 planetas extrasolares descubiertos en la actualidad. Los medios de comunicación, en su labor de difundir estos acontecimientos astronómicos, han desarrollado su capacidad para dar una mayor cobertura informativa. Este trabajo estudia la evolución de las piezas informativas sobre exoplanetas publicadas en los periódicos ABC y El Mundo en sus ediciones impresas, desde el año 1990 hasta el 2014, y compara esta cobertura informativa con la que se ha contabilizado en las publicaciones de las ediciones digitales de estos mismos medios sobre los planetas extrasolares, desde 2001 hasta 2018. Se halla que estos medios han aumentado el número de publicaciones informa-

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their digital versions relative to the printed ones. This work shows that these newspapers have developed greater interest in communicating discoveries in astronomy by locating this information in the science section.

Keywords:

Astronomy; communication; exoplanets; internet; press.

tivas sobre exoplanetas en sus versiones digitalizadas frente a las impresas. Con este trabajo se demuestra que estos diarios han desarrollado un mayor interés en la difusión astronómica al ubicar dicha información en la sección de ciencia.

Palabras clave:

Astronomía; comunicación; exoplanetas; internet; prensa.

1. Introduction

1.1. The state of the question

XXIst century society has adapted to the digital and multimedia environment. The internet offers a greater supply of communication options and has transformed our way of accessing the latest news. The relationship between science and journalism has brought about the specialisation of the latter. A science journalist must know how to report on the discoveries that science is making through its research. It is worth noting the words of Calvo Hernando (2002:49) when he said that “science journalism has as its final objective the explanation of the universe, and a goal, to improve people’s quality of life in favour of technological and scientific development, cooperating in the awakening of people’s interest in the advancement of the full democratisation of knowledge and innovation (...)”.

In Carlos Elías’s work, *Science on the Ropes Decline of Scientific Culture in the Era of Fake News*, the author wonders if a journalist’s scientific training influences the way he/she approaches scientific news (...) (2019: 191). Fernández del Moral (2004) feels that the qualities that should define a science journalist are the same as those for any other news professional: independence, tenacity, leadership, responsibility, and training, a lot of training, which, in the case of the science journalist should include the proper post-graduate courses, not just any science speciality (...). Elías (2008) tells us that science journalism’s discourse presents a series of linguistic characteristics, in particular the aspects related to the language employed in avoiding technicisms which may hinder the understanding of a text by the general public. He makes clear that it is not a question of excluding such technicisms, but of defining them when they are first introduced in the text by the journalist. Furthermore, a science journalist should identify the source and, at the same time, verify the information whilst ensuring that the fact is relevant for the audience and not only for the scientific community. A professional has to know how to develop his/her journalistic discourse from its scientific base. According to the advice offered by Elías (2018), he/she must know how to take the essential ideas from the scientific work and translate scientific discourse into journalistic discourse, whilst always asking themselves if the average reader is going to understand it all. Moreover, he/she has to discern and differentiate science from pseudoscience.

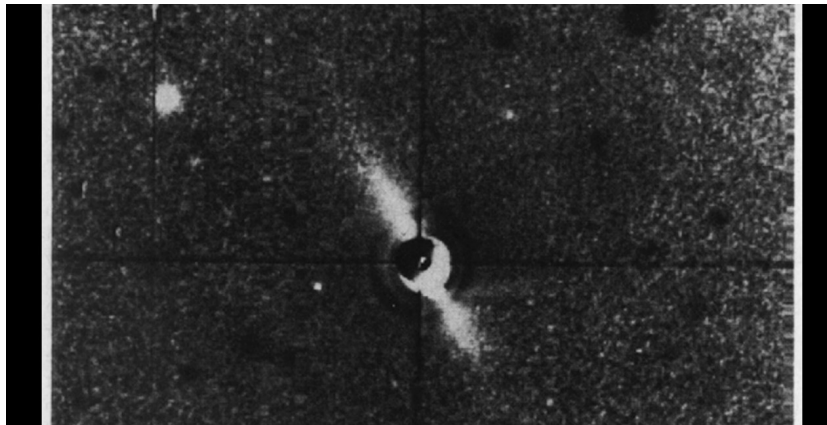
Miguel Arruti (2009) maintains that scientific information follows the same rules as general information. He sees divulgation imposing itself on scientific knowledge. Nonetheless, proper scientific divulgation requires a communicator who understands the subject deeply and is able to explain the content in simple and unassuming words, avoiding the dangers inherent in pseudoscience. He further states that “divulgation is a tale, a story, something told to teach (...). It is a form of journalism closely

related to a series of sciences (...) (2009: 165)". Thus, the social importance of the astronomical information published in the press is to be found in the skill of the science journalist in the labour of extracting the most relevant points from the scientific research. Calvo Hernando suggests a relationship between journalism and science. In his article *El periodismo científico, necesario en la sociedad actual* (2002) he suggests a correspondence exists between the two disciplines. Thus, technological and digital development lends scientific communication focused on Astronomy and Astrophysics greater media repercussion in public opinion, given the proliferation of webpages born and thriving on the internet.

The digital age has affected the world of the media (Marañón, 2014:1). The newspapers *ABC* and *El Mundo* have adapted themselves to the digital world. Each has a section dedicated to science, featuring the growing presence of news items related to Space and the study of the Universe, offering videos, photographs, and related links. These dailies have their own data bases, as well as those of NASA, the European Space Agency (ESA), the European Southern Observatory (ESO) and the Instituto de Astrofísica de Canarias (IAC). The presence of Astronomy and Astrophysics-related matters has increased in the pages of the Spanish daily papers.

Of all the astronomical objects discovered by humanity in the Universe, special mention must be given to the extrasolar planets or exoplanets. NASA defines them as those planets found outside our Solar System orbiting a star other than our Sun. In the 1990s, the North American agency found the first exoplanets. A disc of dust and gas was discovered around the star Beta Pictoris in 1984. The observation was made from the Observatorio de Las Campanas, belonging to the *The Carnegie Institution for Science* in the Atacama region of the Andes (Chile), initiating the discovery of new planets beyond our solar system.

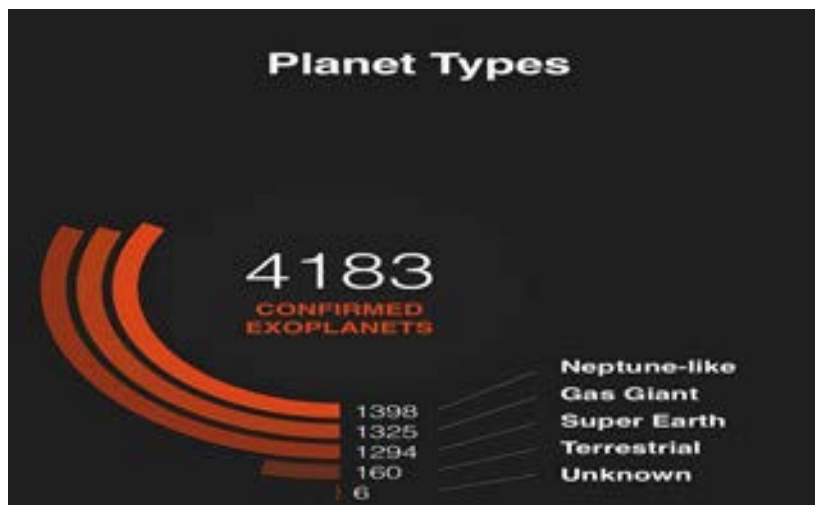
**Image 1. A disk of dust and gas around the star Beta Pictoris, discovered in 1984. Las Campanas observatory (Chile).
Credit: NASA / B. Smith, R. Terile**



Source: exoplanets.nasa.gov

The Kepler probe (NASA) discovered over 700 exoplanets in its first month of operations in 2010. A year later the vessel had found over a thousand extrasolar planets of a similar size to the Earth orbiting at a similar distance to their star as the Earth does to the Sun. News of the discovery of exoplanets continues to this day. As of July 13, 2020, NASA's official account, via its exoplanets channel, @NASAExoplanets, stated that 4,183 exoplanets had been discovered.

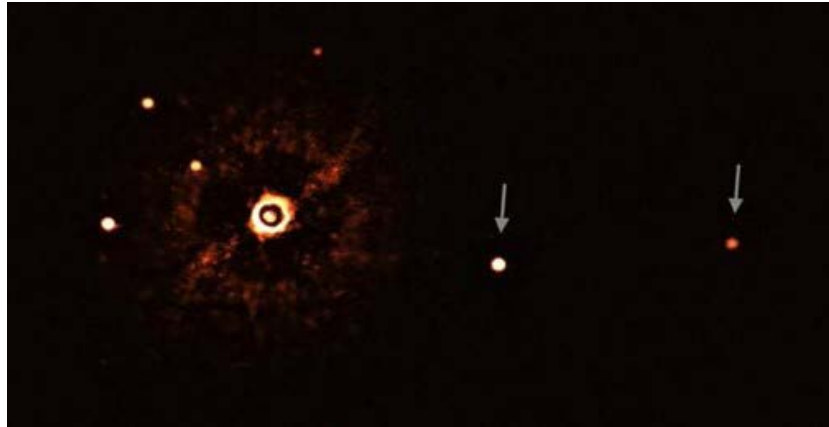
Image 2. Computer graphic of the types of exoplanets discovered by NASA. Credit: NASA



Source: @NASAExoplanets

Some days later, on July 23, 2020, the newspaper *ABC.es* published news of the *Very Large Telescope* (VLT) at the ESO, in Chile, capturing the first image of a system 300 light years from Earth, in the Musca constellation, formed by a young star. The star is known as TYC 8998-760-1, it is 17 million years old, is similar to the Sun, and is accompanied by two giant planets. *El Mundo*, in its digital edition, announced, on December 18, 2020, news that astronomers had detected “a possible radio emission captured from a planet outside our Solar System”.

Image 3. The star TYC 8998-760-1 accompanied by two giant exoplanets. Credit: ESO / Bohn et al



Source: ABC.es

News items about the discovery of extrasolar planets have been published since the late 1990s until the present day. Such news has been gaining greater attention both in the printed press and in their digital versions. Their media repercussion has been reinforced by postings on the social media accounts of these media, such as Twitter.

In Calvo's words (2002), "science journalism has as its final objective the explanation of the universe, and a goal, to improve the quality of the peoples" (p.490). It can be said that information is linked to reality and the present as "scientists recommend greater training for journalists to prevent the distortion of information" (Del Puerto, 1999:777). Journalists, in their function as communicators, must inform, explain and make known to the public the importance of an event generating the appropriate media repercussion.

News items related to Astronomy and Astrophysics enjoy certain prominence in *ABC* and *El Mundo*. Their digital formats allow for interaction via new technology and the corresponding platforms, presenting communication and language characteristics that transform the printed content into moving images and other resources offered by multimedia and hypertext. Real time replaces the periodicity of traditional media, and the audience is only a click away from up-to-date content, drawing their attention by means of the design the media dedicate to the astronomical data published on their pages and through their social media channels. Thus, these two newspapers have made the most of the tools and possibilities offered by the Network, attracting the audience to astronomy content and dedicating pages to information on exoplanets, consolidating the information with the public using the proximity that connectedness to the media provides, offering more information by virtue of the many platforms available, facilitating the readers' participation and obliging the media to maintain quality in both the design of its webpage and in the content published, this needing to be correct and truthful.

The digital editions of the newspapers being studied confirm the characteristics of multi-mediality, hypertext and interactivity, presenting a design adapted to the changes allowed by new information and communication technologies. In Oliva's words (2014):

Publications related to digital scientific divulgation have greater impact on society due to the advantages of immediacy, as well as the updating of content in real time and the interaction favoured by the two-way communication with the audience. The digital age has affected the media. The advantages of digital editions make divulgation immediate, and the event can be retransmitted and modified in real time. (p. 1)

Facts related to the study and exploration of the universe have wider diffusion and therefore, media repercussion among the audience and society.

This study seeks to provide something new to academic-scientific literature, as it is a review of the state of the question, and a bibliographic check of the information about extrasolar planets published in *ABC* and *El Mundo*, compiled in the research for a period of study of almost three decades. No foreign print publications have been found dealing with the communication and divulgation of astronomy related to exoplanets. There are no foreign or domestic references linked to scientific journalism about astronomy. It is shown that there have been no studies published on this question¹. There are national and international journals dedicated to Astronomy² and Communication. However, in Spain there are no scientific journals related to Communication in Astronomy and Astrophysics.

1.2. Objective

The news coverage of the daily newspapers *ABC* and *El Mundo* concerning exoplanets in both the traditional (print) editions between 1990 and 2014 and in their digital editions, from 2001 to 2018, has been taken as the object of analysis of a unique study focused on the news treatment of astronomical events related to the extra-solar planets discovered and, to shed light on the increased number of publications over the period indicated as well as the greater interest in such matters as represented by the greater care taken with and higher quality design in the digital versions.

1 Data bases consulted:

- Dialnet (<https://dialnet.unirioja.es>)
- Web Of Science (<https://www.recursoscscientificos.fecyt.es>)
- Google Académico (<https://scholar.google.es/schhp?hl=es>)
- ProQuest Dissertations & Theses Global (<https://about.proquest.com/products-services/pqdtglobal.html>)
- UdiMundos (<https://udimundus.udima.es>).

2 Spanish Astronomy journals: *Astronomía; Investigación y Ciencia; Boletín informativo de las Sociedad Española de Astronomía (SEA)*. They share an ability to communicate work and discoveries concerning the universe and astrophysics research. Internationally: *The Astronomical Journal (AJ); The Astrophysical Journal (ApJ)*; and *Astrophysical Journal Letters (ApJL)*. Their common objective is to specialise in the publication of studies and discoveries related to Astronomy and Astrophysics.

1.3. Hypothesis

The established period of study, from 1990 to 2018, covers the transformation of *ABC* and *El Mundo* to their digital format. It is clear that the number of items published has grown due to the advantages offered by the Internet, fundamentally immediacy, ease of access to content and the attention these newspapers pay to all matters related to the discovery of exoplanets. Digitalisation has brought about a rise in the number of items published on exoplanets as well as greater quality, in line with more interest in scientific activity among the general public. It is suggested that their webpages will improve their accessibility and ease of use through design, drawing users toward the content. It is further presupposed that the newspapers will add content in real time, increasing their ability to inform on science matters, with the greater interactivity offered serving to generate further interest. Presumably, the change from print to digital will lead to permanent sections providing varied and precise coverage by the media.

2. Methodology

The methodology corresponds to a method of content analysis conducted objectively, quantitatively and systematically. The content analysis can be defined as “a research technique intended to formulate, from certain data, valid and reproducible inferences which can be applied to their context” (Krippendorff, 1990:28). In her book *Periodismo Especializado (Specialised Journalism)*, the author states that with different digital formats and media “the rapid gathering of news on a given subject is made easier, and they are very useful, for example, when one wishes to carry out research into media content” (Berganza, 2005:107).

From among the most prominent newspapers in Spain, according to the Estudio General de Medios (EGM), the newspapers *ABC* and *El Mundo* have been chosen, given the objective nature of the results of this study and for the analysis of a unique study focused on the increase in publication of items related to the discovery of exoplanets, as well as for the journalistic coverage of these items from the 1990s until 2018. This study does not analyse the numerical impact on the audience nor is one of web analysis.

ABC is a century-old traditional medium. *El Mundo* is characterised by being more ground-breaking and relatively new, having first been published on October 23, 1989. This paper studies everything published about exoplanets by these two media outlets up to 2018. The search for astronomical items about these planetary bodies has been performed using the archives of *ABC* and *El Mundo*³. This search and the quantitative study of items related to extrasolar planets make clear how the way these newspapers contextualise and define this type of astronomical information has changed between 1990 and 2018, a period that includes the change and adaptation of these papers to the digital world.

Following the search for news items on exoplanets in the two newspapers' archives, a recompilation and review of the various publications related to these planetary objects was carried out. The interest inspired by the discovery of extrasolar planets was made apparent by the increase in the number of items published on the matter from 1990 to 2018, a period which reaches the digital transformation and consolidation of the newspapers. This increase in published material presumably responds to a greater interest in the subject on the part of the newspapers and their audience. We also analyse improvements in the design of

³ The Access data to the archives of *ABC* and *El Mundo* are available at: <https://www.abc.es/archivo/periodicos/> and <https://www.elmundo.es/hemeroteca/>, respectively.

news content concerning exoplanets, due to the advantages offered by the internet. This paper is the result of a quantitative and qualitative evaluation of news production on astronomy linked to the discovery of other planets outside the Solar System.

The period of study is divided as follows:

- *ABC* and *El Mundo*: recompilation of news items on exoplanets: 1990 to 2014.
- *ABC.es* and *El Mundo.es*: recompilation of news items on exoplanets: 2001 to 2018.

The quantitative results drawn from the recompilation of news items on exoplanets are shown in several tables and graphs for each newspaper, as well as a comparison between them and the different editions. For the qualitative results, analysis files have been drawn up in which the most relevant aspects are shown and analysed from a journalistic perspective, as is web design. (These files are found in Appendices A and B. (See:<https://drive.google.com/file/d/1Yb4B31HwQCPXTkAOtayt-U5e9UEOeo7h/view?usp=sharing>).

The research started in 1990 for two reasons: the first is that April 24 of that year saw the launch of the first space telescope, the Hubble or *Hubble Space Telescope* (HST) in honour of Edwin Powell Hubble. The second is due to the announcement of the discovery of the first planet found outside the Solar System. The news was published in *ABC*, on August 2, 1991, with the title: “The discovery of an exterior planet intrigues the scientific community” (page 41). The piece appears below:

Image 4. News item related to the discovery of the first possible exoplanet, published in ABC. Date: 2 of August 1991.
Access at: <https://www.abc.es/archivo/periodicos/>

VERNES 2-8-91

CIENCIA

ABC, Pág. 41

El descubrimiento del planeta exterior intriga a la comunidad científica

Caluroso debate en la Unión Astronómica Internacional

Buenos Aires. Francisco de Andrea

Como si un asteroide hubiese quebrado el cielo rojo del General San Martín en medio de la sesión, los mil doscientos astrónomos de todo el mundo que se reunieron en este Palacio de Congresos de Buenos Aires discutieron acaloradamente el portentoso descubrimiento del primer planeta fuera del Sistema Solar. Hipótesis variadas, conjeturas, y siempre la sensación de escándalo científico, porque ese planeta «no debería estar allí».

El pasado miércoles 24 de julio una noticia recorrió la academia, abrió que embargaba la XII Asamblea de la Unión Astronómica Internacional (UAI), que concluyó ayer en Buenos Aires. Tres radioastrónomos del observatorio de Jodré Bank, de la Universidad de Manchester, comunicaron al mundo el descubrimiento de un inesplicable planeta en torno a «PSR-1829-10», una estrella de neutrones situada a 270.000 kilómetros de la Tierra.

Como informó ABC, el hallazgo provocó una explosión mayúscula en la comunidad científica por doble motivo. En primer lugar porque ni el primer planeta que se descubrió fuera de nuestro Sistema Solar, «Y», más aún, porque la sensación general entre los astrónomos de todo el mundo es que el objeto descubierto «no debería estar allí», en las proximidades de una estrella de neutrones capaz de volatilizar cualquier cuerpo sólido como si fuera una bola de queso.

Rolf Davies, director del Jodré Bank, al salir del reunión, se vio en la necesidad de salir en defensa de su equipo en los debates que empezado se fueron en los pasillos del Congreso. «No es que cuando PSR-1829-10 hizo explosión —los astrónomos definen la estrella de neutrones como el cadáver de una estrella roja que explotó— la onda de choque volatilizó las capas externas y reñidas de algún planeta que se estaba allí una órbita más o menos lejana, algo al estilo de nuestro Júpiter», señaló Davies al diario «Clarín».

«Lo que continuó de aquel planeta —sigue diciendo— debe ser apenas el núcleo metálico. Ese «bulto de planeta» fue lanzado por los gases de la explosión y cayó hacia una órbita más cercana. Así que lo que tenemos hoy es el bulto de dos cadáveres el de un planeta rotando en torno a una estrella».

El ruso Alexander Bogorichuk, que será el próximo presidente de la Unión Astronómica Internacional, aventura por el contrario otras dos hipótesis científicas. «Una posibilidad es que en forma posterior e independiente a la explosión —señala—, la vacuola de neutrones capturara un asteroide de gran tamaño ajeno a ese sistema».

Por si esta explicación no llega a satisfacer, el astrónomo soviético ofrece una segunda conjetura: «que PSR-1829-10, que rota rápidamente sobre sí misma, haya disparado una parte de sí por su propia velocidad rotacional, fragmento en algo un trozo y quedó atrapado en una órbita cercana».

La hipótesis atrae los ojos de los periodistas por parte de algunos astrónomos pero no convence al científico galés David S. Gammie, científico de la Universidad de Tokio. «Para explicar de la manera más sencilla la cuestión de PSR —dice—, el fragmento tiene que haber sido disparado a casi la velocidad de la luz».

El astrónomo «Británico» ha podido ser recuperado por la Agencia Espacial Europea tras permanecer sesenta días fuera de control.

Confirman que un meteorito acabó con los dinosaurios

Londres. Agencias

Un meteorito que cayó sobre la Tierra hace unos 65 millones de años puso fin a la era de los dinosaurios, según ha confirmado un nuevo estudio publicado ayer por la revista británica «Nature». La investigación, que fue realizada por el geólogo norteamericano Jack Wolfe, indica que el impacto del meteorito en la Tierra provocó nubes de polvo, escorrentías y un descenso brusco de la temperatura. En opinión de este experto, el «invierno nuclear» resultante, con temperaturas en torno a los 18 grados bajo cero, determinó la desaparición de las especies animales y vegetales.

Según Wolfe, este impacto tuvo su epílogo en la península de Yucatán (México) y duró unos dos meses, pero sus efectos fueron «devastadores para cientos de especies». El estudio indica que, a medida que las nubes de polvo se fueron disolviendo, la temperatura de la Tierra fue ascendiendo paulatinamente y dio paso a una era de calor.

Con la aparición del nuevo estudio se agudiza aún más la teoría catastrófica sobre el fin de los dinosaurios. El pasado mes de mayo, esta misma publicación científica recogió otro estudio donde se afirma que la península de Yucatán poseyó un cráter de dieciséis kilómetros de diámetro producido por la caída de un meteorito.

■ **Fuertes vientos y tormentas** junto al Centro Espacial Kennedy (Florida) impedieron ayer el despegue del transbordador «Atlantis», que además sufrió un fallo de presión en su cabina de mando cuando quedaban escasos minutos para terminar la cuarta etapa. La NASA efectuará hoy un nuevo intento, aunque el pronóstico meteorológico continúa siendo desfavorable para el despegue. El de ayer fue el tercer retraso que este módulo sufre en diez días.

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en Madrid: 02/08/1991, página 41.
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The study finalises in 2018 because of the announcement by NASA on October 30, of the end of the mission performed by the Kepler space telescope⁴. The telescope had discovered more than 2600 exoplanets over a period of nine years. This was announced by, among others, *El Mundo.es* on October 31, 2018, with the title: “NASA retires its “planet hunter” Kepler”⁵. The news was also published by *ABC.es* on November 6, 2018: “The life of NASA’s historical Kepler space telescope has come to an end”⁶.

The authors Berganza Conde and Ruiz San Román advise us of the importance of performing a study employing qualitative methods. They say that “qualitative techniques do not aim to make generalisations but to interpret specific situations” (2005: 33). The qualitative research is conducted defining a series of non-numeric variables taken from the reading of the books: *Los elementos del ciberperiodismo* (2017) (*Elements of Cyberjournalism*), *Escribir en internet. Guía para los nuevos medios y las redes sociales* (2012) and *Redacción periodística en internet* (2005). Characteristics defined for print and digital editions are considered. Concerning the digital edition, apart from previous characteristics, it is analysed if *ABC* and *El Mundo* have been able to make the most of the advantages offered by the Internet to better communicate the event to their users.

- Headlines. By characteristics:
 - Epithets: trying to draw attention to a fact without informing in detail.
 - Expressive: trying to make an impact on readers’ emotions.
 - Informative: express the fact and the protagonist.
- Sources. Elías tells us (2008: 146) that the importance of sources is established in the news text which the journalist has selected them for. The author maintains that “the sources back the information and therefore, the stages of documentation are verified”.
- Language and technicisms. How content should be treated is linked to the guidelines with which the medium draws up a quality news item for its readers, written simply and without technicisms. Elías (2008: 157) states that “a journalist draws up news using language characterised by clarity and ease of understanding, using vocabulary that shuns technicisms which might hinder the public’s understanding of the text”.
- Genre and style. As Martínez said (2010), the news item must be analysed after its publication in the media in terms of style (news, editorial, etc.), attitude (communicative, informative, interpretative, etc.) and genre (report, interpretive report, feature, opinion, etc.).
- Surfability. Tascón says (2012: 307) that it is about the user’s experience when surfing the web. He defines the variables: advertising (pop-ups; reproduction of ads with audio); links (to downloadable files, to content in other languages or different windows); and others (self-loading pages, contact details, *captchas* unintelligible? how do I get out of here? And Page 404).

4 The Kepler space telescope was launched in March 2009. Its mission was to find planets similar to Earth within our galaxy, the Milky Way. On October 3, 2018, NASA, faced with a lack of fuel in the telescope, decided to put it into hibernation mode until a solution was found, but, not finding an answer, on October 30 they announced the end of the mission with which scientists had discovered over 2600 confirmed exoplanets plus another 2900 unconfirmed. Source: xataka.com. Recovered from: <https://www.xataka.com/espacio/siempre-kepler-telescopio-espacial-se-queda-combustible-termina-su-labor-nueve-anos-descubrimientos>

5 Access at: https://www.abc.es/ciencia/abci-vida-historico-telescopio-espacial-kepler-nasa-llega-201810311637_noticia.html

6 Access at: https://www.abc.es/ciencia/abci-vida-historico-telescopio-espacial-kepler-nasa-llega-201810311637_noticia.html

- Usability. For Tascón it is “the ease with which Internet users utilise the web” (2012: 259). The variables are defined: eye-catching, clarity of purpose, immediate orientation, public objective, clear and simple design, error prevention and help for the user.
- Accessibility. In Tascón’s words, this is about “Access to multimedia content (images, videos, audio, etc.) that can be used and understood by the widest possible number of users, regardless of their physical, technical or intellectual abilities or of the device or media utilized” (2012: 454).
- Some of the elements that make up the digital news item. According to Flores (2017) we should consider:
 - Hypertext or hyperlinks to other news. This allows content to be linked, so that users can access new data or complementary information, even going to other sources of information. Hypertext is equivalent to a link to the content. The characteristics of hypertext are mentioned by Tascón (2012: 375-377) highlighting: non-linear reading, ease of interaction for the reader in the construction of the narrative, it allows the text to be enriched, but he warns against using the tool so as to avoid disorienting the user while he/she is surfing the web.
 - Multimediality. Defined by Flores (2017: 106-107) as the term to be employed to “designate the set of methods, techniques or procedures to write, design or compose content in the various formats, facilitating interaction”. Among the characteristics mentioned are the integration of heterogenous content around the text, oriented towards collaboration; (it should be) contextualised and capable of promoting interactivity in order to increase the clarity of that which is to be expounded and to offer a more attractive and reasonable content to the user.
- Content grouping. Tascón says (2012: 309) that this is the architecture of the content presented by a web page with the commonest elements that it is composed of, such as the front page (Home, initial or main); the basic elements which make up the web’s information zones or areas: title zone, body zone and end zone.

A qualitative and descriptive study has been conducted of the news items on exoplanets published in *ABC* and *El Mundo*, from 1990 to 2014 and in *ABC.es* and *El Mundo.es*, between 2001 and 2018. The results were taken from the archives of those newspapers (<https://www.abc.es/hemeroteca/> and <https://www.elmundo.es/hemeroteca/>). For the analysis of the news item about exoplanets, a study was carried out evaluating both journalistic and design aspects of the content from the data gathered, based on the criteria concerning methodology established on page 7.

As an example of the analysis we can see, in Appendix⁷ A, the content analysis data (created by the author) for a news item published in the print edition of each newspaper. In Appendix B, we can see the data drawn up for the news items published in the digital editions. This data corresponds to the journalistic analysis carried out to study the news treatment the papers gave to news items about exoplanets in terms of their veracity and dissemination for society.

⁷ Appendices A and B are available via the link: <https://drive.google.com/file/d/1Yb4B31HwQCPXTkAOtayt-U5e9UEOeo7h/view?usp=sharing>

3. Results

The qualitative and quantitative results obtained in this study are presented here. They relate to the number of publications and the news treatment which the newspapers *ABC* and *El Mundo* have given to the discovery of exoplanets during the period of study, which was established as: 1990 to 2014 for the print format; 2001 to 2018 for the digital format. They are a consequence of the search carried out in the online archives that these newspapers make available for users.

3.1. Quantitative results

Print media: *ABC* and *El Mundo*. Publications related to exoplanets. Study period: 1990-2014

We accessed the archives of the daily newspapers *ABC* and *El Mundo*. The dumping of the printed pieces was done considering their relationship with extrasolar planets, over a study period covering 1990 to 2014. After a review of the sample gathered, Table 1 shows the total number of items published by the newspapers during the established period of time.

Table 1. Total number of news items about exoplanets published in the daily papers *ABC* and *El Mundo*, 1990-2014

Astronomical object	<i>ABC</i>	<i>El Mundo</i>
Exoplanets	99	88

The sample is representative of the total number of news items related with exoplanets, from 1990 to 2014.

Source: created by the author

Digital media: *ABC.es* and *El Mundo.es*. Publications related to exoplanets. Study period: 2001-2018

Table 2. Total number of news items about exoplanets published in the daily papers *ABC.es* and *El Mundo.es*, 2001 - 2018

Astronomical object	<i>ABC.es</i>	<i>El Mundo.es</i>
Exoplanets	448	231

The sample is representative of the total number of news items related with exoplanets, from 2001 to 2018.

Source: created by the author

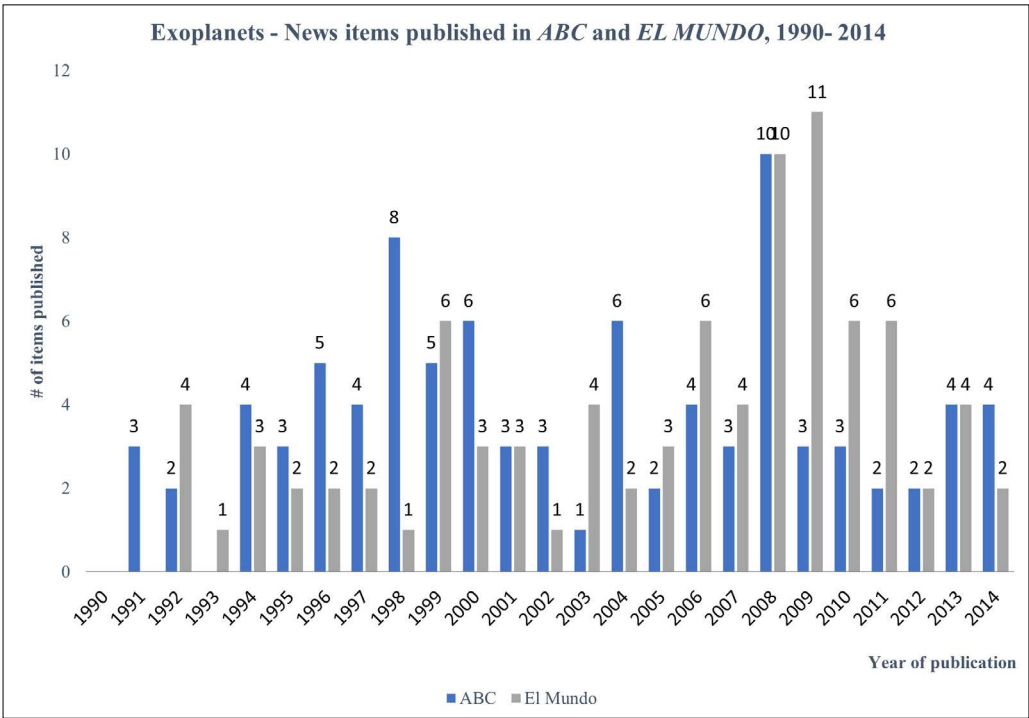
The total number of news items published annually in the print edition of *ABC* and *El Mundo* is presented in greater detail (see Graph 1); the publications in the digital editions *ABC.es* and *El Mundo.es* figure in Graph 2. This refers to publications related to the discovery and study of extrasolar planets.

With the data obtained, shown in Graphs 1 and 2, we can see a comparison between the number of news items published annually in *ABC* and *El Mundo*, in both the print format (see Graph 1) over the period 1990 -2014, and the digital (see Graph 2) between 2001 and 2018.

Print media: *ABC* & *El Mundo*. Number of news items published annually, from 1990 to 2014, relating to exoplanets.

Graph 1 shows a comparison between the total number of news items published in the papers *ABC* and *El Mundo*, from 1990 to 2014.

Graph 1. Number of news items about exoplanets published annually in the dailies *ABC* and *El Mundo*, 1990 - 2014



Source: created by the author

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Graph 1 shows the quantitative results relating to news items concerning extrasolar planets published in *ABC* and *El Mundo*, from 1990 to 2014:

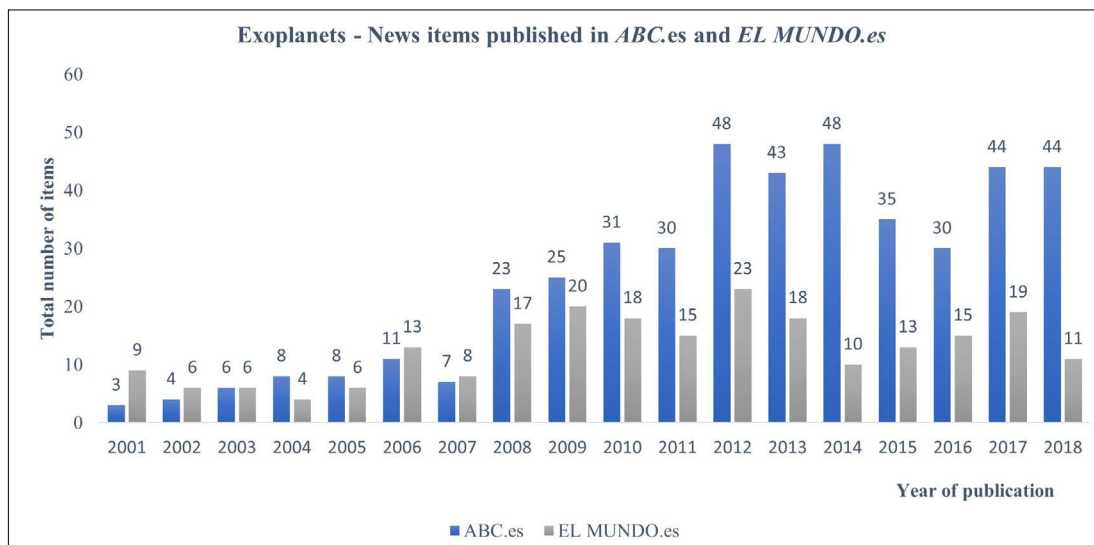
- 2009 saw the highest number of publications related to exoplanets, *El Mundo* offering a total of 13 news items published whilst *ABC* only published three.
- In 2008, the two dailies coincided, for the first time, in the total number of news items about exoplanets, with a total of 10 publications each.
- *ABC* published three news items about exoplanets in 1991, while no information relating to extrasolar planets was found in *El Mundo*.
- Neither *ABC* nor *El Mundo* published astronomical information relative to exoplanets in 1990.
- For 1998 *ABC* was found to have published a total of eight news items, as opposed to only one in *El Mundo*. However, this latter contained a total of 11 items in 2009 compared to the three published in *ABC*.

- In the years 2001, 2012 and 2013, both newspapers coincided in the number of news items published on exoplanets, with a total of three items each in 2001, two in 2012 and four in 2013.

Digital media: *ABC.es* and *El Mundo.es*. Number of news items published annually concerning exoplanets, from 2001 to 2018. See Graph 2.

Graph 2 shows a comparison of the number of news items published in *ABC* and *El Mundo*, from 1990 to 2014.

Graph 2. Number of news items on exoplanets published annually in *ABC.es* and *El Mundo.es*, from 2001 to 2018



Source: created by the author

Graph 2 shows the quantitative results related to news items about extrasolar planets published in the newspapers *ABC.es* and *El Mundo.es*, from 2001 to 2018:

- In 2012 and 2014 a total of 48 news items were counted in *ABC.es*, against 23 in 2012. The highest number found for *El Mundo.es* was in 2001, with a total of 10 pieces on exoplanets.
- For 2017 and 2018 we found that *ABC.es* tripled the number of news items on exoplanets, with totals of 44 pieces each year, for 19 and 11, respectively in *El Mundo.es*.
- In 2001, 2002, 2006 and 2007, *El Mundo.es* published more news items, 9, 6, 13 and 8, respectively, as opposed to the figures for *ABC.es* of 3, 4, 11 and pieces respectively.
- The comparison between the number of news items published in the print editions (1990 to 2014) and the digital editions (2001 to 2018) is of interest:

- *ABC.es* has a total of 448 news items.
- *ABC* has a total of 90 news items.
- *El Mundo.es* has a total of 231 news items.
- *El Mundo* has a total of 86 news items.

3.1.1. Position of the news item on exoplanets in the various sections of *ABC* and *El Mundo*.

Results related to the insertion of news items concerning exoplanets counted by sections in each newspaper.

- For *ABC*:

After searching for, reviewing and recompiling news items about exoplanets in the archives of *ABC*, a total of 10 different sections and subsections with these pieces were found, from 1990 to 2014. News related to exoplanets had been inserted in sections and subsections dedicated to: Science (S); Science/Education (S/Ed.); Society/Science (Soc/S); Health/Science (H/S); Science/Religion (S/R); Education/Science (Ed./S); News Photo (NP); Society (Soc); Science & Future (S & F); Society/Brief (Soc/B); Society/Astronomy (Soc/A). Quantitatively, the results appear in Table 3:

Table 3.Number of news items about exoplanets by section/subsection of *ABC*, 1990 - 2014

<i>ABC</i>	Exoplanets - Section/subsection										
Year	S	S/Ed	Soc/S	H/S	S/R	Ed/S	NP	Soc	S & F	Soc/B	Soc/A
1990	-	-	-	-	-	-	-	-	-	-	-
1991	3	-	-	-	-	-	-	-	-	-	-
1992	2	-	-	-	-	-	-	-	-	-	-
1993	-	-	-	-	-	-	-	-	-	-	-
1994	3	1	-	-	-	-	-	-	-	-	-
1995	-	-	1	1	1	-	-	-	-	-	-
1996	3	-	1	-	-	1	-	-	-	-	-
1997	1	-	1	1	1	-	-	-	-	-	-

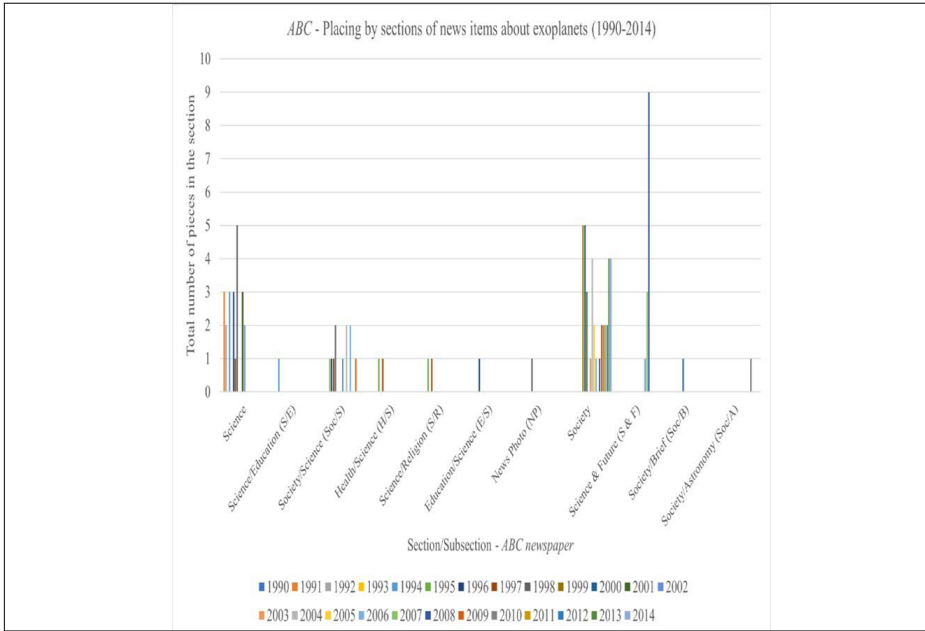
1998	5	-	2	-	-	-	1	-	-	-	-
1999	-	-	-	-	-	-	-	5	-	-	-
2000	-	-	-	-	-	-	-	5	-	1	-
2001	3	-	-	-	-	-	-	3	-	-	-
2002	2	-	1	-	-	-	-	-	-	-	-
2003	-	-	-	-	-	-	-	1	-	-	-
2004	-	-	2	-	-	-	-	4	-	-	-
2005	-	-	-	-	-	-	-	2	-	-	-
2006	-	-	2	-	-	-	-	1	1	-	-
2007	-	-	-	-	-	-	-	-	3	-	-
2008	-	-	-	-	-	-	-	1	9	-	-
2009	-	-	1	-	-	-	-	2	-	-	-
2010	-	-	-	-	-	-	-	2	-	-	1
2011	-	-	-	-	-	-	-	2	-	-	-
2012	-	-	-	-	-	-	-	2	-	-	-
2013	-	-	-	-	-	-	-	4	-	-	-
2014	-	-	-	-	-	-	-	4	-	-	-

Total number of news items on exoplanets in each section/subsection of ABC, 1990 - 2014. Key: Science (S); Science/ Education (S/Ed.); Society/ Science (Soc/S); Health/ Science (H./S); Science/ Religion (S/R); Education/ Science (Ed./S); News Photo (NP); Society (Soc); Science & future (S & F); Society/Notes (Soc/N); Society/Astronomy (Soc/A).

Source: created by the author

Graph 3 shows the results obtained in Table 3. The graph shows how *ABC* has varied the insertion of news items on exoplanets, placing them in different sections and subsections, from 1990 to 2014.

Graph 3. Total number of news items on exoplanets placed in the various sections and subsections of ABC, 1990 - 2014



Source: created by the author

– For *El Mundo*:

Following consultation, review, and recompilation of the news items related to exoplanets in *El Mundo's* archives, a total of seven sections and subsections have been counted, from 1990 up to 2014. News related with exoplanets have been inserted into the sections and subsections: Society/Astronomy (So/A); Society/Space (So/Sp); Society (So); Society/Science (So/S); Science (S); Science/Astronomy (S/A); Science/Particles (S/P). Quantitively, the results appear in Table 6:

Table 4. Number of news items about exoplanets by section/subsection of *El Mundo*, 1990 - 2014

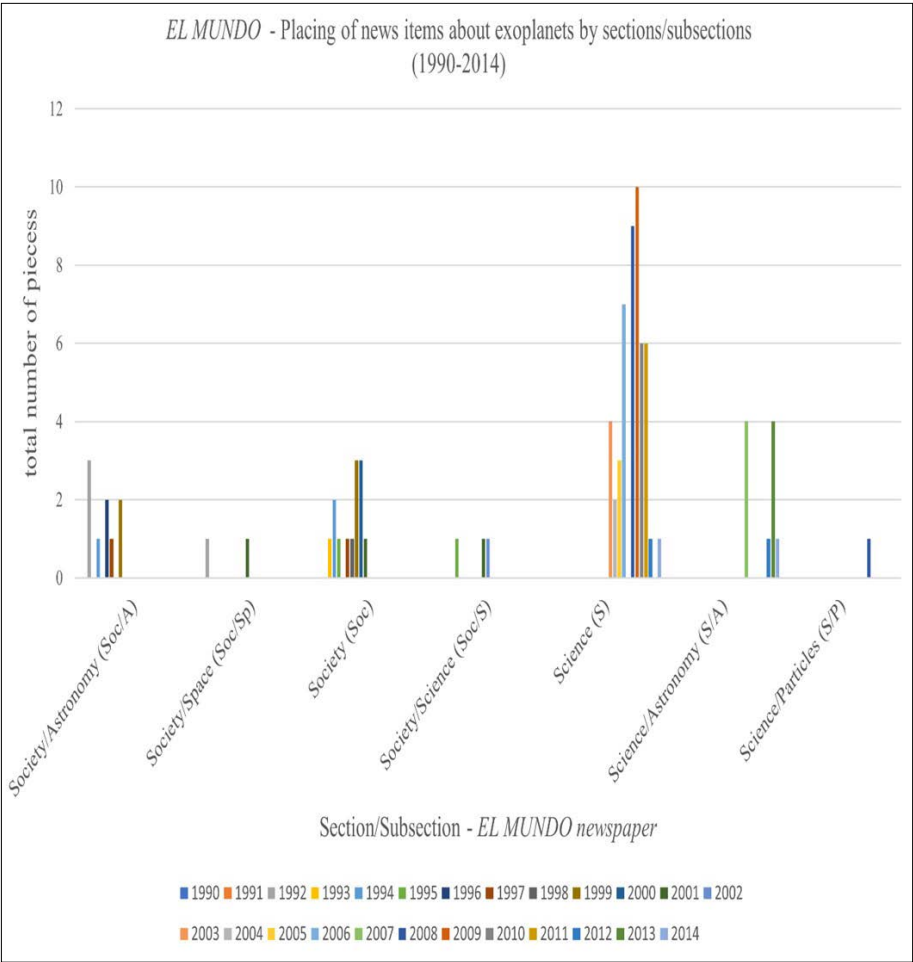
<i>El Mundo</i>	Exoplanets – Section/subsection						
Year	S/A	Soc/Sp	Soc	Soc/S	S	S/A	S/P
1990	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0
1992	3	1	0	0	0	0	0
1993	0	0	1	0	0	0	0
1994	1	0	2	0	0	0	0
1995	0	0	1	1	0	0	0
1996	2	0	0	0	0	0	0
1997	1	0	1	0	0	0	0
1998	0	0	1	0	0	0	0
1999	2	0	3	0	0	0	0
2000	0	0	3	0	0	0	0
2001	0	1	1	1	0	0	0
2002	0	0	0	1	0	0	0
2003	0	0	0	0	4	0	0
2004	0	0	0	0	2	0	0
2005	0	0	0	0	3	0	0
2006	0	0	0	0	7	0	0
2007	0	0	0	0	0	4	0
2008	0	0	0	0	9	0	1
2009	0	0	0	0	10	0	0
2010	0	0	0	0	6	0	0
2011	0	0	0	0	6	0	0
2012	0	0	0	0	1	1	0
2013	0	0	0	0	0	4	0
2014	0	0	0	0	1	1	0

Total number of news items about exoplanets placed in each section/subsection of *El Mundo*, 1990 to 2014. key: Society/Astronomy (Soc/A); Society/Space (Soc/Sp); Society (Soc); Society/Science (Soc/S); Science (S); Science/Astronomy (S/A); Science/Particles (S/P).

Source: created by the author

Graph 4 shows the results obtained in Table 4. The graph demonstrates how *El Mundo* has varied the insertion of news items on exoplanets, placing them in different sections and subsections from 1990 to 2014.

Graph 4. Total number of news items on exoplanets in the various sections and subsections of *El Mundo*, 1990 - 2014



Source: created by the author

3.2. Qualitative results

The qualitative results for both newspapers are taken from the data in Appendices A and B. (available via the link: <https://drive.google.com/file/d/1Yb4B31HwQCPXTkAOTayt-U5e9UEOeo7h/view?usp=sharing>).

The following are some of the qualitative results:

- Both newspapers have learnt to present modern designs making the most of the available technology, arousing the reader's interest, attracting the reader to the page's content via images or videos.
- The design of the papers' web pages is structured so that the user accesses them with a minimum of time and effort, labelling the information and the position of the news item. It is presented with a menu, title, body and end.
- The sources consulted are indicated.
- The majority of the headlines are nominal. Those of *ABC.es* are more precise and informative than those of *El Mundo.es*, which tend to be more eye-catching.
- The journalistic and scientific discourse avoids tecnicisms.
- The meaning of terms such as light year, magnitude, gravitational lens etc are given via a link or hyperlink so as to not distract the reader whilst offering an opportunity to learn more.
- An impersonal style employing the third person singular is utilised as well as the passive voice. This adds to the sense of objectivity.
- The reader is allowed to access additional information related to the central theme to complement or expand on it, through the web's multi-media which offers textual content, with images, video, audio, computer graphics and applications.
- Audience participation is encouraged through the links available to the social networks offered by the newspapers, thus allowing linking or sharing of the piece with other users, facilitating two-way communication.
- Users can orientate themselves on the page thanks to the search engine each web page offers.
- Inserted advertising neither affects nor interrupts the user's concentration, there is no evidence of his/her reading experience being bothered, there being no invasive advertising, unexpected sounds or unannounced reloading of the page. Nor are there pop-ups related to the content or advertisements.

4. Conclusions

Technological change has reconfigured a change in the editing of the newspapers *ABC* and *El Mundo*, best seen in their adaptation to converge the printed version with the digital.

Seeing the results shown in Tables 1 and 2, together with Graphs 1 and 2, it can be concluded that:

- The number of news items related to exoplanets has increased in the digital editions compared to print in both *ABC* and *El Mundo*.
- There are more news items on exoplanets published in *ABC.es* and *El Mundo.es* than in their print editions.

- The digital press has increased its production of news items on exoplanets. Both papers show an increase relative to their print edition.
- The higher number of news items published about the discovery of exoplanets since the beginning of the XXIst century demonstrates there is greater media and social interest in scientists' work. These newspapers' digital editions provide greater news coverage than the print editions of the end of the last century.

In light of the results shown in Tables 3 and 4, together with their respective Graphs 3 and 4, it can be concluded that:

- A total of 10 sections and subsections have been counted in *ABC*, and a total of seven in *El Mundo*, the placing of pieces on exoplanets not always being correct in the two newspapers.
- *El Mundo* has better insertion of astronomy news related to exoplanets, the majority appearing in the science section.
- *ABC* has an imprecise placing of astronomy news related to exoplanets in the society section. It can be said that users' interest in the subject is not enhanced, as many of the news items of a scientific nature are not in the correct section.
- The web pages of *ABC.es* and *El Mundo.es* do place exoplanet news in the right section, *Science*, with an organised structure favouring the users' access and use of the page.
- The two newspapers' ability to communicate this type of information is framed as a field of science that promotes its interest among the general public by the communication of matters linked to Astronomy and Astrophysics.

In conclusion, news is marked by the digital and technological developments which have reconfigured and changed the press. *ABC* and *El Mundo* have both increased their production of astronomy news achieving greater impact on the public thanks to the advantages offered by the Internet, (immediacy, updated content, and interaction between the medium and its audience providing two-way communication). The increase in the number of digital pieces published relative to the number in print makes clear that the internet allows the media to offer greater news coverage on events in astronomy focused on the discovery of new planets beyond our Solar System.

Using the digital editions, citizens can find up-to-date and immediate content compared to the print versions, being able to access the news item to share it with other users through multiple platforms. The figure of the specialised science journalist acquires greater importance as he/she has to be taken into consideration in the media and in the organisations specialized in astrophysics research, as their communication work has to be performed with due rigour and veracity, making abstract content understandable, knowing how to interpret the results that science has provided. With their texts, they must know how to transfer scientific progress in astronomy to the wider public, fostering their interest and favouring the cultural advancement of our society.

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