

The impact of using images on CSIC's Twitter profile

El impacto del uso de la imagen en la cuenta de Twitter de CSIC

O impacto do uso da imagem no perfil do CSIC no Twitter

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Abstract

Science is one of the most important fields of knowledge to people and communication has one of the main strengths to disseminate their discoveries, news, current events and outstanding events. This scientific communication has in the image a support through which to show concepts in a visual way that can sometimes be difficult to explain only by words.

Internet first and social media then have changed the communication schemes as they were known until they appeared. Facebook, Twitter or Instagram have hundreds of millions of users, which has been valued by institutions and organizations, including scientific ones. These social media, especially Twitter, have emerged as a new communication channel more accessible than traditional media, with a greater number of potential recipients, especially for organizations without the resources to obtain a presence in those traditional media.

This work analyzes the Twitter profile of the Consejo Superior de Investigaciones Científicas (CSIC) to see how the institution uses images in the messages that sends on Twitter. According to the results, the CSIC makes a majority use of the image, especially of illustrations or photographs that show what is presented in the text of the message. Thanks to this use of images, CSIC increases its impact on the social network, with a greater number of interactions by users.

Key Words: *Image; Science; Social Media; Diffusion; Twitter; CSIC*

Resumen

La ciencia es uno de los campos de conocimiento más importantes de los que dispone el ser humano y tiene en la comunicación una de las principales bazas para divulgar sus descubrimientos, novedades, actualidad y sucesos destacables. Una comunicación científica que tiene en la imagen un soporte mediante el que mostrar conceptos de forma visual que a veces pueden ser difícilmente explicables únicamente mediante la palabra. Internet primero y las redes sociales después han cambiado los esquemas de la comunicación tal y como se conocían hasta su aparición. Facebook, Twitter o Instagram cuentan por cientos de millones sus usuarios, lo que ha sido valorado por las instituciones y organizaciones, incluidas las científicas. Estas redes sociales, en especial

Twitter, se han erigido como un nuevo canal de comunicación más accesible que los medios tradicionales, con un mayor número de potenciales receptores, sobre todo para organizaciones sin los recursos necesarios para obtener presencia en dichos medios. El presente trabajo analiza el perfil en Twitter del Consejo Superior de Investigaciones Científicas (CSIC) para conocer la utilización que el organismo hace de las imágenes en los mensajes que envía en la red social. Según los resultados el CSIC hace un uso mayoritario de la imagen, sobre todo de ilustraciones o fotografías que muestran lo que se presenta en el texto del mensaje. Gracias a esta utilización de las imágenes, el CSIC aumenta sus impactos en la red social, con un mayor número de interacciones por parte de los usuarios.

Palabras clave: *Imagen; Ciencia; Redes Sociales; Difusión; Twitter; CSIC*

Resumo

A ciência é um dos campos de conhecimento mais importantes que o ser humano possui, tendo na comunicação um dos principais ativos para disseminar suas descobertas, notícias, assuntos atuais e eventos relevantes. Uma comunicação científica que tem suporte na imagem e através da qual é possível exibir conceitos visualmente que às vezes podem ser difíceis de explicar apenas através da palavra.

A Internet primeiro e as redes sociais depois mudaram os esquemas de comunicação, tal como eram conhecidos. O Facebook, Twitter ou Instagram representam centenas de milhões de usuários, valorizados por instituições e organizações, inclusive científicas. Essas redes sociais, especialmente o Twitter, surgiram como um novo canal de comunicação mais acessível que os mídia tradicionais, potencialmente com um maior número de destinatários, principalmente para as organizações sem os recursos necessários para obter presença nessas mídias.

Este artigo analisa o perfil do Twitter do Consejo Superior de Investigaciones Científicas (CSIC) relativamente ao uso de imagens no corpo das mensagens enviadas nesta rede social. De acordo com os resultados, o CSIC faz uso maioritário da imagem, especialmente de ilustrações ou fotografias que revelam o que é apresentado no texto da mensagem. Graças a esse uso de imagens, o CSIC aumenta o seu impactos na rede social, com um número mais elevado de interações dos usuários.

Palavras chave: *Imagem; Ciência; Redes Sociais; Divulgação; Twitter; CSIC*

1. Introduction

A black and white photograph, an advertising page in a newspaper, a tourist postcard, a schematic drawing, an image of a microscope, a painting made with mud on a hillside... Every image involves a set of notations and connotations that a receiver processes by giving it meaning. In short, every image communicates.

Every image communicates through different media, genres and formats thanks to its iconic nature, whether visual, acoustic or audiovisual. Camusso and Marchetti (2002) understand the image like this:

Conceptual and formal device that relates different actors based on the strategic articulation of visual and linguistic codes, aesthetic resources, modes of representation, inscribed in the complexity of a particular socio-historical moment that defines the limits and scope of that contract. (p.102)

Image communication is more than a message exchange, it is an interactive construction of meaning that occurs when “communication enters into synergy with cognitive and emotional fields” (Goyes, 2003, p.46). This means that its messages will vary or influence the recipients according to their own characteristics, such as their level of culture, their socioeconomic status or their context of reception since “the ‘read’ image is a carrier of meaning because it offers resonances with one’s own internal narration to connect with all the possibilities of interpretation (personal, contextual, social, cultural and symbolic)” (Abad, 2012, p.2). Frascara (2015) also believes that any image, illustration, photography, etc. placed in front of a receiver communicates “an unpredictable spectrum of messages” (p.13) because “the power of images is based on the total reaction that a person experiences in every communication” (p.63).

We are increasingly exposed to the influence that the image has, not only in communication, but in our way of thinking and acting. Photography, together with cinema, television and Internet, have gained a leading presence in modern societies by building the Image Society, where sources and means of reproduction of images are consolidated and where the image is positioned as a massive support

of iconic communication (Pantoja, 2007, p.188). Images are another alternative to communicate a message, to disseminate knowledge or to report facts, and are used both by people and those responsible for education and associations, companies or institutions that communicate their aspects and information, also in science.

Science is one of the areas that use images to communicate or clarify content, aimed at the training of new scientists or the dissemination of their research and discoveries. At the end of the 20th century, the rejection of the image as an argumentative resource is overcome and the potentialities of the increasingly technological innovations that favoured and facilitated the use of graphic resources are taken advantage of (Otero, Moreira & Greca, 2002, p.130).

The use of images with communicative purposes received a new impulse at the end of the last century thanks to the technological development. In the nineties, Tim Berners Lee created the World Wide Web and since then the Internet has been growing in number of users and worldwide scope to become an element of society, leading the so-called Third Industrial Revolution. Later, at the beginning of the 21st century, as a result of this constant development appears the Web 2.0, a new internet in which interaction and participation were enhanced, causing the user to stop being a single receiver to also become a content creator, giving rise to the emergence of social networks (O'Reily, 2006; Celaya, 2011, p.30; Martínez de Salinas, 2015, p.61).

Thanks to the arrival of the Internet and the rise of mobile devices, which have facilitated and accelerated the distribution of images between people, images are now "the preferred language in mediated communication practices" (Van Dijck, 2008, p.58). This fact, in addition to the interactive and visual potential that social networks have, has revitalized the use of images in the communication and transmission of scientific knowledge (Otero, Moreira & Greca, 2002, p.130). Perales (2006) explains that "new technologies provide a potentially fruitful opportunity as a source of audiovisual resources" (p.23), and points out that, in the case of scientific knowledge, the use of images "must be marked by specific activities, such as the clarification of the graphic signs, the proper correlation with the written text, the simultaneity of the observations of the real and symbolic levels" (p.23).

Social networks have become an element of current society and allow users to build a public profile, create a list of users to share a connection with and establish personal and professional relationships or exchange information (Berlanga & García, 2014, p.101). Social networks enable an almost free flow of information and knowledge, and change the way in which citizens interact with companies, institutions and governments (Díaz, 2015, pp. 8-9).

The rise of interactivity provided by Web 2.0 and social networks has also generated a new type of receiver-user, the digital native, who opposes the digital immigrant (Prensky, 2001). This difference is not generational, but it is a growing cognitive gap, with digital natives having the first contact with culture through technology and not through paper, for the first time in history (Piscitelli, 2006, p.182).

Digital natives process information very quickly and work best when they are online, using the Internet to socialize, learn and talk, and not being able to understand reality without the Internet or social networks (Prensky, 2001, p.2; Noguera, Martínez & Grandío, 2011, p.49; García, 2014, p.249). These natives also have the responsibility of becoming an “enculturalizing agent of previous generations” (García & Gértrudix, 2009, p.23), such as digital immigrants, those who “come from other technological environments and communication uses” (p.26). Digital immigrants have had to adapt to the new environment driven by labour and professional needs, and have habits of their analogue past, such as reading paper instructions or not using the Internet as the first source of information, while also underestimating the habits of digital natives just because they are different (García, 2014, p.246; Prensky, 2001, p.2).

In the same way that society and users have changed due to the rise of the Internet and social networks, companies, organizations and institutions have also adapted their communication to reach new users in an effective and beneficial way. Noguera, Martínez and Grandío (2011, p.11) argue that the Internet and social networks have caused a change in the way in which society and organizations communicate and talk in much more complex communication schemes where actors that cannot be controlled appear and participate. The growth of these technologies has created the so-called Net Society, a social structure that is based on digital networks that “generate, process and distribute information” and where so-

cial structures and communications between economic, political and social agents are produced around these digital networks (Castells, 2005, p.7).

Corporate communication already takes into account the Internet and social networks, whose communicative value should not be ignored when planning communication strategies (Hernández & Subiela, 2012, p.80). With social networks as a new communication channel, organizations have seen, firstly, that they can now make direct communication with their audiences, without intermediaries, and secondly, that now the messages they launch are global and their impacts are immediate (López & Cuesta, 2012, p.24). In addition to this, social networks also allow organizations to give users "a great deal of information in small doses while creating a community in which anyone who is interested can receive first-hand institutional information." (Fernández, 2015, p.419).

The scientific field has not remained impervious to these communicative changes and social networks have also become a source of scientific information, especially for digital natives. As reflected in the VII Survey on the Social Perception of Science and Technology carried out by FECYT, "youngest generations access scientific information through a more intense and diverse use of online resources and channels of non-journalistic nature", such as social networks, YouTube or Wikipedia (Revuelta & Corchero, 2016, p.201). This study presents that social networks are the first means of access to scientific information among those younger than 55, while being the second option for those over that age. Facebook and Twitter are the most used social networks for access to scientific information.

Twitter has an advantage over the rest of social networks in terms of communication and information because of possibilities such as retweets or the elaboration of message threads, in addition to its immediacy, something present in all social networks but with special relevance in Twitter. This social network gives organizations control over their information and allows them to become a primary source of information and communicate their activities in real time and even with specific users, which, in return, gives them credibility and brings them closer to their audiences. On Twitter, organizations can include images, videos and hashtags or retweet posts, helping them to increase their impacts (Fernández, 2015, p.416).

The main feature of Twitter is the limitation of 280 characters in its messages, which has led to it being considered a microblogging service instead of a social network. Its operation is based on sending short messages for users who follow the profile, known as followers, who can reply to those messages, retweet them or press “Like” on them. Other features such as hashtags help users to filter content or increase the impact of their messages, which can become *Trending Topic*, the most talked about topics at that time on Twitter.

Despite having fewer users than other social networks such as Facebook or Instagram, Twitter has managed to find its position among users by enhancing its informative nature and instantaneity, and by affirming that its mission is to make it possible for “people to tell what is happening in the world at this time” (Twitter, n.d.) from different points of view and with an international and global character. This is highly valued by users as well as organizations, who see in this social network an opportunity to interact directly with their audiences. Since its creation in 2006, Twitter has been growing exponentially to reach 330 million users worldwide (Statista, 2018), while in Spain the figure stands at 4.9 million users (Cardeñosa, 2018).

CSIC online

Having introduced the new communicative context, it is time to present the object of study of this paper, the Spanish National Research Council (CSIC from this point forward for its acronym in Spanish). This institution has its origin at the beginning of the 20th century, when in 1907 the Board for Advanced Scientific Studies and Research (JAE from this point forward for its acronym in Spanish) was created under the presidency of Santiago Ramón y Cajal and which “was intended to end the Spanish isolation and link with the necessary science and culture in the spheres of science, culture and education” (CSIC, n.d. A). This institution trained numerous doctors, biologists, chemists and scientists in general until the Spanish Civil War, when its activity ceased. After the war, in November 1939, JAE was dissolved and renamed as it is known today (CSIC, n.d. A).

After Franco’s era and with the return of democracy, CSIC recovers its main original competences, such as the execution of research or the training of researchers

and technical personnel, promoting relations with universities, and sees a new responsibility for developing the scientific policy and promoting internal and external scientific relationships. In the 21st century, the institution adapts to the new reality, transforming itself into an agency through a royal ordinance in 2007 in order to have greater agility and autonomy, giving the presidency, carried out by Rosa María Menéndez López since 2017, an executive nature and articulating its activities in management contracts, based "on the principles of quality, transparency and evaluation" (CSIC, n.d. B).

Currently, as reflected in their report from 2017, CSIC has 120 research institutes both own and mixed, where 11,085 scientific professionals, training researchers, technicians and managers work. During 2017, more than 3,000 R&D projects have been counted, which have resulted in the publication of 13,500 scientific articles, 220 books, 863 doctoral thesis and 95 patents (CSIC, 2018).

These data reflect the great importance of the institution in the development of scientific research in Spain, being also the third largest public institution dedicated to research in Europe. Due to this relevance, CSIC, like any other organization, has a presence on the Internet and social networks. It has a main web page (<http://www.csic.es/>) in which, in addition to presenting the agency, its researches or research grants, it details its current status with the latest discoveries and publications made by its researchers (CSIC, n.d. C).

Focusing on social networks, CSIC has numerous profiles on main platforms. Starting with Twitter, as the social network under study, CSIC has up to 129 profiles on Twitter, distributed among its delegations, libraries, research centers and research groups (CSIC, n.d. D). Among all, the main profile stands out (@CSIC), an account created in September 2010 that has published 15,833 tweets until the writing of this work. It follows 1,104 profiles and has a total of 920,468 followers. Among the tweets that have been published, up to 5,584 photos and videos are counted, which means that approximately one third of the messages sent have audiovisual content (Twitter, n.d. B).

CSIC also has a large presence on Facebook, where there are up to 64 profiles of its different centers, delegations, groups or libraries (CSIC, n.d. D). Again, one main profile (CSIC) stands out, which has 27,107 followers and where it publishes its news (Facebook, n.d.). In addition to Twitter and Facebook, CSIC has an Instagram profile (@CSIC) since April 29th 2015, where it has a total of 603 posts and has 7,053 followers (Instagram, n.d.). YouTube also has the presence of CSIC, with a channel for dissemination (CSIC Divulga) and another one for communication (CSIC Communication), which is the main channel among the two of them. Created in September 2010, with 436,162 views and 1,682 subscribers, the institution has published a total of 196 videos about its different lines of research, such as biology, humanities or natural resources, each with its own playlist (YouTube, n.d.).

2. Methodology

Given the importance of images in scientific communication and the relevance that social networks such as Twitter have gained, this paper has the main objective of analyzing the use that CSIC makes of images on its Twitter profile, with the following secondary objectives:

- S01: To study the type of format and frequency of the images used on Twitter by CSIC.
- S02: To analyze the purpose of the images used on Twitter by CSIC.
- S03: To quantify the impact of the images used on Twitter by CSIC.
- S04: To compare the impact of tweets with images with tweets without images published on Twitter by CSIC.

As a result of the data presented in the introduction and the objectives pursued in this research, a series of hypotheses have been developed, which show what is expected to be obtained from the methodological application detailed below.

- H1: CSIC makes great use of images in the content that it publishes on Twitter.
- H2: CSIC uses the photographic format more frequently in its tweets, although it also uses illustrations and videos.

- H3: The most common purpose of the images on CSIC's Twitter profile is the explanatory one.
- H4: Thanks to the use of images, CSIC achieves more impacts on Twitter.
- H5: Tweets with images published by CSIC achieve more impacts than tweets without images.

Content analysis is the technique used to defend or refute the hypotheses presented, which has enabled the study of the use that CSIC makes of images on Twitter and the quantification of the impact derived from that use. According to the criteria established by Piñuel (2002), the content analysis used is delimited as follows:

- Based on the objectives pursued: it is a verifying and/or explanatory content analysis, since it establishes inferences about the functioning and effects of communicative products (Piñuel, 2002, p.9), CSIC's tweets in this case.
- Based on the object of study: the analysis performed is horizontal or extensive, since the documentary corpus is very extensive (almost 16,000 tweets published by CSIC) and requires a sample selection to perform the analysis.
- Based on the measurement parameters: it is a qualitative and frequency analysis, since it examines qualitative elements, such as images, within each unit of analysis, and also counts the amount of times that certain established categories appear.

In regards to the sample selection stated above, it has resulted in obtaining a representative and comprehensive number of publications. This sample selection has been made using a multi-stage sampling according to Wimmer and Dominick (2001):

- In the first stage, i.e. sampling of material sources, CSIC's main account is used on Twitter (@CSIC), dismissing the account dedicated to scientific dissemination (@CSICDivulga) due to its lower activity and mass of followers. From this account, the tweets sent have been analyzed and not the retweets, considering that they hold CSIC's will to communicate and not the will of the other retweeted accounts.
- In the second stage, i.e. sampling of dates, tweets issued during the month of September 2018 have been selected because they are dates in which the summer break has already been exceeded and with the aim of going through all the activity of a full month to obtain a representative sample volume.

The sample analyzed includes a total of 124 tweets. The contrast of the hypotheses presented has been established based on the comparison of the results in the procedures indicated.

3. Results

In order to carry out a more thorough and detailed analysis of the results, these have been presented separately according to the different categories established in the analysis sheet used. Before that, it is necessary to comment that, after having performed the analysis of the sample, it has been discovered that CSIC only tweets messages during the weekdays, and that these messages are mostly sent in the time slot from 9:00 to 15:00, maybe due to the fact that the communication team in charge of social networks is very small. In addition, it demonstrates that CSIC's communication team is unaware of the existence of platforms such as Hootsuite, where users can schedule the publication of tweets at a desired time, being able to increase the impacts of CSIC's profile throughout the day and not only in a standard work schedule. This has to be taken into account when assessing the interaction of users, since the mentioned schedule is a strip in which most people are working and do not access social networks that much, what causes that the impact of the tweets is smaller than it would be if the messages were emitted in a wider schedule.

The first fact to highlight in the analysis is the use of audiovisual material within the Twitter profile of CSIC. During the analyzed period, CSIC published 124 tweets, from which 77 contained some kind of audiovisual material and 47 had no images at all. This means that 62.1% of the tweets published included visual content, this being the main habit during the analyzed period and reflecting that the use of images is very present in CSIC's communicative routines on Twitter.

This use of images has differences within CSIC's profile that can be taken into account, such as the way to include images, the type of format used, the function of these images, the relationship they have with the published tweet or even the ownership of the audiovisual material included.

Regarding the way in which images are added to the tweets, as shown in Figure 1, in 80.52% of the cases the audiovisual material is added proactively, attaching it with the options available on Twitter, while in 19.48% of tweets with images, these appear as a result of the preview that the social network makes of hyperlinks that redirect to news or YouTube videos. However, it is not possible to know if the link was added so that an image would appear in the tweet or not. The fact that most images are included through manual attaching demonstrates that CSIC has a proactive willingness to include images on its tweets.

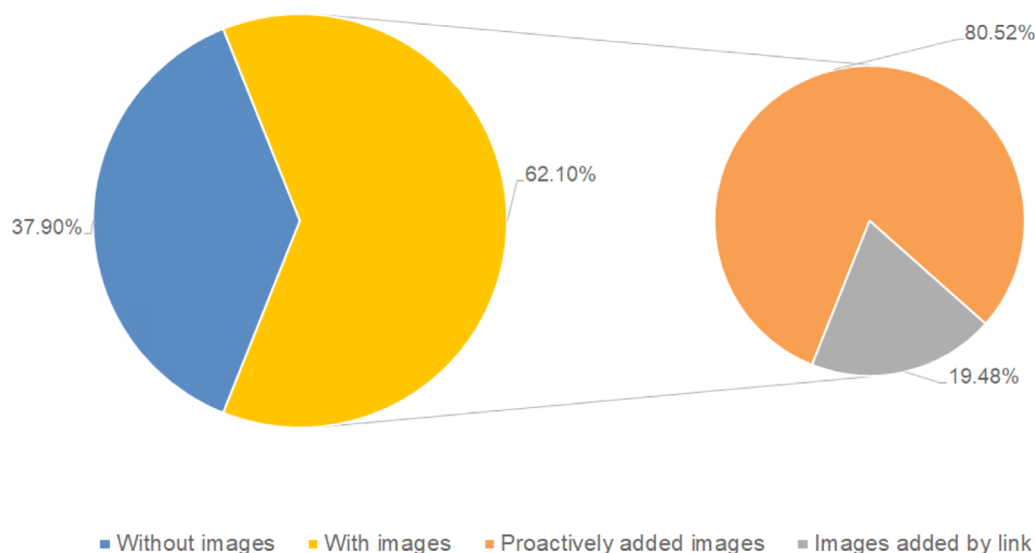


Figure 1: Percentage of CSIC tweets with images and their type of inclusion. (Source: own elaboration).

Based on the format of this audiovisual content, up to five types are observed throughout the analyzed period: photographs, illustrations, graphics, videos and GIFs. As Figure 2 shows, photographs are the most recurring format, reaching 67.53% of the audiovisual material present in CSIC's Twitter profile. The illustrations represent 12.99% of the audiovisual material used during the analysis period, followed by the use of GIFs, which make up 9.09% of the visual content used. However, the use of videos only accounts for 7.79% of the global, while graphics are only used 2.6% of the time. This fact reflects an interest from CSIC to show the reality of what

it communicates and disseminates about science, and, in order to show that reality, the best format is photography, which reflects what is happening at that moment.

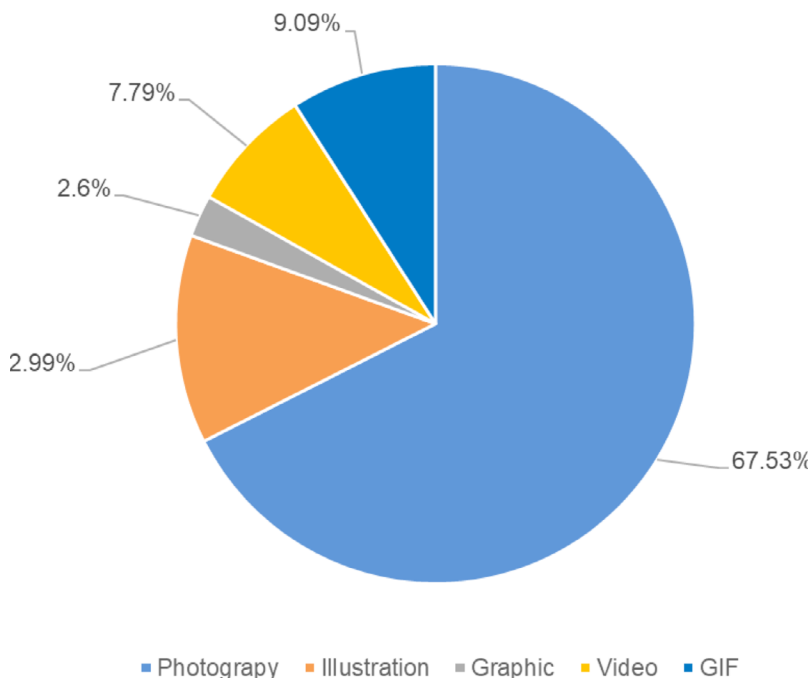


Figure 2: Percentage of the type of audiovisual material used by CSIC. (Source: own elaboration).

In addition to the preference for photographs, this Figure 2 also brings up the greater use of the static image. As it can be seen, photographs, illustrations and graphics represent 83.12% of the visual material used, while contents that include moving images, such as GIFs or videos, involve only 16.88% of the audiovisual material used. This may be due to the greater elaboration effort required by this second type of images compared to the first one, especially in scientific matters of laboratory or nature, where getting a picture might already be complicated, therefore getting a video is almost impossible.

Minor are the differences between the variables when analyzing the function of the images included in the analyzed tweets. As it can be seen in Figure 3, the use of images made by CSIC on Twitter has as its main function the accessory, as a visual support, with content related to the tweet but without showing in detail

or giving explanations about what is explained in the tweet. This happens with 46.75% of the audiovisual material used; therefore, it is CSIC's most used function.

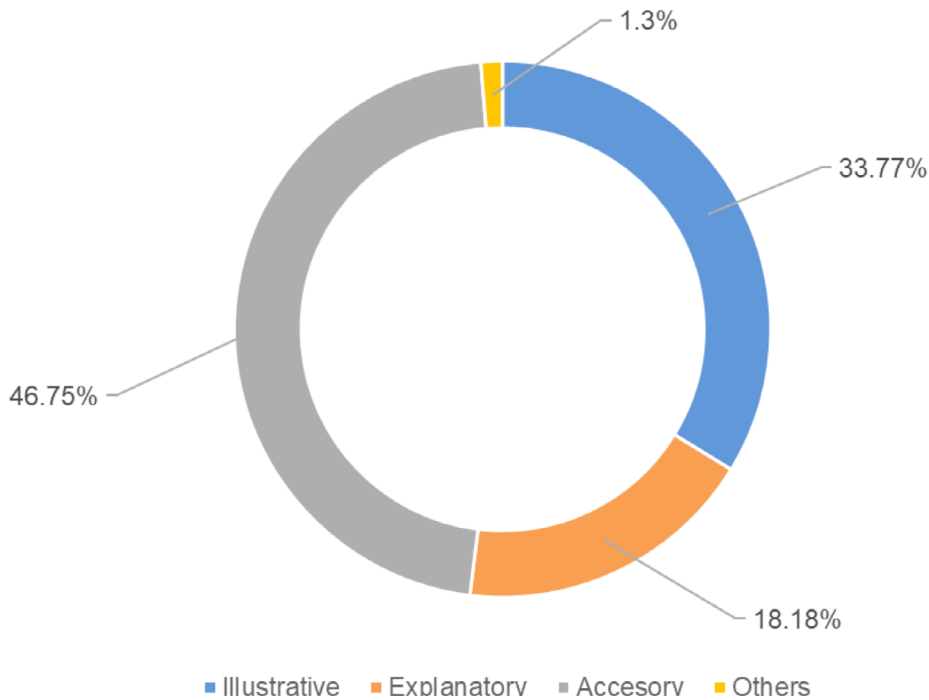


Figure 3: Percentage of the function of the images added in CSIC's tweets. (Source: own elaboration).

After the accessory, the illustrative function appears as the second most recurring function, which shows visually what is presented in the tweet. This occurs in 33.77% of the cases analyzed and holds great importance in scientific dissemination, since it gives an image to what is explained in the published tweet. Lastly, the explanatory function appears in 18.18% of the cases, where images serve to expand or justify the scientific information detailed in the content of the message published on Twitter. It also appears 1.3% of the times in the category of "Others", which corresponds to a logo of a media outlet that appears in a tweet after adding a hyperlink to that media outlet and which could not be classified in any of the other three previous categories.

Beyond these categories, Figure 3 reflects a greater presence of the informative and educational functions, such as the explanatory and the illustrative ones, which together add up to 51.95% versus 48.05% of the accessory function. This data highlights the willingness of CSIC to position itself as an entity of scientific dissemination and reflects that the use of images is yet another factor when it comes to getting science to reach, educate and train users.

Continuing with the presentation of results, the analysis of the sample has reflected a dominant relationship of the images with the text of the tweet, far exceeding the images that relate to other aspects such as hyperlinks, hashtags or mentions to other users. As Figure 4 reflects, 82.05% of the images used and analyzed are related to the text present in the tweet, much higher than the 11.54% of images that are related to the hashtag of the message, the second majority relationship. Minor is the relationship of the images with the hyperlink used, where it barely amounts to 3.85% of the cases, or to the personal mention used, where the images that reflect the mentioned person hardly represent 2.56% of the total.

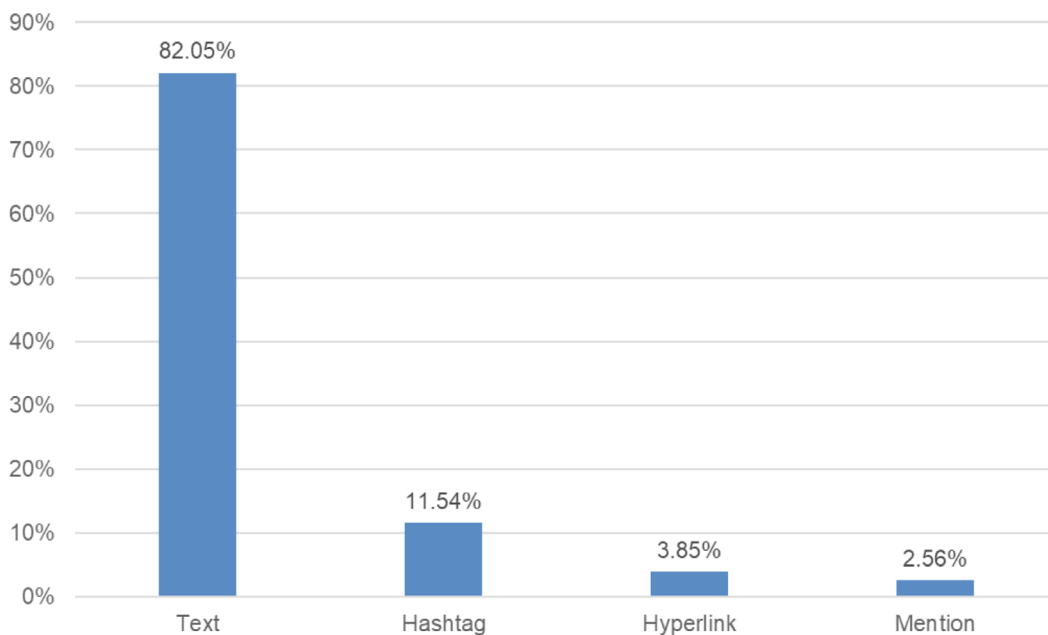


Figure 4: Percentage of the relationship of the images with CSIC's tweet. (Source: own elaboration).

This data is related to what has been commented on CSIC's intention to add images to show visually what it explains in the tweet, as well as with the main informative function in the images analyzed. The fact that images are primarily related to the text suggests that it is because these images try to explain or illustrate what CSIC explains through words and, therefore, allow users to better understand the content.

Regarding the ownership or authorship of the images used during the analysis period, Figure 5 shows a slight superiority of images whose authorship is CSIC itself or someone dependent on it, assuming 53.25% of the cases. The remaining 46.75% is composed of images whose authorship is foreign to CSIC and where GIFs, accessory images from image banks or hyperlinked news are included.

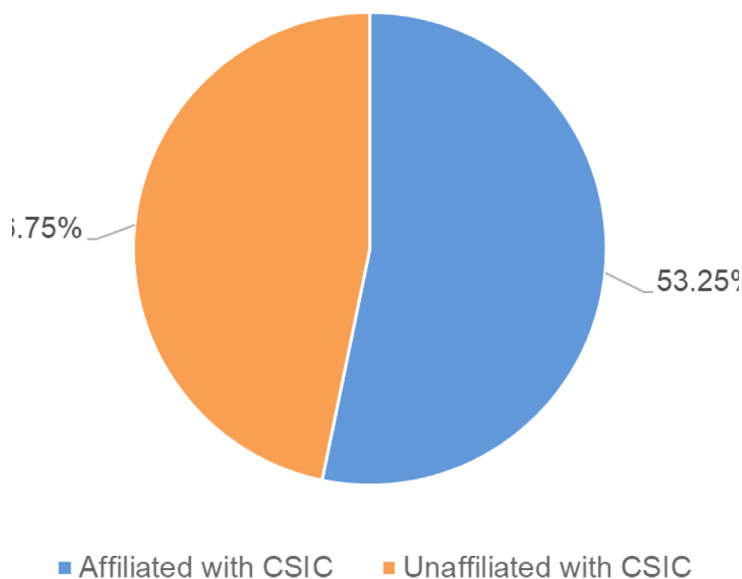


Figure 5: Percentage of ownership of audiovisual material used by CSIC on Twitter. (Source: own elaboration).

Again, this data highlights the importance that images have for CSIC, since in addition to having a large number of images in its profile, most of them are self-

made, showing the concern of the entity not just to include them, but to look for a visual demonstration of what it is explained in its tweets. Furthermore, the fact that the images owned by others have a figure almost comparable to their own notes that CSIC is also involved in the use of visual content even when it is not available, using image banks to visually present its contents.

Regarding the number of interactions received by users, it can be seen that those tweets that include images of some kind triple the results obtained by those tweets without them. In fact, the retweets of tweets with images exceed those tweets without images by 738.89%, while likes surpass them by 623.40% and responses by 409.52%.

	Retweets	Likes	Responses
Tweets with images	3.724	5.860	86
Tweets without images	504	940	21
Total	4.228	6.800	107
Difference	+738,99 %	+623,40 %	+409,52 %

Table 1: Number of retweets, likes and responses received by CSIC. (Source: own elaboration)

Turned into ratios per tweet, tweets with images receive an average of 48.36 retweets, while those messages without visual content barely reach 10.72 retweets per message, being almost a fifth of that obtained by those with images and demonstrating the greater interaction of users with messages that include images. This fact perhaps is due to their better understanding or the attractiveness that the image generates in the users. Regarding the number of likes, each of the tweets with audiovisual content published by CSIC during the sample period obtained an average of 76.10 likes, a figure almost four times higher than the figure obtained by those tweets without images, whose average descend to 20 per tweet. The responses also vary depending on the use or lack of images. CSIC obtains an average of 1.12 responses in those tweets that include images, a figure that is reduced to 0.45 responses per tweet in those messages without images.

During the analyzed period, the maximum number of interactions received by a tweet with image reach 297 retweets, 445 likes and 3 replies, while the tweet without image with greater impact is one integrated in a thread that presides over a tweet with image and their numbers amount to 26 retweets, 87 likes and 1 reply, as it can be seen in Figure 6.



Figure 6: Tweets with image and without image of CSIC with greater number of interactions during the analyzed period. (Source: CSIC Twitter Profile).

This amount of interactions is not the general trend, since there were tweets with smaller figures both with and without images during the analyzed period. However, it is still noteworthy that all those publications with visual content have always received some interaction from users, while up to four tweets without images are counted, where CSIC does not receive a single retweet or like, as seen in Figure 7.

ARTÍCULOS DE INVESTIGACIÓN

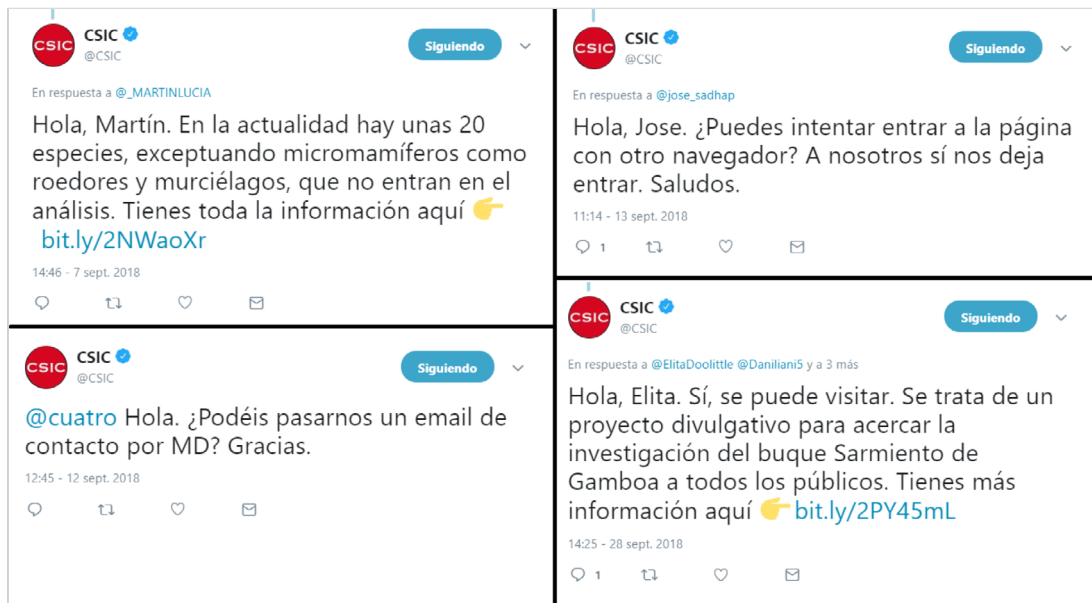


Figure 7: Examples of CSIC's tweets without interactions. (Source: CSIC Twitter Profile).

Discussion

The study carried out shows the great importance that CSIC gives to images on its communicative routines on Twitter. Hence, the first hypothesis is confirmed, which states that CSIC adds visual material to 62.1% of its tweets.

Regarding the type of format of the images, the second research hypothesis is also validated, which confirms that CSIC uses mainly photography (it represents 67.57% of the analyzed visual content) and, to a lesser extent, illustrations (12.99%) and videos (9.09% for GIFs and 7.79% for videos).

The third hypothesis is refuted, since the explanatory purpose, with a presence of 18.18%, is not the most common purpose for the images that CSIC publishes on Twitter. The accessory with a presence of 46.75% and the Illustrative with 33.77% are the most recurring functions.

The quantitative numbers obtained in the analysis confirm the last two research hypotheses. It has been demonstrated that CSIC obtains more interactivity on Twitter in those tweets that include images, which also achieve more retweets, likes and replies than those without visual content.

Lastly, as a final assessment, the analysis demonstrates that the use of images is a great benefit for the scientific dissemination and communication that CSIC carries out on Twitter, helping to communicate its research and news in a more visual way for its public. This issue brings more impacts and dissemination to CSIC's message, which has led it to position itself as one of the baseline profiles in the Spanish scientific communication on Twitter, as detailed in the investigation done by Pérez-Rodríguez, González-Pedraz and Alonso Berrocal (2018) in which CSIC, in addition, is the only research organization present among the largest Spanish scientific influencers on Twitter.

Given the results and conclusions, it is now time to discern about the research undertaken. One of the limitations of the investigation is related to the size of the sample. The investigation brings up the analysis of CSIC's communication on Twitter throughout one month, a period of time that other investigations believe to be sufficient. However, in this case, it has turned out to be insufficient, perhaps because of the aforementioned issue related to the lack of activity in social networks during weekends and after hours. For future research, the option of extending the analysis period to provide a more consistent sample is proposed.

The research is an interesting approach to the field of scientific communication in social networks from the perspective of the images. This research sheds light on a field of study that has not experienced much research so far and constitutes an approach to understanding the importance of images in scientific communication in social networks.

Regarding future lines of research, it is interesting to shift through images related directly to scientific content and those related to actors, managers or administrators of science. Likewise, it is also interesting to analyze the use of images in other Twitter profiles with scientific nature, both Spanish and international, and make a comparison between the results obtained from this research and from those carried out by other institutions to discover if CSIC's data is relevant or improvable within the scientific field on Twitter.

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