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Sharing Society

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Sharing Society

The Impact of Collaborative Collective Actions in the Transformation of Contemporary Societies

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Benjamín Tejerina, Cristina Miranda de Almeida and Ignacia Perugorría
Editors

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The Impact of Collaborative Collective Actions in the Transformation of Contemporary Societies

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TRACK 6

Science and Knowledge

Citizen Science in Spain. Social Impact of Science-Society Collaboration

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Abstract: *It is now 40 years since Paul Feyerabend published Science in a free society (1978) where he denounced the surprising prestige of science in the West and its incompatibility with a democratic society. Since then, scientific experiences based on the participation in various forms of numerous citizens have continued to increase both in Europe and in the rest of the world (Haklay 2012; Irwin 1995; Irwin and Michael 2003; Lewenstein 2004). This communication has three objectives: 1) to identify the different forms of participation between citizens and scientists (Lafuente 2013; EU 2014); 2) to try to respond to the characteristics, means, purposes, social impacts and resistances of this form of collaborative collective action between citizens and professional scientists; and 3) to present the current debates on the role of participation of citizens in scientific projects in the scientific field.*

Keywords: *citizen science, collaborative collective action, social impact, mobilization.*

1. Introduction

History of knowledge is riddled with cases where personal interest and motivation have been the motor of innovation and scientific findings by people who did not possess specialist training. Cases such as that of Anton Leeuwenhoek, the Dutch tradesman who made several discoveries regarding optics, biology and physiology in the 17th century are examples of a situation that has frequently repeated itself.

After that, scientist William Wheewell organised numerous people from different backgrounds in 1835, to map the Atlantic coastline tides, mobilising thousands of *volunteers* to gather information with the purpose of preventing maritime tragedies.

The 20th century stands out for the exponential growth of examples of citizen collaboration with scientific experiments, health-related programmes or as source of information and data collection on matters of scientific interest. During the last five decades, scientific experiences based on citizen and non-scientific agent participation in diverse forms have increased in Europe as in the rest of the world (Irwin 1995; Irwin and Michael 2003). However, scientific dissemination and the current technological facilities have placed this collaboration in a whole new dimension.

Based on a few cases of citizen science, we have the aim of examining the forms of collaboration between citizens and scientists, to find out what the social impact is in a world protected by a particular worldview (*weltanschauung*) as is scientific knowledge. The aim of this communication is to explore the participation of collective collaborative action in some exemplary cases, with the purpose of finding out what the effects are of opening the doors of

science to citizens' regular active participation.

With this purpose, we will delve into different forms of collaboration between lay people and scientists, between ordinary knowledge (Maffesoli) and specialist knowledge. On the basis of a text by Antonio Lafuente, we will explore the difference between the figure of the amateur, the activist, the hacker and the scientist. Later on, we will focus on some characteristics, social impact and resistance found in three particular cases of current citizen science.

2. Some Issues Regarding Definition

The collaboration between science and society has extensive antecedents, as in history it is possible to identify numerous examples of amateur scientists and scientists who self-funded their own science: Isaac Newton, Benjamin Franklin, Charles Darwin. On occasions, astronomers and other scholars of the natural world have been driven to build their own instruments of observation or fund their activities through patronage.

The figures who were half way between professional and amateur scientist played a very important role in the creation of the first associations that promoted scientific activities for people other than just members (astrophotography, observation of the stars, oceanography, ornithology, etc.). In recent decades, thanks to technology and the means devoted to science and nature dissemination, there has been an increase in the tendency to blur the boundaries between amateur and scientific dissemination.

Many public organisations and academic and research institutions have opened a space for public participation. However, we must not forget that, although the collaboration between science and citizens is very old from the praxis perspective, from the perspective of the role of science in a democratic society and the need to democratize science, it is relatively recent (Feyerabend 1982). The first use of the term citizen science can be found in the magazine *New Scientist* in an article about ufology from October 1979.

After the analysis of three cases of interaction between science and citizenship (the use of pesticides and agricultural workers, mad cow disease and consumers, and chemical plant accidents and residents), Alan Irwin identified the following issues as relevant for debate: the ignorance of the public, the role of science in the process of decision making, the role of science in the improvement of humankind, the absence of values of science, the impoverishment when citizen participation is excluded, and how a better scientific understanding among the public can lead to better acceptance and support of science and technology (Irwin 1995:26).

Alan Irwin understands citizen science as the task of developing concepts of scientific citizenship that highlights the need for opening science and scientific policies to the public (Irwin 1995). This process would have two main characteristics: 1) science should respond to the needs and concerns of citizens; 2) the citizens themselves should be able to produce reliable scientific knowledge. There are other less ambitious definitions, such as that of ornithologist Rick Bonney for whom citizen science is any project in which non-scientists contribute voluntarily with scientific data.

Other definitions of citizen science seem more productive, such as Bruce Lewenstein's and its three dimensions (2004), and Muki Haklay's with its three levels of participation (crowdsourcing –sensor-; participatory science -defines problems and collects data-; extreme citizen science –incorporating citizens in the analysis, on top of the two previous ones - (2012).

In 2013 the European Commission stated that

> *"Citizen Science has been used to define a series of activities that link the general public with scientific research. Volunteers and non-professionals contribute collectively in a diverse range of scientific projects to answer real-world questions. Both citizens' contributions and researchers' attitudes encompass a wide set of activities at multiple scales. We find massive occasional virtual interactions on a global scale, but also regular proactive involvement in local environments identifying new research questions." (EU 2014:21)*

The question of the definition of citizen science has attracted the attention of numerous researchers from different disciplines, and has generated broad consensus on what could be denominated 'the minimum conditions of participation (basic requirements of citizen collaboration between the general public and scientific investigations) and 'the strong programme of citizen science (conditions and degrees of involvement of participants in the stepping stones of the process: definition, planning, systematisation, analysis, interpretation, implementation and follow-up of research results). However, the issues related to how we understand participation of the 'general public' and 'volunteers' in the scientific process remain far from a correct clarification and therefore, far from a minimum consensus.

In the enlightening article entitled "Amateur, activist and hacker: three ways of being in science", Antonio Lafuente identifies three figures/itineraries that have blown up the validity of an imaginary line establishing a strict boundary, severely scrutinised and defended between science and society (Lafuente 2014:1). Including the *amateur* –as well as women and *criollos*- in the scenario of knowledge is a matter of historical rigour, a duty of social justice and a need to

> *"overcome the crisis of representation, incarnated by politicians (the elected) and incarnated by experts (the selected)." (2014:2)*

The second figure, neighbouring the first one, is that composed by citizens turned into *activists*. Both citizens concerned about the presence in daily life of

> *"an endless number of substances, radiations, codes and devices that we can ignore less and less. (…) [That] not only modulate us, but sometimes determine us" (2014:3)*

'and workers testing, who are the overwhelming majority of scientists', mobilise, empower, undertake fights and global actions, resist or rebel, turning into activists who "have in common being able to compete against the experts for the monopoly on scientific discourse." (2014:4)

The third figure is represented by the *hackers*, who "initially defended knowledge from corporative appropriation", and who have ended up becoming advocates for the culture of *Do it Yourself* (DIY), forms of cooperation, practices of *garage*, *maker* innovation, free software, *open access* and the vindication of the *creative commons*. As pointed up by Lafuente, hackers commit

to sharing, to "the culture of mending, reusing, repairing and recycling" (2014:6). Practices and manifestations of hacktivism can take creative forms (doing things among themselves or with others) and transgressor forms (WikiLeaks, Cablegate, Falciani's List).

Table 1 presents a provisional classification of the different roles that citizens can play in the intersection between scientific knowledge and society. The Table identifies different combinations between: a) the different degrees of knowledge, b) the different levels of mobilisation, and c) the different levels of commitment with the principles of scientific culture.

	LEVEL OF KNOWLEDGE		
LEVEL OF COMMITMENT	LOW	MEDIUM	HIGH
LOW	LAYPERSON	ENTHUSIAST	EXPERT
MEDIUM	COLLABORATOR	ACTIVIST	HACKER
HIGH	AMATEUR	MAKER	SCIENTIST

Table 1. Level of Commitment versus Level of Knowledge
Source: Own elaboration.

We cannot stop and explain in detail the differences between each one of them, a matter we shall look into another time. In the remainder of this communication we will focus on the effects of participation of people who have collaborated in some way in the three cases of citizen science. We intend to rethink and systematize the impacts of mediation (workshops and projects) as a means to make possible the interaction between lay people and scientists.

3. The Impact of Participation in Three Cases of Citizen Science

We tentatively define collective collaborative action (CCA) as "the set of formal and informal practices and interactions carried out between a plurality of individuals, groups or associations who share a feeling of belonging or common interests, on the basis of collaboration with others, with the purpose of producing or stopping a social change through mobilisation of certain social sectors" (Tejerina 2010:19-20). Citizen science (CS) can be defined as a collaborative collective action (Della Porta and Diani 1999) of a specific type, by which agents from the field of research, technology and a section of the community engage in collaboration with the aim of overcoming a limitation in the development or implementation of a scientific project in one or several stages.

All three cases selected respond to activities of the Ibercivis Foundation[2], practices carried out by BIOOk; Biology by & for the people[3], and the development of the Project Mosquito Alert[4].

In this section we will look into six aspects related to citizen participation in the three scientific projects mentioned: 1) difficulties in mapping the territory of the CS, 2) issues referring to the definition of CS itself, 3) what is participation for in CS, 4) how does participation happen, 5) effects and impact of participation, and 6) resistance to participation. We are especially interested in the social impact of CS as defined in the literature about collective action (Giugni,

McAdam and Tilly 1999; Snow, Soule and Kriesi 2004; Whittier 2004; Giugni 2008; Bosi, Giugni and Uba 2016).

1. Mapping the territory. In recent years the cases of citizen science projects have continued to increase, as has the importance of science and technology in the formulating of problems and solutions to risks and challenges that concern specific populations and areas as well as the whole of humanity. The current debate on Climate Change is just another case, although possibly a paradigmatic one, in this complex relationship between science, citizenship and daily living. It seems only logical to dare saying that CS is a growing field whose boundaries will continue to expand in the future. Today it is still a "frontier territory" (E1), a disputed space that on occasions is not clear as there are no commonly-agreed criteria and, therefore, there is a "grey scale" (E1).

CS has had a modest start (E3), and although it certainly has numerous historical antecedents, the *boom* has taken place from the first decade of 2000, a little bit later in Spain. The reason must be found in the combination of three elements: great research projects, social networks and mobile phones with computer applications (E1). However, there are some areas where development has been greater: environment, biodiversity and astronomy.

The practices being developed are shaping two extensive fields (that do not necessarily need to be apart), the great projects and dissemination (E1); the latter particularly linked to the school environment. Although there are clear differences between what is research and what is dissemination (which in turn is also a blurred concept), the latter is increasingly being incorporated into the first, as part of the development and sustainability of research projects[5].

In spite of these changes, it is safe to say that some projects have a more scientific vocation, while others are more oriented towards dissemination or communication (E1) and to the "promotion of scientific culture" (E2).

2. Definitions of citizen science. Participation of ordinary people in CS projects adds a new role to that of amateur. While the amateur is someone initiated who has shown great interest or curiosity and has a scientific *background*, the layperson lacks this background –in principle-. A loose definition of CS would claim that this is a type of science that involves people to do/try/produce things using a scientific method (E3).

A very close definition to the previous one is that claiming that CS attempts to include the citizens for their contribution (E3). The question in this case is transferred to the levels of participation, as the participant can contribute to different degrees, moving up and down a scale of more or less involvement, both in frequency and commitment.

A step further in this sequence of collaboration may be given by the demand of a bidirectional communication between participants and scientists (E3). Bidirectionality requires the existence of protocols so that in the transmission of information the requirements of scientific process are safeguarded, information can be validated and, at the same time, the privacy of participants is guaranteed (E2, E3). A requirement often mentioned is the fact that CS should generate value for the community (E1, E2). The definition of CS which shares consensus among those interviewed is that suggesting the participation of different agents in the different stages

of the research process, generating value for the community and sharing the results with the rest of society.

3. The condition of sharing leads us to the 'what for' of CS. The general idea is that CS is necessary to "shake up science" (E3), to "incorporate persons who do not belong to the scientific field" (E2), which allows to "open a communication channel" (E1) with society.

It is interesting to pay attention to the verbs and metaphors used to refer to this process: "open the windows of the laboratory" (E1), "lay bridges to connect professional science and daily life" (E2), "open a can of worms" (E1, E3), "shift scientific method" (E2). Other ways of referring to the aims of CS are "share with the community" (E2), "to act as a listener to contribute" (E1) and "construct a virtual community" (E1).

In the background, a sort of counterpoint is underlying between normal science, practised by a professional scientific community who develop their work following the scientific methods behind closed doors, with its back to society, and CS, which is open to certain types of collaboration and to "awakening things we had previously put to sleep" (E2).

4. Some aspects related to participation. A recurring theme in participation has to do with motivation, which is hard to systematise, as there is a "diversity of motivations" (E1). In general terms it can be said that "people who suffer it get more involved" (E3). The literature on collective action has consistently pointed out the proximity to the problem as a source of motivation, what we know as NIMBY (*Not In My Back Yard*) mobilisation.

The key is to do it consciously (E1). The call may arise from the citizens, "people were starting to wonder and become interested" (E1), but to a greater extent it arises from science: "it is either done with the people or it is not done at all" (E1), that is, "we ask for help from citizens" (E1), which would involve a scientific motivation to solve their own problems. The result is that participation "reformulates our role as individuals" (E3).

If we establish a distinction between projects formulated *bottom-up* and those carried out *top-down*, almost all belong to the second category. The scientific world faces many problems to integrate citizenship into the scientific tasks, to the extent that there is important consensus in considering "*the problem* of acknowledging citizen participation" (E1). According to the testimonies of interviewed people, we are still far from a satisfactory response on how to proceed with citizen participation, integration into the process and acknowledgement.

5. The social impact of participation. The most visible effect of participation is the repercussion on the people, as "it changes your perception" (E2), it "empowers" participants (E2, E3), and some interviewees point out "the impact on the individual, the community and the environment" (E2). Participation "creates a fascinating community" (E1), although "the issue of personal data" is not easy to manage (E3) to comply with the legal requirements on data protection[6].

The most important effects, however, take place in the scientific field. First, on the role of the scientist, as "scientists also get transformed" (E2), "citizen science changes you as a scientist" (E3); it has "effects in scientific practice, which becomes more open to the unexpected, and it

is configured in a different way, non hierarchic" (E1). Second, citizen participation influences knowledge itself, as it "contributes to knowledge through more discoveries" (E3), and on occasions, "sharing improves the results" (E1). Third, citizen participation affects "the approach" (E3), introducing "greater complexity, which means more difficulties in management" (E3), it promotes that "projects become very transversal, and therefore you need a lot of experts" (E3); this brings greater "social return" as they are *win-win* projects (E3). Lastly, citizen participation forces the introduction of "methodologies for participation" (E1), resounding also in aspects such as "the legitimation of science in society" (E1), "the difficulties of funding science" (E1), and the "drawing up of public policies" (E1).

6. The participation of ordinary people in CS projects is not without difficulties, problems or conflicts. The most frequent is to come upon "barriers and resistance" (E2), situations that "generate conflicts", and "resistance in the system of scientific acknowledgement" (E1), as well as from part of the "scientific establishment" (E1), "in the use of social networks" (E3)

4. Debate and Conclusions

Field research has provided verified information about the limitations of participation of non-experts in the scientific process**,** ranging from validity and precision of the data generated by volunteers to legal and ethical problems linked to privacy. At present numerous projects are being carried out in the field of education, training and scientific dissemination, but with little evaluation of their social impact. Equally, we have little knowledge about the economic, social and cultural consequences of such participation.

Citizen science can be defined as the set of practices that take place on the basis of a shared curiosity, among science professionals and amateurs or activists concerned by a subject of public interest which leads them to get involved in the definition, planning, realisation, interpretation, dissemination and/or application of the results of a research project.

The joint exploration of the world around us has allowed to lay bridges and break down some differences between expert knowledge and lay knowledge, the distance between science and ethnoscience. Technology, for its part, has contributed to facilitating information exchange and data interpretation between the laboratory world and daily life. Without reaching a role exchange, the layperson can indeed come closer to the place traditionally occupied by the expert, and the expert, without ceasing to be an expert, can learn a lot from ethno knowledge.

Thus, different categories of actors emerge more clearly defined such as the *amateur*, pseudo-professionalised –DIY-, the *activist* both, from the point of view of the *scientist* as from that of the *lay citizen*, and those who claim greater participation such as the *maker* –who wants everyone to learn how to do science- or the *hacker* –those fighting for open science and its appropriation -.

Most cases of citizen science happen within the scope of the education system, an attractive arena to carry out collaborative experiments between teachers and students. Many examples of citizen science outside the field of formal education have a pedagogical and disseminating end, rather than directly scientific. The cases with a scientific end *per se* tend to concentrate collaboration in the process stage or in the post stage, rather than the design stage. However,

citizen science projects have a great impact in the planning of participation (Senabre, Ferran-Ferrer and Perelló, 2018), with the establishment of validation controls of the activities carried out by "nonscientific staff". In these cases, the scientific method adapts to the requirements of collaboration without relinquishing the verification of the correct implementation of "scientific objectivity".

From the significance for science, citizen science has not had a great impact in the scientific community (embedded), its repercussion has been greater among participants (embodied), and shows greater impact in the world of activism and social movements (actionable).

Based on the data provided by interviewees and the documental analysis from different projects referenced in the Report of the Ibercivis Foundation, it can be asserted that:

a) the biographical impact among participants of citizen science projects is remarkable (Lahire 2001; Martuccelli and De Singly 2009);
b) the repercussions on changes of organizational forms are scarce (Irwin and Wynne 1996; Rao, Morrill and Zald 2000; Novel 2013; Moore 2015);
c) the same goes for the emergence of scientific controversy and the role of science in social controversy, and in the redefinition of new rights (Gajardo 2015; Laval and Dardot 2015);
d) the emergence of new legal forms of regulation has not been observed (Hochschild 1997; Moreno 2012; Del Pino and Rubio 2016);
e) neither has the increase of resilience of certain groups (Sennett 2012; Conill et al. 2013; Tejerina et al. 2013; Della Porta and Mattoni 2014; Zarlenga 2015; Telleria and Ahedo 2016);
f) the scale of citizen interest in participating in scientific policy and in the democratization of scientific research and its results is very limited.

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6. Methodological Appendix

The information used in this communication comes from a) documentary analysis of various experiences, b) from the testimonies of strategic informants and experts gathered in individual interviews, and c) from the discourse of participating citizens in several cases with which different discussion groups have been made. Special attention has been paid to three cases of citizen science: the work carried out by the Ibercivis Foundation, the Biook, Biology by & for the people activities dedicated mainly to the dissemination of scientific culture, and the tiger mosquito project (Mosquito Alert) (https://www.gbif.org/dataset/1fef1ead-3d02-495e-8ff1-6aeb01123408/project).

7. Abbreviations

- **CCA:** Collective collaborative action
- **CS:** Citizen science

8. Biographical Note

Benjamín Tejerina is Professor of Sociology at the University of the Basque Country and Director of the Collective Identity Research Center. His research interests include collective action and social movements, living conditions and precariousness, collective identity, youth transitions, and sociological theory. Among his publications are Crisis and Social Mobilization in Contemporary Spain (edited with Ignacia Perugorría, Routledge, 2018); From Social to Political: New Forms of Mobilization and Democratization (edited with Ignacia Perugorría, BCUP, 2012); La sociedad imaginada. Movimientos sociales y cambio cultural en España (Trotta, 2010); Los movimientos sociales. Transformaciones políticas y cambio cultural (edited with Pedro Ibarra, Trotta, 1998).

9. Notes

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2 Ibercivis Foundation was founded in Madrid, on the 14th November 2011. Ibercivis Foundation has as its goals to continue its collaboration work with research and to carry out dissemination activities to give visibility to research groups participating in Ibercivis. More information is available at http://www.ibercivis.com/

3 BIOOK is a non-profit association that aims to promote social innovation, creating ecosystems for citizens to participate and enjoy scientific-cultural production, eliminating borders between biology and other disciplines. BIOOK is based on the Do It Yourself Biology movement (DIYbio) and on Citizen Science. More information is available at http://biook.org/

4 Mosquito Alert is a citizen science observatory to investigate and control mosquito-borne diseases. It brings citizens, schools, scientists and managers of public health and the environment together to combat the tiger mosquito and the yellow fever mosquito, vectors of Zika, Dengue and Chikungunya. More information is available at http://www.mosquitoalert.com/en/project/what-is-mosquito-alert/

5 These changes can be clearly observed in the evolution of the relevance of the broadcast, dissemination and sustainability in the calls for research projects at a national and European level.

6 Regulation (EU) 2016/679 of the European Parliament and of the European Council of 27th April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

TRACK 6
Science and Knowledge

Academies for Solidarity under the State of Exception in Turkey

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Abstract: *This paper examines the Academies of Solidarity founded by purged academics who signed a peace declaration and local political agents as collaborative collective actions in a context of deepening authoritarianism in Turkey. For more than two years, beginning right after the failed coup d'état attempt (July 15, 2016), Turkey has officially been governed under the state of exception during which the government made statutory decrees that are subject to no auditing nor judicial appeal by any means. With the implementation of those statutory decrees, they have massively been purged from Turkish universities due to their leading role in an initiative by signing a petition for peace as the armed confrontation between the state security forces and Kurdish guerrilla. Additionally, those who have lost their job via statutory decrees can neither leave the country nor can they work at private universities as their passports are taken away and they are blacklisted. In the presence of these repressive and discrediting measures, those academics have decided to turn this severe situation into an opportunity to produce knowledge out of the limitations and competitiveness of highly neoliberalized institutions. To that end, they founded 'academies of solidarity' in different cities with different forms depending on the local dynamics of each city and the organizations that act in solidarity such as unions, professional associations, students, citizens, international organizations, and gathered in order to respond to the judicial processes and the political repression collectively under the umbrella of these academies. Given that these practices aim to transform academic relations and knowledge production processes with other participants in a collective way, converting it into a reciprocal learning process instead of a top-down relation, it is crucial to analyze their effects in terms of resistance against democratic regression within the local realities of each city. Through in-depth open-ended interviews in four cities (Istanbul, Ankara, Kocaeli and Mersin), we also scrutinize to what extent academies of solidarity have become influential political agents not only against the persecution of academics but also against the ongoing democratic regression in Turkey and neoliberalization of universities.*

Keywords: *democratic regression, political repression, academics for peace, academies for solidarity, Turkey*

1. A Brief Historical Background

Throughout the up-and-down history of the Republic of Turkey in terms of democratic rights and freedom of expression, academia has usually been subject to repressive measures put into practice by regimes with clear inclination towards authoritarian rule. The traditional role of military rule on civil politics, widely attributed the role of a modernizing institution (Harris 2011: 203), led to successive interventions in democratically elected civil governments in each decade from 1960 on. From the single-party period of civil politics, which overwhelmingly bases

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