Perceptions of public communication on archaeology and heritage. The case of the scientists of Atapuerca (Spain)

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Abstract

This paper presents an analysis of the scientists' perceptions of public communication on the scientific themes related to the archaeological sites of Atapuerca (Spain), which are included in the UNESCO World Heritage List. Based on a qualitative/ethnographic methodology, testimonies from researchers were collected on the impact of dissemination in the field of heritage and scientific culture. Findings show a communication imprint that is inherent to the scientific and management project, in which the stakeholders perceive a great public responsibility.

Keywords

Public engagement with science and technology; Public perception of science and technology

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Context and objectives

This work is part of a broader study that aims to address the public communication of archaeology and archaeological heritage in Spain, beginning with the Archaeological Sites of Atapuerca. The systematic scientific investigations carried out at this site for over forty years have yielded important results in the field of studies of human evolution at global level [Alcalde, Ruiz & i Roura, 2021; Carbonell & Tristán, 2017]. The scientific relevance of this case has had various impacts. On the one hand, there is the important social visibility backed by national and international recognition, in particular the inclusion of the site in the UNESCO World Heritage List in the year 2000, based on its exceptional universal value. On the other hand, the implementation of strategies for its tourist use turned it into a sustainable cultural resource as well as one of the main economic assets of Castile and León [Sarmiento Carrión, 2020]. During this process, both the managers and the scientists working in the site adopted a strong communication approach. This is a key point to understand its scientific and social relevance in the framework of science and technology communication [Carmelo Polino & Castelfranchi, 2012].

In such a framework, this work focuses on analysing the perceptions that the operators connected with the production of specialised knowledge on the

Archaeological Sites of Atapuerca have regarding the mechanisms of the public communication of science (hereinafter PCS) historically carried out on the above-mentioned heritage site. This issue will be addressed in the perspective of science communication, based on qualitative/ethnographic studies of public perception [C. Polino & Castelfranchi, 2019].

This particular group — scientists — poses different types of questions to the present study, in relation to their characteristics, motivations and interests to get involved — with greater or lesser interest — in the PCS process. In this sense, we will deal with how subjective representations of the communication that the Atapuerca scientific group implements are constructed. There is little history of this type of studies in the field of archaeology [Kapff, 2004; Carmona Jiménez, 2006; Scherzler, 2007; M. E. Conforti, 2010; M. E. Conforti, Giacomasso, Mariano & Endere, 2016]. This approach constitutes an opportunity to establish a dialogue with similar findings of related research carried out in the field of public communication of science focused on the operators [Kreimer, Levin & Jensen, 2011; Torres-Albero, Fernandez-Esquinas, Rey-Rocha & Martin-Sempere, 2011; Besley, Dudo & Yuan, 2018; Besley, Dudo, Yuan & Lawrence, 2018; Cerrato, Daelli, Pertot & Puccioni, 2018].

Public archaeology and public communication of science

This work aims to put the field of Public Archaeology (and archaeological heritage) in relation with PCS. Public Archaeology is a sub-discipline of archaeology that deals with the multiple issues that go beyond basic research and concern the social level. This means that the archaeological activity does not end with the findings of the research interpretation being shared with the academic community for discussion. In this perspective, the research carried out within the framework of this discipline is in the public interest [Moshenska, 2010], and archaeological researchers need to implement actions in order to return their findings to the community. This is related to what Bustos Cara [2004] suggests about the processes of appropriation and valorisation of cultural assets (in this case archaeological ones) as a selective action, either individual or collective, which is expressed through concrete actions capable of promoting and building identity references in the long term. In this regard, at the beginning of the 21st century, UNESCO named "communication" as a central axis in the strategic objectives of the World Heritage Convention, referring to its importance in increasing heritage public awareness, participation, and support. Through communication, an appeal is made to share the values and quality of archaeological assets to contribute to the promotion of social "good practices" that concern heritage [UNESCO, 2002; Castillo Mena, 2015].

The heritagisation of the values of a specific group implies building what is called "heritage awareness," which, in general, in the current conditions has a character of representation and communication. Successfully achieving the sustainability of these assets depends first and foremost on understanding the social and cultural processes that govern them. It should be noted that, in terms of social and cultural dimension, sustainability promotes the maintenance of the system of values, practices and symbols of identity, equality and human well-being [Guimarães, 2003]. To this end, it is essential to understand the role played by communication in the processes of sharing cultural heritage (in particular, archaeological heritage).

One way to approach the issue is to address the perceptions of the stakeholders involved in their study.

The issue of the stakeholders was addressed in several works that focus on the perceived role that scientists play in society, their attitudes and beliefs in terms of policies and effectiveness: the duty and need to promote science and its importance in society, to influence the public perception of science, to spread the love for science among young people or to take full advantage of the little time they have to disseminate [Besley, Dudo & Yuan, 2018; Besley, Dudo, Yuan & Lawrence, 2018; Cerrato et al., 2018].

By observing the current forms of knowledge production practices and discourses and by emphasising the contemporary communicational aspect of scientific institutions, Carmelo Polino and Castelfranchi [2012] show how PCS plays a central role in the construction of knowledge and in the governance of today's complex scenarios. Thus, the responsibility towards society is especially strong among researchers working with public funds, and more and more scientists are convinced that they have a public role to play [Cerrato et al., 2018].

Therefore, this work aims to contribute to the focus on the case of Atapuerca, given that since 2014 this team has been carrying out studies linked to its communication and the perceptions of different sectors of the public, which highlight PCS strategies linked to a model aimed at overcoming the communication deficit [M. E. Conforti, Mariano, Díez Lomana & Endere, 2019; María Eugenia Conforti, Chaparro, Degele & Lomana, 2018; María Eugenia Conforti, Díez Fernández-Lomana, Mariano, Endere & Romero Alonso, 2015]. In this context, it is hoped that the findings of this study that involves the scientists of Atapuerca will constitute a valuable contribution to understanding its complexity.

The Atapuerca case

The archaeological sites of Sierras de Atapuerca (hereinafter Atapuerca) are located in the province of Burgos, Spain (Figure 1). The interest in the archaeological study of this area dates back to the late 19th century with the first interpretations of its caves [Alcalde et al., 2021]. However, it was not until the 1970s that a period of systematic research began, which has continued to the present day. Since the 1990s, the Atapuerca Research Project has been managed by three co-directors who created a multidisciplinary group called the "Atapuerca Research Team" (hereinafter ART), which comprises approximately 176 specialists from several countries and disciplines. The excavation work carried out at the Sierra de Atapuerca sites each summer is complemented by various investigations at universities and study centres during the rest of the year.[1] At the Spanish level, the main ones are the University of Burgos, the National Centre for Research on Human Evolution in Burgos, the Institute of Human Paleoecology and Social Evolution in Tarragona and the Joint Centre of the Complutense University of Madrid-Carlos III Health Institute of Evolution and Human Behaviour in Madrid [Alcalde et al., 2021].

Over more than 40 years of scientific studies, extensive evidence of the evolution of human groups in Western Europe from more than a million years ago to the

[1]Source: https://www.atapuerca.org/es/atapuerca/Proyecto-Atapuerca.

Figure 1. Location of Atapuerca, Burgos (Spain).

present day has been identified in fifteen sites. The hominids found in Atapuerca represent five different species: *Homo sp.* (undetermined fossil remains dating back 1,300,000 years), *Homo antecessor* (850,000 years), *preneanderthal* (500,000 years), *Homo neanderthalensis* (50,000 years), and *Homo sapiens*. It can be said that this relevance "has materialised in a thousand scientific publications that have placed the Atapuerca Research Team at the forefront of the studies on Human Evolution worldwide" [Alcalde et al., 2021, [. 426]. In addition, the magnitude of the findings has made them worthy of widespread recognition, in particular the inclusion in the UNESCO World Heritage List in the year 2000, considering that the site meets the criteria of being the oldest and most remarkable testimony of human existence in Europe, whose fossil remains constitute an exceptional reservoir of information on the physical nature and way of life of the first human communities in Europe (UNESCO, 2000).[2]

The progress of the research was accompanied by a set of governance structures aimed at consolidating its development, not only at the scientific level but also at the public level. In its over 40 years of existence, the Atapuerca project has seen numerous professionals who have been working on the project's PCS: researchers, educators, communicators and journalists, specialists in museums and cultural heritage, documentary filmmakers, etc. It should be noted that the development of professional communication has been gradual. The first stakeholders to devote time and effort to such tasks were the researchers themselves, and today they continue to be an important pillar of the communication model. Initially, they approached the surrounding communities and the local media to report on their findings and the scientific potential of the site. It was in the late 1980s that the first press conferences were held to present the findings of the excavation campaign to the media. With the passing of the years and the increasing magnitude of the

[2]Information available at: http://whc.unesco.org/en/list/989.

findings, organisational structures were created and activities of greater scale and diversity began to be carried out. The highlights of this project in terms of PCS include, for example, the creation of its own newspaper (specialising in dissemination) that is being published to this day, or the early inclusion in the project of a documentary filmmaker as a stable member of the team who has been responsible for audio-visual and photographic productions to date. In addition, its travelling exhibitions have been presented all around the world[3] [Museo de la Evolución Humana, 2018]. Figure 2 summarises only a few of the most outstanding actions that are linked to the project's communication. It is worth mentioning that the communication structure is currently supported by the work carried out by the Atapuerca Foundation, the Museum of Human Evolution, Carex and the Scientific Culture Units of each of the aforementioned academic institutions involved in its scientific and public development.

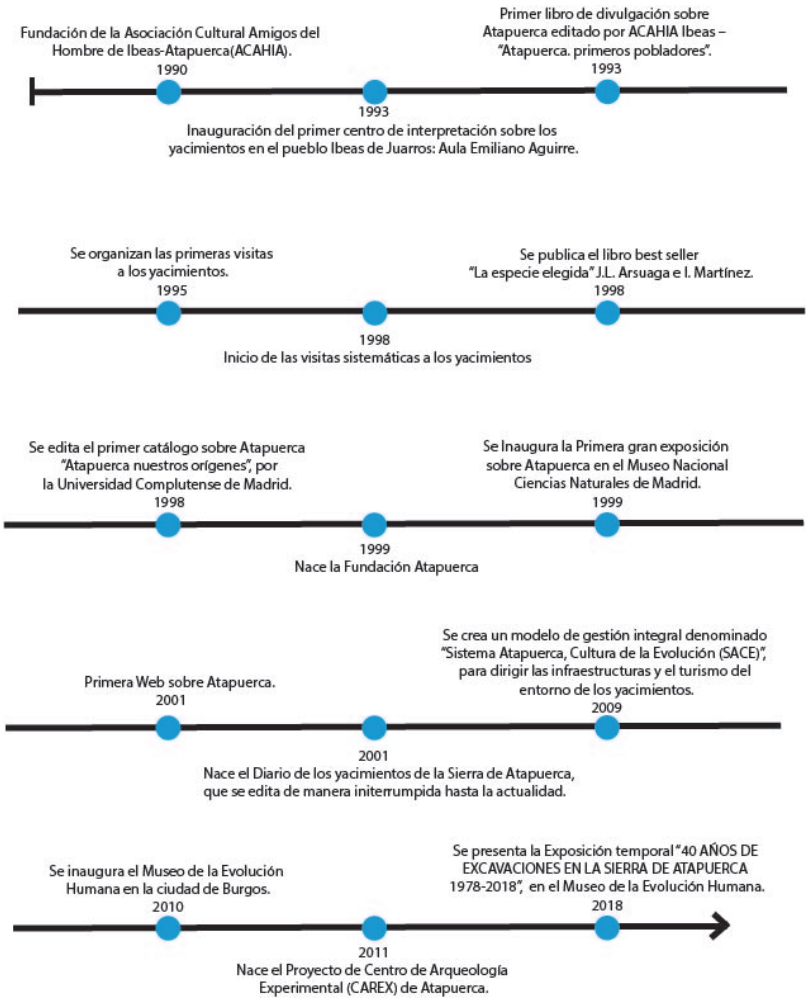
The public visibility of the Atapuerca Project has always been a constant in its historical development [Alonso Alcalde & Martín Nájera, 2013], and the magnitude of its findings and the awards implied a permanent media presence since the beginning (Figure 3), which has been enhanced in recent times with the success of social networks [Chomón-Serna & Busto-Salinas, 2018]. The strong social impact saw the tourist value of the site increase to the point of becoming one of the main active cultural assets of the province of Burgos. The implementation of a communication strategy mediated by infrastructures and institutions created especially for such purposes, as well as an active approach of socialisation and dissemination of knowledge [Bermúdez de Castro Risueño, 2012] have turned Atapuerca into a successful model [Nieto-Galán, 2011]. This type of organisation has turned into a reference not only for archaeology but for the scientific community in general, thus arousing a genuine interest in this research from the point of view of science communication.

Methods

The methodological framework was a qualitative-interpretative one, based on an ethnographic approach [Guber, 2011], aimed at reflecting in the analysis the diversity and uniqueness of the perspectives of the stakeholders themselves in their context of practices [Hamilakis & Anagnostopoulos, 2009]. The collection of the information was carried out onsite, within the framework of the intensive archaeological excavations carried out in the Atapuerca sites during the month of July 2021 — a time of massive influx of researchers from different disciplines. Among them, an intentional sample of key informants was selected, consisting of professionals who are well-established or at an advanced level of training and perform their jobs onsite on a regular basis. Through in-depth semi-structured individual and group interviews, a total of 78 testimonies were collected from agents who voluntarily agreed to participate in the study.[4] It should be clarified that the agents interviewed are divided into 46 women and 32 men. The foreign researchers were seven. The survey participants identified their specialties or reference disciplines as follows: archaeology, palaeontology, biology, geology,

[3]Exhibitions: "The first European treasures from the hills of Atapuerca" (New York, 2003); "Atapuerca, sur les traces des premiers européens" (Paris, 2009); "Atapuerca" at the Shanghai Universal Exhibition (China, 2010).

[4]The corresponding informed consent was obtained from the respondents, as established in items 4, 8 and 9 of the Ethical Principles governing the relationship with the Persons subject to research, contained in the Code of Ethics of Social Sciences (CONICET-Argentina) (Res. 2857/06).



1990: Establishment of the Cultural Association "Amigos del Hombre de Ibeas-Atapuerca" (ACAHIA).

1993: Opening of the first interpretation centre on the archaeological sites of the town of Ibeas de Juarros: Emiliano Aguirre Hall.

1993: The first dissemination book on Atapuerca is published by ACAHIA Ibeas — "Atapuerca, primeros pobladores".

1995: First visits to the archaeological sites.

1998: Regular visits to the archaeological sites are organised.

1998: The best-selling book "La especie elegida" by J.L. Arsuaga and I. Martínez is published.

1998: The first catalogue on Atapuerca "Atapuerca nuestros orígines" is published by the Universidad Complutense of Madrid.

1999: The Atapuerca Foundation is established.

1999: The first great exhibition on Atapuerca is opened at the "Museo Nacional Ciencias Naturales" of Madrid.

2001: First website on Atapuerca.

2001: The Journal of the Sierra de Atapuerca heritage sites is established, which has been uninterruptedly compiled to this day.

2009: A comprehensive management system called "Sistema Atapuerca, Cultura de la Evolución (SACE)" is established to manage the infrastructures and tourism of the area surrounding the archaeological sites.

2010: The "Museum of Human Evolution" is opened in the city of Burgos.

2011: The "Centro de Arqueologica Experimental de Atapuerca" (CAREX) project is established.

2018: The temporary exhibition "40 AÑOS DE EXCAVACIONES EN LA SIERRA DE ATAPUERCA 1978–2018" is presented at the Museum of Human Evolution.

Figure 2. Milestones in the history of Atapuerca's communication.

Figure 3. Atapuerca Communication and Diffusion Gallery, located in the permanent exhibition of the Museum of Human Evolution (Burgos).

anthropology, geography, palaeoanthropology, conservation and restoration, medicine, geophysics, history and heritage, history, anthracology, taxonomy and humanities. For the purposes of this work, Table 1 summarises the composition of the sample, detailing the name of the site in which the subjects were excavating at the time of the interviews and the codes by which the respective testimonies are identified in the Results section.

For the processing and analysis of the information, the ATLAS.ti software was used (version 8.4).

Interview Questionnaire

The full script of the interview consists of 14 questions (Figure 4). In particular, questions 6, 8, 10 and 11 were selected for this work, and the three axes of analysis were constructed as follows:

- The first variable is the "Communication Footprint" and it refers to the high public visibility of the Atapuerca Project. It is related to a retrospective and diachronic gaze of the historical development of the communication on the work carried out at the sites.
- The second variable is "Agents on PCS" and it brings together the thoughts of the agents on the role that public communication plays[5] — in its different

[5]It should be clarified that in their answers the respondents used the following expressions as synonyms: Science communication, dissemination, social communication. We believe that this does not change the meaning of their answers in relation to the objectives of the study.

Table 1. Classification of the researchers interviewed.

SCIENTISTS INTERVIEWED DURING THE 2021 EXCAVATION WORKS			
Task assigned within the excavation team	Name of the site in which the excavation work was carried out	Code	Number of interviewees
Project Co-director		DIR.	3
Researcher responsible for logistic tasks		LOG	2
Researcher that carries out excavation work	La Paredeja Site	LP	2
Researcher that carries out excavation work	El Mirador Site	EM	4
Researcher that carries out excavation work	Trench Sediment washing Lab Site (Río Arlanzón)	RA	6
Researcher that carries out excavation work	Exterior Gallery of Statues Site	EE	7
Researcher that carries out excavation work	Gallery Site	GA	7
Researcher that carries out excavation work	Great Sinkhole TD4 Site	TD4	8
Researcher that carries out excavation work	Portalón de Cueva Mayor Site	CM	9
Researcher that carries out excavation work	Great Sinkhole TDS Site	TD8	10
Researcher that carries out excavation work	Cueva Fantasma Site	CF	10
Researcher that carries out excavation work	Sima del Elefante Site	SE	10
			Total 78

formats and models — in the scientific tasks of researchers and their preferences in this regard.

– The third axis focuses on "Responsibility in PCS" and is further divided into two sub-axes. In the first, we collected their thoughts on who has the greatest responsibility to publicly communicate the knowledge about Atapuerca, referring to scientists, managers or communicators (who are considered the three agents that directly operate on the sites' public discourses). The other sub-axis in this variable reveals their opinions on the social responsibility that they have with respect to the knowledge they produce about the past.

Questionnaire for the researchers
During the excavation works at the heritage sites

1. Name and Surname.
2. Education level.
3. Research team in which you work.
4. Line of research that you manage or develop.
5. How did you initially get involved in the Atapuerca project? What is your main interest in this project?
6. As a scientist, do you think you have a social responsibility in relation to the knowledge that you produce on the past?
7. Which connection do you think science communication has with cultural heritage?
8. In your scientific work, what role does public communication (dissemination) play in its different formats and models? And do you practise it?
9. Do you think that in Atapuerca communication cannot be separated from research?
10. Scientists, managers or communicators: who should be in charge of/responsible for communication (in Atapuerca)?
11. What do you think in relation to why and how such a strong public communication imprint has been built in Atapuerca, at different levels (national and international)?
12. What do you think it is that the public appreciates most of Atapuerca?
13. Do you think that the recognition as a UNESCO World Heritage Site (in 2000) has had an impact on the communication of Atapuerca at the international level?
14. Finally, do you think that the Covid-19 pandemic has had an impact on the communication of Atapuerca? If so, to what extent? What were the challenges?

Figure 4. Full interview script used with the researchers during the Atapuerca excavations in 2021.

Results

The following are the main results obtained by interviewing the researchers, based on the selected analysis axes.[6]

"Strong communication footprint" axis

Regarding the researchers' opinions on why and how the public communication footprint of Atapuerca was built at different levels (national and international), 64% (43) said that it was thanks to the early and constant work of the three directors of the Atapuerca project:

> "*I think that the people who started the job, the three directors, invested in that. It was very clear for them that respect for and support to heritage had to come from the connection between research and social communication, not only from politicians but also from society*" (LOG-2).

However, about 36% (24) of the 66 interviewees said that the quality and quantity of scientific dissemination on the Atapuerca sites is due to the uniqueness of the findings that have been made there:

> "*For what Atapuerca represents in terms of science, there is no other place like this, it's so interesting. It's easier to reach the public when you have something spectacular*" (RA-2).

Others expressed various aspects that complement and provide further facets to the reasons for the communication imprint of the project:

> "*It is the result of many years of work, more than 40. It is an exceptional place because of two elements: firstly, what is there, and secondly the people who managed to combine the wealth of this place, this paradise of fossils, with the privileged minds that they have been directing for all these years, who know how to instil respect among the public*" (TD4-1).
>
> "*It has been a clear and strong effort of dedication to dissemination as no other scientific project in Europe had done. The level of general knowledge in Spain about human evolution is very high, everyone knows something. It is that combination: an underlying important multidisciplinary research project which generates interesting knowledge and delivers reach. And that we have had a 'school' that has been passed down, vocations are transmitted*" (TD4-8).

"Agents on PCS" axis

Regarding the role played by PCS in its different formats and models in the scientific tasks of the researchers, whether they practice it and what they prefer, out of the 74 respondents, 36% (27) said that they assiduously devote themselves to dissemination activities (a). Conversely, 31% (23) said that they do not carry them out (b). However, all respondents referred to the importance of dissemination in the work with historical heritage and especially within the Atapuerca Project.

[6]It should be noted that in the analysis of the results no significant differences were found on the basis of the roles of the agents specified in Table 1. This made it possible to establish generalities that we interpret in the framework of their collective work.

(a) "*It is a matter for everyone. It is true that there are members of staff engaged in it, but it is a task for everyone. Here in Spain the projects have begun to require us to carry out dissemination, but we already did before*" (EM-1).
"*I do a little of everything, it is what comes at the end of every investigation process. The type of activities I do are press releases, public talks, social networks*" (LP-2).

(b) "*Right now not much, because I don't have time. On Facebook and the likes, I share news. I prefer to give informative talks, at the university I have given countless. With the media, I believe that it is a profession that should always go hand in hand*" (EM-2).
"*Not as much as I would like. I prefer face-to-face interactions, I use social networks, but I prefer contact with people. In person, and perhaps on the social networks, I believe that we need to carry on with dissemination*" (TD8-7).

The vast majority chose face-to-face dissemination — in the form of talks and guided tours — while many alluded to the potential of virtual reality and writing, making a reference to feeling embarrassed when speaking in public and on television. Some work assiduously with the media because they prefer it and believe it is productive, while almost everyone uses Twitter — personal accounts and also those of the research teams — to disseminate their production.

"Responsibility in PCS" Axis

The first part of this pillar addresses the respondents' opinions on who should be primarily responsible for communication at Atapuerca (scientists, managers or communicators). There were 59 responses, out of a total of 78 interviewees.

In general terms, their opinions are divided into two large groups of responses. On the one hand, the majority of the scientists (37 answers, 63%) think that such responsibility is shared by the three groups of agents linked to the PCS of Atapuerca. They mention the construction of a communication model based on teamwork in which each party makes a specific contribution, which makes up the process in its entirety:

> "*Everyone. Managers, researchers, disseminators. Each one of them at their level, collaboratively, it's a chain reaction*" (CM-6).
>
> "*It's a shared responsibility, each of us reaches a different audience, and that balance and interaction is what ultimately allows us to reach all those who have some interest*" (TD8-5).

On the other hand, a smaller share of respondents (22 answers, 37%) is inclined to choose one of the agents in the first place: 13 gave priority to researchers, six to disseminators (or communicators), one to excavation volunteers and two to the managers (including in this group the scientific co-directors of the Atapuerca Project, who are also active as researchers). However, it should be noted that in their answers all the interviewees mention the need for collaborative work between the agents to achieve successful communication. For example, those who prioritise researchers do so as they think that researchers are the producers of scientific material and those who should initially generate interest in the communicators so that a process of facilitation, collaboration and quality is developed:

> "*Researchers do have a part of responsibility but many times we are not trained to do so, so there should be people who specialise in translating what we say using our technical words as well as people who are trained and have knowledge of research and communication and dissemination*" (GA-4).

On the other hand, those who mention the disseminators in the first place do so in consideration of their professional value as specialists, within the framework of a joint interdisciplinary relationship. Similarly, those who choose managers do so with reference to the three scientific co-directors, as the most publicly visible people.

Overall, in their responses the interviewees highlight general aspects of the communication project that stand out as the imprint of the Atapuerca case, and which they consider to be those that have made a difference and showed leadership. For example, the professionalisation of the public communication work, which implies the creation of a stable, long-term outreach team that shapes — and is fed back by — the three pillars of the project: research, teaching and social communication. They also emphasise the intention of managing communication as a team to achieve a balance based on interdisciplinary and collaborative work.

The second part of this axis focuses on the respondents' answers regarding whether as scientists they think that they have a social responsibility regarding the knowledge they produce about the past. There were 71 responses, out of a total of 78 interviewees.

The answer to this question was unanimous as everyone thinks that they have some kind of responsibility in the process. Their arguments mention different aspects that should not necessarily be interpreted as disconnected, but which actually show a close relationship. The majority (33 scientists, 46%) associate such responsibility with a personal motivation to contribute to the democratisation of the subject and make visible the work that scientists do. This contributes to the action of updating and increasing the knowledge that circulates socially about the past and generating public interest:

> "*We have a social responsibility if we want this to continue to grow, more people to know and understand it, and more people to be included here, for the world to know the importance of knowing the past because that can imply many interesting social changes in a time of many changes*" (EE-6);
>
> "*Yes, dissemination is essential because if we are not able to explain to the rest of the population the importance of the research we carry out, that value is often lost and no importance is given. I also believe that Atapuerca is an example of how a research project can win when people know, value and appreciate what is being done, and I believe that a magnificent job has been done here since the beginning*" (CF-8).

Secondly, they say that they feel a responsibility in relation to the use of public funds (from the State) for research, which is money that comes from the tax contributions of citizens, and so they feel they owe them a payback in the form of knowledge:

> "*If I keep it to myself, what is the point? We work with public contracts and people needs to receive their payback*" (RA-2).

A smaller number (13 interviewees, 18%) also mentions the fact that they consider it a necessity, that is, a constitutive part of the investigation process that, if not carried out, generates an incomplete cycle:

> "*It is fundamental. I consider it an inherent part of my responsibilities. Generating knowledge is not an end in itself, then you have to put it out there, give it a face. Knowledge that is not transmitted dies. Humans need other humans, we are an eminently communicative species*" (TD4-8).

Also, six of the interviewees (8%) directly relate responsibility to the theme of cultural heritage, taking into account that it is a process of knowledge generation about an asset with the highest standards of formal recognition and protection, and with a public and community character:

> "*Of course it is about responsibility: we work with heritage and hold the maximum international recognition as World Heritage, it means that it is not ours. We feel privileged that we are retrieving such heritage, but we are intermediaries and it has to be recognised by everyone*" (TD4-3).

In general terms, all the answers make a reference to a great social responsibility which is also linked to what they acknowledge as a constitutive part of the project since the outset. They define it as "a school" that "has been instilled" in them, a fundamental part of a three-pillar model (research, training of human resources and social communication) that they have learned — and assimilated at different levels and extents — which is not ignored, but on the contrary is assumed and supported to guarantee the comprehensive balance of the project.

Discussion and final remarks

The objective of this work was to present the perceptions that expert agents have in the production of scientific knowledge about the archaeological sites of Atapuerca, in relation to the public communication process. This case was chosen for its character as a scientific/heritage space whose research-management plan includes in its main objectives the social promotion of a scientific culture through a PCS project implemented by creating a set of institutions and consolidating specially trained work teams. In addition, a particular feature of Atapuerca is that the above-mentioned communication setup prominently features researchers. The history of this heritage site gives it a certain relevance for its approach and allows us to discuss some central aspects of its involvement in the collective construction of an archaeological PCS model such as: a) the impact on the heritagisation of a cultural asset that features the highest level of international recognition; b) the representation of the communication activity in science and technology, as well as its impact on scientific culture; and c) the place that the traditional viewpoint of popularisation understood as a model of simplification occupies in these discourses.

a) With regard to the impact that the communication model has on heritage, what emerges is the appropriation of communication as a central axis which appears to be directly associated with the concept of heritage as a public

asset, in direct connection with what UNESCO's 2002 reforms promote for world heritage assets. To generate genuine valorisation and social appropriation of a set of cultural assets "belonging to humankind," it is necessary to include it in the agenda of the citizens' debate, but also in the agenda of the different administration levels (local, regional, national). This can only be achieved through proper dissemination at different levels, as part of what is referred to as "good practices" in the field of public archaeology and cultural heritage, i.e. pro-active and dynamic management of World Heritage assets that addresses the diversity of communities and seeks strategies to make the majority of people feel represented and reflected by the World Heritage assets that are close to them [Castillo Mena, 2015]. In this work this is also understood in the framework of a contribution to the consolidation of a scientific culture as it helps the promotion of critical and analytical views on heritage, based on scientific knowledge.

b) The communication activity is considered in relation to an expansion of the scientific culture following the establishment of institutional structures that promote it and encourage scientists to increasingly interact with society. In Atapuerca, the respondents show that they recognise themselves as members of a project that was conceived as interdisciplinary from the very beginning, with an important institutional investment in the creation of expert areas and the establishment of a team that featured cooperative work between disseminators and scientists from the outset. The team adopted this approach over 40 years ago, well before it was included in the agenda for PCS policies in Spain. This is recognised by the respondents as the foundation of their current strong communication imprint, which they directly attribute to the co-directors of the project, whom they consider "pioneers." In addition, in the context of Atapuerca, they think that communication is supported by the (scientific) quality of the findings as well as the theme of human evolution, which managed to generate widespread public interest.
In this context, the professionalisation of Atapuerca's communication and the creation of a stable team for such purposes contributes to strengthening and providing opportunities to the project as a whole. Specifically in terms of responsibility, the respondents unanimously said that they accept it in the name of a collective interest to democratise the knowledge produced and make the project visible. In addition, the use of public funds gives them an increased social responsibility which they say has become a constitutive part of their activity as scientists. This imprint was not only constant over time, but it has also increased both qualitatively and quantitatively. The increasing scientific data was always processed through a communication perspective that made it possible to create a story about the past and the heritage, and progressively complete it. In this context, Atapuerca has posed a challenge for politicians and state institutions as well as for the researchers themselves. Cultural enrichment and the ability to make an impact are some of the promises they make facing the social importance of science and the great investment it implies.

c) Regarding the place that the traditional viewpoint of PCS, understood as a simplification model, occupies in these discourses, the findings of this study lead us to say that Atapuerca has developed in a different direction compared to other existing cases. For example, this case study does not reflect the contrast between the vocation of scientists to disseminate and the limitations

> arising out of a low interest in science from the Spanish society, together with professional promotion policies that do not prioritise dissemination activities. Previous studies showed that the majority of Spanish scientists were caught up between dissemination activities, governed by moral values, and a social and professional context that was not very favourable [Torres-Albero et al., 2011], while in the perceptions of this group of Atapuerca agents it is evident that they recognise that they are provided with a scenario that has been motivating them to include public communication among their responsibilities, making it one of the pillars of their profession.

However, also evident in their reflections is a certain reproduction of a PCS vision that identifies expert knowledge as genuine and pure [Hilgartner, 1990]. This reveals a vestige of the traditional way of seeing dissemination that points to simplification and an educational activity necessary for non-specialists that is carried out in two well-defined stages. First, scientists develop genuine knowledge, and then disseminators spread "simpler" ideas to the public. In this report, it is argued that any difference between the two characterisations is based on the dissimilarity between the original truths of genuine science and what is produced and communicated in social communication activities.

In short, this work provides an approach to the analysis of the current contexts of PCS, a situation that the stakeholders are aware of and which they expressed in their testimonies and reflections. Whilst this case provides some concrete contributions given its actions in the field, it should be acknowledged that in order to understand the complexity of the Atapuerca communication it is necessary to put it in the perspective of a broader investigation that includes and goes beyond the case itself, a process that is being carried out in parallel and that may be integrated in future projects. This work also proposes as a future agenda the development of similar studies that focus on other comparative cases and may expand the debate with more contextual data, which may or may not be related to patrimonial assets having the highest level of formal recognition, but that feature different agents who deal with a common example of PCS. These challenging exercises are necessary to provide reflections that put into discussion the communication theory and practice with respect to internal and external audiences.

This case shows the importance that the current processes of knowledge production attach to their own social relevance. This makes it clear that there is a significant change in the connections between science, the State, the market and civil society, scenarios in which scientific-technological institutions are understood as suppliers of strategic knowledge. The communication structure created around PCS in Atapuerca is a clear example of how important social relevance is in the research and work with cultural heritage. The commitment of the directors, the uninterrupted construction of a strategic communication model, the quality of the findings as well as human evolution as the main theme represent the cornerstones of an organisation determined to see PCS as an intrinsic part of their scientific activity.

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