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Communicating science: The profile of science journalists in Spain

Comunicar la ciencia: El perfil del periodista científico en España

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ABSTRACT

Science journalists are mainly responsible for publicly communicating science, which, in turn, is a major indicator of the social development of democratic societies. The transmission of quality scientific information that is rigorously researched and understandable is therefore crucial, and demand for this kind of information from both governments and citizens is growing. We analyzed the academic profiles of a representative sample of practicing science journalists in Spain to clarify what training they had received and how they perceived the quality and scope of this training. Using an ethnographic methodology based on a survey, in-depth interviews and focus group discussions with science journalists working for the main Spanish media (mainly printed press, audiovisual, Internet and news agencies), we analyze their academic backgrounds and collect information on their opinions and proposals. Our findings depict a complex and heterogeneous scenario and also reveal that most science journalists not only do not have any scientific training, but also do not even consider this to be necessary to exercise as science reporters. They also criticize the current system for training journalists and consider that the best way of learning the profession is by acquiring experience on the job.

RESUMEN

El periodista científico es uno de los principales responsables en la cadena de transmisión e interpretación hacia la sociedad de toda noticia, novedad o avance de carácter científico. A su vez, una información científica rigurosa, comprensible y de calidad es, además, un indicador del desarrollo social. La demanda de este tipo de información crece cada día en nuestras sociedades, tanto por parte de los gobiernos como de los ciudadanos. Por este motivo, y con el objetivo de esclarecer cuál es el perfil de los periodistas científicos que deben lidiar con tal responsabilidad, cómo se han formado y cómo ellos mismos creen que deberían haber sido formados, en esta investigación analizamos los perfiles académicos (tanto el real como el ideal) de estos profesionales en España. Utilizando una metodología etnográfica, basada en entrevistas, cuestionarios y focus group con periodistas científicos que trabajan en los principales medios españoles, analizamos su trayectoria académica y sus consideraciones y propuestas al respecto. Los resultados muestran un escenario complejo y heterogéneo, pero también revelan que la mayoría de los periodistas científicos no solo no goza de una titulación universitaria en el ámbito científico, sino que tampoco la considera necesaria. Los periodistas científicos son críticos con el sistema educativo y consideran que la mejor forma de aprender es trabajar en los medios, más que estudiar.

KEYWORDS | PALABRAS CLAVE

Science Journalism, popularization of science, science communication, information providers, communication skills, training, science 2.0, information quality.

Periodismo científico, popularización de la ciencia, divulgación científica, proveedores de información, competencias comunicativas, formación, ciencia 2.0, calidad informativa.

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1. Introduction and state of the art

Science is a crucial part of our lives and an indicator of the social development of democratic societies. Its dissemination and popularization is, therefore, a priority for the European Union, governments, and international institutions around the world. Franco (2008: 97), in a study of the challenges of science journalism, argues that "science is one of the pillars of society: with it citizenship is built, disease is combated, poverty is overcome and wars are won".

However, bringing science knowledge and advances to the public in a clear and comprehensible way and highlighting the implications for our daily lives, is not an easy task. While this responsibility is shared with the media, scientists, and governments, science journalists are the last link in the chain of transmission, and their task of interpreting scientific results is often highly complex and conceptually and methodologically abstract. As Bauer, Howard, Romo-Ramos, Massarani and Amorim state (2013: 1), "social discussion about science is vital for any modern culture, and it is very important to identify the changing conditions in which this discussion about science takes place in different contexts. Clearly, science journalists play a fundamental role".

However, the work of science journalists, despite the great consensus about their important social function, is not always appreciated by newsroom editors, who tend to relegate science news to a secondary role (Brumfield, 2009; Williams & Clifford, 2008). Nor is it always applauded by the scientific community, which often sees defects or simplifications in the journalistic interpretation of their research, sometimes with sensationalist touches (Rosen, Guenther, & Froehlich, 2016; Lynch, Bennett, Luntz, Toy, & Van-Benschoten, 2014).

In May 2014 on CNN's StarTalk programme conducted by science journalist Miles O'Brien, astrophysicist and science popularizer Neil deGrasse Tyson, in response to the question "What's wrong with science journalism?", pointed to issues such as the desire for protagonism of journalists, audiences, and leaders (Meneses-Fernández & Martín-Gutiérrez, 2015). Journalists tend to deviate from quality science journalism for reasons that go beyond scientists and science, according to deGrasse Tyson, who questions the suitability of an exclusive focus on the journalists' communication profile, when a major problem is their inadequate scientific training. This situation exemplifies the less than satisfactory relationship between scientists and journalists, widely studied by authors such as Calvo-Hernando (1977), Besley (2010), Bauer, Howard, Romo-Ramos, Massarani and Amorim (2013), Peters (2013), Lynch, Bennett, Luntz, Toy and Van-Benschoten (2014), and Meneses-Fernández and Martín-Gutiérrez (2015).

Who are the science journalists, however? And what training have they received to equip them to deal with such a great responsibility? The overall purpose of this article is to explore the academic profile of science journalists. Specific objectives are as follows: (1) to analyze the academic training received by science journalists; (2) to analyze the academic training that journalists consider ideal and compare it with the training they actually received; and (3) to analyze gaps in the Spanish educational system in this area, and consider how they could be resolved.

Modern science journalism originated between the late 1800s and the 1940s, a period that embraced the Second Industrial Revolution and the two World Wars. People's interest in technological advances grew, especially in relation to war, atomic energy, and the space race. In Spain, however, it was not until the 1980s and 1990s that specialist science and technology pages, sections or supplements were included in major newspapers (Moreno, 2003).

However, the scenario has changed in recent years, as science has been one of the journalism' specialties most affected by the economic crisis unleashed in recent years in much of Europe and the world. Most science supplements and pages have shrunk or disappeared altogether, and this has inevitably led to staff cutbacks, restructured newsrooms, and revised editorial functions (Kristiansen, Schäfer, & Lorencez, 2016; Cortiñas, Lazcano-Peña, & Pont, 2015; Williams & Clifford, 2008). These disruptive changes are very likely to have caused important changes in work routines and in science journalist profiles in recent years. Although there is ample literature regarding science journalism in Spain, as far as we are aware, no research to date has used ethnographic techniques to investigate the academic profiles of Spanish science journalists.

The journalist Manuel Calvo-Hernando (1977) laid the foundations for research into science journalism in Spain. Subsequently, researchers such as De-Semir (1996), Revuelta (1999), Fernández-Muerza (2004) and Cortiñas (2006; 2009) analyzed the dissemination of science in Spain, while Duran (1997), Del-Puerto (2000), Cortiñas (2008) and Elías (2008) investigated news handling of scientific results. Meanwhile, Moreno and Gómez (2002) took the first steps in researching the university training of science journalists in Spain. More recently,

Cortiñas led studies on perceptions of pseudoscience by science journalists (Cortiñas, Alonso, Pont, & Escribà, 2014) and the impact of the economic crisis on science journalism (Cortiñas, Lazcano-Peña, & Pont, 2015).

Numerous international studies of science journalism analyse the work routines of science journalists and the difficulties and challenges facing the profession (Friedman, 1986; Hansen, 1994; Nelkin, 1995; Peters, 2013; Brumfield, 2009; Irwin, 2009; Williams & Clifford, 2008; Jensen, 2010; Schäfer, 2010; Secko, Amend, & Friday, 2013; Badenschier & Wormer, 2012; Bauer, Howard, Romo-Ramos, Massarani, & Amorim, 2013; Mellor, 2015; Kristiansen, Schäfer, & Lorencez, 2016). Some of these studies discuss the profile and training received by science journalists.

One of the most recent reports on science journalism is the "Global Science Journalism Report: Working Conditions and Practices, Professional Ethos and Future Expectations" (Bauer, Howard, Romo-Ramos, Massarani, & Amorim, 2013). Although this report does not focus specifically on the academic training of science journalists, it does provide some relevant information in this regard – for instance; it documents the fact that only 20%-25% of surveyed science journalists received academic training that combined journalism and science.

In previous studies, mostly focused on the USA and Canada, Palen (1994) also reported that few journalists had received scientific training. Weaver and Wilhoit (1996) confirmed that only 3% of university-educated journalists have a degree in science, regardless of their area of work and Hartz and Chappell (1997) concluded that most science reporters specialized in scientific information in the newsroom.

> Regarding the future of the profession, most science journalists in our sample advocate the need to promote mixed or interdisciplinary profiles, whether through formal training or tutored work experience. For most of these journalists, on-the-job learning is the key to the development of a good science journalist. Nonetheless, it continues to be desirable for both academia and the media to invest greater efforts and resources in the training and growth of professionals capable of communicating science from a rigorous and critical perspective.

The studies of the above authors would suggest that journalists, in general, require more scientific training and, even more emphatically, for science journalists in particular.

Referring to science journalism in Spain, Elías (1999) distinguishes between the 'specialist journalist' and the 'journalist by habit'; that is, between journalists with proper scientific training and journalists without scientific training who rate themselves as specialists because they have been working in the area for a long time.

Fahy and Nisbet (2011), in their analysis of the challenges facing science journalism, conclude that the science journalist of today requires scientific knowledge as well as journalistic skills to be able not only to transmit science results but to adopt a critical and analytical perspective. Williams and Clifford (2008), drawing on interviews with 47 UK science journalists, warn that science journalists have insufficient time for investigations and have increasingly become slaves to communiqués and press conferences. Kristiansen, Schäfer, and Lorencez (2016), in a study based on interviews with 78 Swiss science journalists, confirm that although working conditions in Switzerland are privileged in comparison with other countries, the economic crisis and newsroom budgetary cuts have negatively affected the routines of science journalists.

This impact of cutbacks was also confirmed in widely disseminated articles for Nature written by Toby Murcott (2009), science correspondent for the BBC, and Boyce Rensberger (2009), science correspondent for the Washington Post with over 30 years of science journalism and editorial experience. Both journalists also advocated less dependence on press releases and a more critical role for the science journalist. One clear conclusion, shared with Fahy and Nisbet (2011) and Williams and Clifford (2008), was that there was a need for more scientific training for journalists specializing in this area and dealing with often unfavorable working conditions.

2. Material and methods

This research, conducted within an ethnographic methodological context, was based on qualitative techniques (structured in-depth interviews based on open questions and focus group discussions) and quantitative techniques (a closed-question survey). This methodological triangulation allowed us not only to obtain quantitative data but also to observe and report concerns, feelings, and nuances as expressed by the science journalists themselves.

Understood as a science journalist is someone who has demonstrable and considerable experience as a journalist, and whose main professional occupation is to write about science for the media (whatever their academic background). In the case of freelance journalists, only included were freelancers whose dedication was equivalent regarding salary to a reputable journalist specializing in science.

A total of 49 science journalists covering science, technology and the environment for Spanish media were included in this study: 32 men (65%) and 17 women (35%). Regarding media, 35% work in the press, 33% in audio-visual media (radio and television), 16% on the internet, 6% in news agencies and 4% in other media.

There is no specific census of the number of science journalists working for the Spanish media. However, based on data provided by the interviewees themselves and other inferences, we estimate that there are around 150 science journalists in Spain. Our sample can be considered reasonably representative, as it includes a third of all science journalists working for the Spanish media. Journalists from specific newspapers refused to participate as informants, although this fact did not significantly alter the representativeness of this study.

Two focus groups were arranged, lasting (approximately) 90 minutes each: one with 12 and the other with 15 participants, both composed of a similar proportion of science journalists (four of whom were also interviewed) and scientists. The focus groups were held in Barcelona between September and May 2012. Interviews were recorded and transcribed with the permission of the interviewees. Likewise, the focus group discussions and survey were conducted in person, and the confidentiality of the data provided by the informants was guaranteed.

Since the aim of this research was to shed light on the academic training of science journalists and their perceptions regarding the relationship between their profession and training, we attempted to answer three research questions:

- What is the academic profile of science journalists in Spain?
- What is the ideal academic profile for a science journalist?
- What is lacking in the academic training of science journalists and how can this lack be overcome?

3. Analysis and results

Six different science journalist profiles were detected among the study participants and categorized regarding academic training (Figure 1):

- With university studies in journalism/communication without scientific training (n=18; 36.73%).
- With university studies in journalism/communication and a master's/doctorate in science (n=6; 12.24%).
- With university studies in science without journalism training (n= 6; 12.24%).
- With university studies in science and a master's/doctorate in journalism/communication (n=12; 24.49%).
- With university studies unrelated to journalism or science (n=4; 8.16%).
- With no university studies (n=3; 6.12%).

3.1. More journalistic than scientific training

The most typical profile of science journalists in Spain –although not in the majority (category a: 36.73%)– is that of a journalist graduate without specialist training in science. Nonetheless, an equal proportion has both scientific and journalistic training (categories b+d; 36.73%). Another 12.24% (category c) have only scientific training, and 14.28% (categories e+f) have neither journalistic

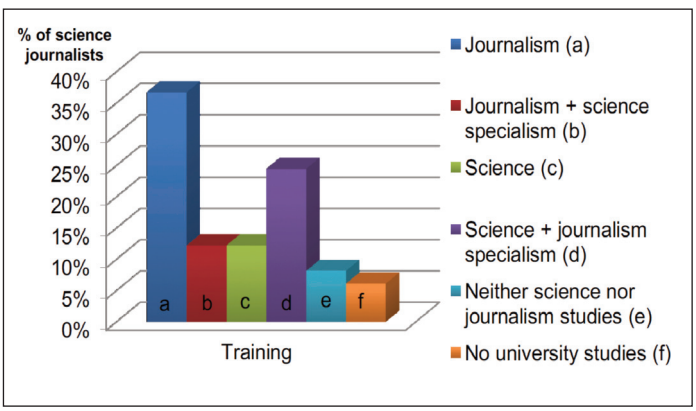

Figure 1. Profile of the Science Journalist in Spain.

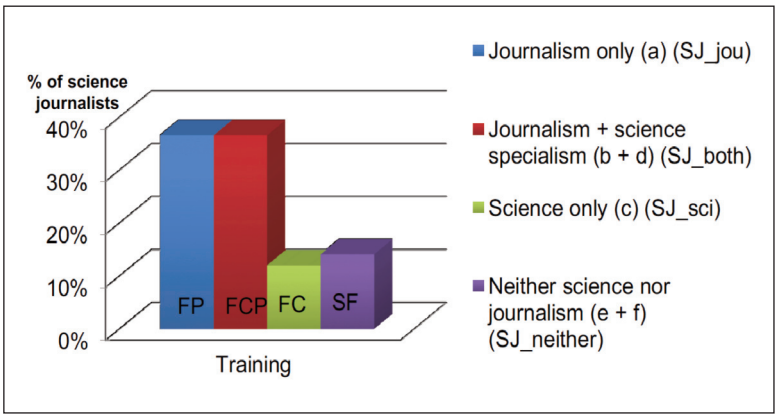

Figure 2. Academic Background of Spanish Science Journalists.

nor scientific training. We, therefore, identified four main groups of science journalists in Spain based on their academic training (Figure 2):

- With only journalism training (SJ_jou).
- With only science training (SJ_sci).
- With both journalism and science training (SJ_both)
- With neither scientific nor journalism training (SJ_neither).

Analyzing these data from the perspective of non-exclusive categories, it can be observed that journalism training takes precedence over science training among our informants: 73.46% (a+b+d: SJ_jou + SJ _both) had some journalistic training, whereas only 48.97% (b+c+d: SJ_sci + SJ_both) had some science training.

3.2. Ideal academic profile for science journalists

One of the most surprising results from both the surveys and the questions asked in the interviews and focus groups was that most science journalists in Spain do not consider a science education to be necessary to exercise as a science journalist. Thus, 59.1% of journalists disagreed or strongly disagreed with the statement: 'To be a good science journalist it is increasingly necessary to have a degree in science' (Figure 3).

Breaking down these data according to training, disagreement was greater among those who received only formal training in journalism, 68.1% of whom believed that science training is not necessary. However, even among the science journalists who received both journalism and science training, science training was considered of secondary importance: 47.1% did not believe it to be necessary, whereas only 29.4% considered it necessary (Figure 4).

In contrast, of the science journalists with formal training only in science (just over 12% of the sample), 75% consider science training to be necessary. Finally, not a single science journalist with no training in either science or journalism (just over 8% of the sample) believed that scientific training was necessary.

For the in-depth interviews, the results were similar. In response to the question 'What is the ideal academic profile for a science journalist?', 48.97% of informants said that journalistic training was essential, whereas only 28.49% indicated that scientific training was necessary.

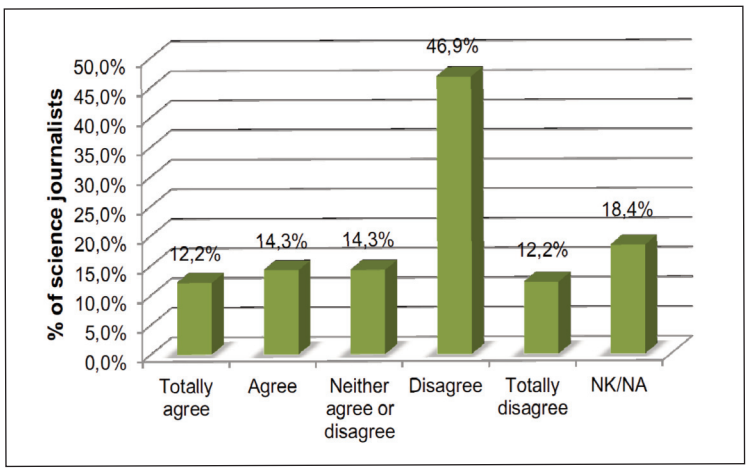

Figure 3. Value of a Science Degree. Responses to the Question 'To Be a Good Science Journalist It Is Increasingly Necessary to Have a Degree in Science'.

3.3. Learning on the job

The above results coincide to a large extent with the conclusions drawn from the focus groups, although with some nuances. For instance, although science journalists did not consider science training to be essential to exercise the profession, they did acknowledge the importance of mixed training and specialization, which could, however, be obtained through experience on the job.

A clear majority of the science journalists considered the experience gained on the job to be more important than academic training, emphasizing the fact of being able to learn from prestigious and experienced professionals.

Although scientific training was relegated to a secondary role by most informants, half (51.02%) proposed training in both areas – not necessarily academic training, but (as has previously been pointed out) acquired through work experience in journalism or science. Reproduced below are some responses that reflect this thinking (SJ followed by a number refers to the science journalists in our sample using an internal code that ensures their anonymity):

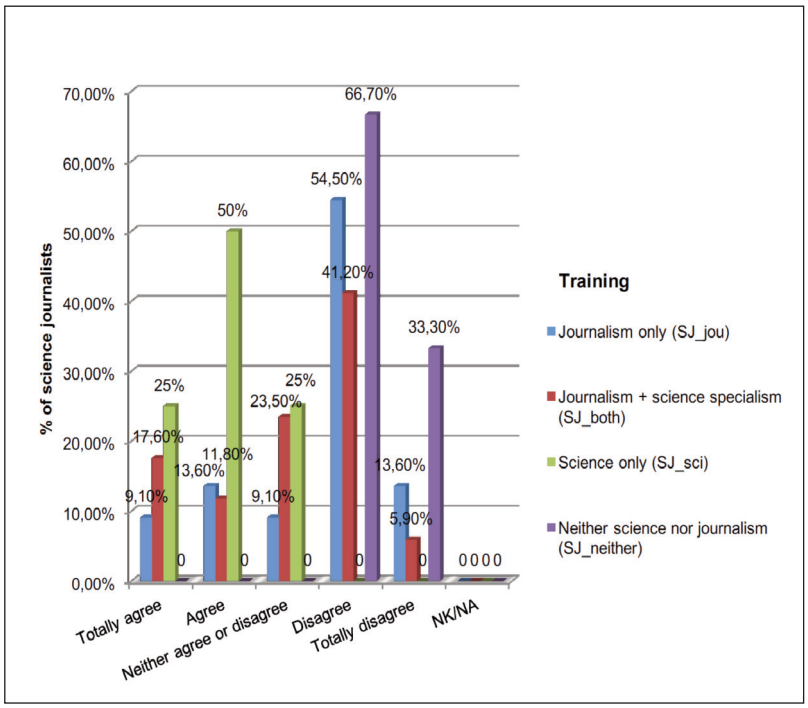

Figure 4. Value of a Science Degree. Responses to the Question (According to Respondent's Training) 'To be a Good Science Journalist It Is Increasingly Necessary to Have a Degree in Science'.

"You do not have to have a degree in journalism to exercise the profession. This is learned from practice and attitudes. Having a science degree helps a lot to understand many things, but since science covers many different knowledge fields, a physicist and I are in exactly the same position when faced with zoology. What is really important is attitude and experience" (SJ18).

"I believe that having a science background helps, but I would like to demystify this. It helps not to be afraid of science (...), but the science journalist is not trained at a university. Three years of intense professional activity and you have a good science journalist" (PC22).

These positions are inevitably linked to a criticism of academic journalistic training, and a defense of learning on the job, as reflected in almost half of the responses and also in the focus group discussions. Thus, many informants referred to skills they rate as essential, including "intellectual curiosity" (SJ43), "being interested in science" and "having clear ideas and being focused". (SJ33). Other similar or related comments were as follows: "You don't have to have scientific training, but you do have to be generally knowledgeable" (SJ39); "Experience shows that journalists are good when they can manage the tools of the trade" (SJ26); "The key is to do the job well and, to do that, you don't need to be either a journalist or a scientist, as you can do well coming from either field" (PC37); "Journalism is an art, it's not something that's learned by studying" (SJ1); and "I am one of those disillusioned by journalistic training, I think that journalism can be learned on the job" (SJ2).

3.4. Improving training

Journalists conceded (directly or indirectly, in the surveys, interviews and focus groups) that there were deficiencies in their academic training. The closed-question survey results indicate that 73.4% of the informants believed that university journalism and communication faculties do not pay enough attention to science journalism; furthermore, a mere 6% of the informants believed that the necessary importance is attached to science journalism (Figure 5).

Just over a quarter of the informants (26.53%) specifically stated that the level of scientific knowledge is low in newsrooms, where science topics are often covered by generalist journalists without specialist training.

"There are deficiencies regarding a lack of knowledge of the scientific method, research procedures, clinical

trials... Science does not prove anything, it discards or proves hypotheses, and [science journalists] sometimes do not understand this" (SJ42).

"We take what we read in journals at face value. It would be a good thing if the journals were afraid if they thought 'reading is now more critical'. We need to stop believing that everything a scientist says is the truth. Nothing is 100% proven, there is always uncertainty, and that is not explained to readers either. Everything needs to be set in context" (SJ36).

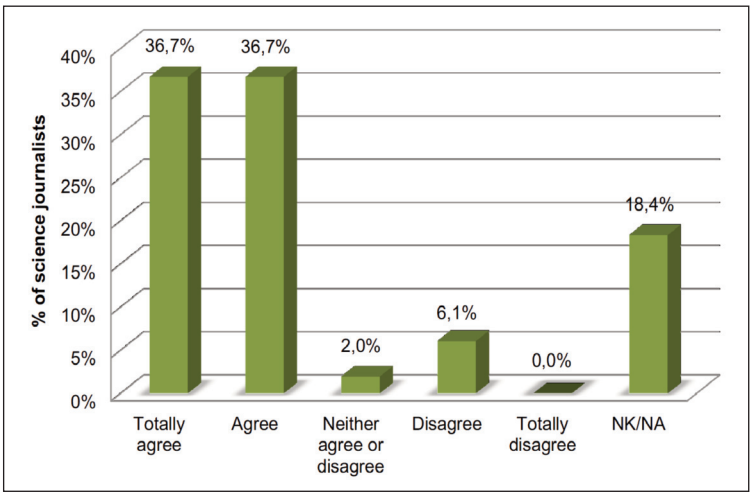

Figure 5. Attention Paid to Science Journalism at University. Response to the Question: 'Journalism and Communication Faculties Do Not Pay Sufficient Attention to Science Journalism'.

As for how to overcome the shortcomings of training, around half of the informants, referred to scientific training in the form of offering elective subjects and postgraduate or master's courses and including or reinforcing the subject of science journalism: one respondent went even further, indicating that "science and technology should be mandatory in the curriculum" (SJ14).

Furthermore, 18.36% of the informants believed that the deficiencies in science journalism training are shared by all journalism specialties and that, consequently, improvements in training should be aimed across the board.

However, while the majority do criticise training, there is a clear minority of science journalists who have more positive opinions of the existing training, and focus their criticisms on other aspects. Thus: "The problem is not training but the lack of work. You only have to see the number of people with a master's out there" (SJ25).

In fact, a considerable number of the science journalists went off the main topic (training) to criticise working conditions, thereby displacing the problem to one of the work settings. The panorama described is one of a wide variety of topics and areas to be covered, the impossibility of specializing properly and, directly related, low pay, and a lack of time. These would point to a precarious work situation for science journalists, who have to write many articles, are unable to do thorough research and, in short, have many limitations on rigorously fulfilling their information function.

"It's not so much an academic as a working conditions problem. The situation is very precarious (...) very few science journalists are on a payroll. If you are poorly paid and have to write on many different topics, then that's more a source of error than training. There are journalistic tools that compensate, but if you have little time, quality will suffer" (SJ3).

4. Discussion and conclusions

As the results of this research show, the profile of the science journalist in Spain is complex and heterogeneous. While the academic backgrounds of active professionals are very different, university journalism or communication degree is the most common background. Significant is the fact that while 73.46% of professionals have some journalistic training, only 48.97% have received some scientific training. Just over a third of science journalists have mixed training in both areas. Mixed training, in fact, is considered to be the most suitable profile, even though journalistic training continues to be considered more important than scientific training.

Most science journalists in Spain not only do not have science training but also do not consider it necessary, with almost 60% of the informants of the opinion that a science qualification is not necessary to exercise as a science journalist. Even more revealing is the opinion regarding whether a scientific qualification is necessary to exercise as a science journalist: most (75%) of those with only scientific training, but only 22.7% of those with only journalistic training, considered this necessary. Among those who received both kinds of training, only 29.4% consider it necessary, whereas none of those with no academic training in either journalism or science consider it necessary. Therefore, the more scientific the profile of the journalist, the more value is attached to science training, and vice versa.

The little value that is attached to scientific training for journalists is surprising since scientists indicate that it is precisely the lack of a scientific background that generates distrust towards their work. The science journalists also acknowledge deficiencies in training and the need to be more critical and analytical regarding sources and information. Corroborating both Murcott (2009) and Rensberger (2009), they also suggest the need to foster a more critical role among science journalists regarding questioning, not only scientific findings but the entire scientific process.

Along the same lines, it is interesting to note the dissonance between the ideal and real profiles of science journalists in Spain. According to our sample of science journalists, while journalistic training is more important than scientific training, complementary scientific training for journalism graduates is also fundamental. The ideal profile, therefore, is that of the journalist trained in communication who has received further training in science; the reality is, paradoxically, that only a small minority (12.24% of our informants) have this profile.

Three other conclusions drawn from the study further explain the above paradox and refer to factors with a bearing on the quality and kind of training.

First, it is evident that the journalists attach great importance to ongoing learning and the experience and knowledge that can be acquired outside academia. For many, the best training for a science journalist is on-the-job learning.

Second, the journalists criticize university training for journalists in Spain. A considerable number suggest that specific training in science journalism should be acquired through elective subjects taken as part of the undergraduate degree or through a master's degree. In fact, fully 73.4% of the journalists in our sample consider that Spanish journalism and communication faculties do not attach sufficient importance to this specialty.

Third, many journalists place the spotlight, not on academic training, but on working conditions in Spain: low pay, lack of time and general employment precariousness hinder in-depth investigation, specialization, and further training. This last conclusion corroborates those of previous studies in Spain that document how newsrooms have undergone a profound transformation in recent decades, with many veterans and experienced journalists replaced by young, inexperienced or trainee journalists lacking the expertise to be able to tackle the complexity of science journalism (Cortiñas, Lazcano-Peña, & Pont, 2015).

Finally, regarding the future of the profession, most science journalists in our sample advocate the need to promote mixed or interdisciplinary profiles, whether through formal training or tutored work experience. For most of these journalists, on-the-job learning is the key to the development of a good science journalist. Nonetheless, it continues to be desirable for both academia and the media to invest greater efforts and resources in the training and growth of professionals capable of communicating science from a rigorous and critical perspective.

In universities, therefore, communication and scientific faculties both need to foster hybrid training, which could be done by including science topics (especially on the scientific method) in humanities degrees, and of writing and communication topics in science degrees, by offering science journalism electives in undergraduate degrees, and by offering master's degrees and specialist postgraduate courses to both journalists and scientists. Training good science journalists –more than a dilemma for ethnographers– is essential to the successful communication of science and to building a better society.

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