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## **Faune France: amateur naturalists' attachment and indebtedness in a citizen science biodiversity database**

### **Abstract**

Data monitoring by citizen scientists in the field of biodiversity is mainly achieved for free, since citizen science is primarily carried out by amateurs who are not paid for what they report. This lack of remuneration has been claimed to be either exploitative by those who study inequality of access and participation in amateur circles, or empowering by those who promote new digital solutions for naturalist reporting. In that respect, Faune France, a major citizen fauna database in France, represents a renewed relationship between amateurs and the general public through their contribution to this digital initiative. In contrast with explanations in terms of personal motivation or social stratification, participation in Faune France reveals a special attachment to the subject – birds, butterflies, frogs – and the obligation toward nature felt by contributors, shown by their desire to pass on their observations digitally to recipients who are for the most part unknown. Rather than a means of 'luring' amateurs when they give away information, commitments such as Faune France reporting is based on attachments to nature and others, and cautiousness in information disclosure. Data are given to an indeterminate other, be it a distant scientist or other participants on the internet. Hence the stress in this study on data sensitivity (given that the final destination of the data is unknown and there is a risk of it being misused), and on responsibility seen from the point of view of the contributing naturalist.

Keywords: Citizen science, Science and Technology Studies, Amateurs, Biodiversity, Digital database

### **Introduction**

There are conflicting social explanations for participation in digital participatory science initiatives, ranging from the view that citizens are hired hands or cheap labor for scientists lacking other resources, to the perspective that these initiatives allow 'local voices' and provide an equal opportunity to contribute to effective knowledge production in society (Gooding 1998, Lawrence 2006). This article seeks to tackle these contrasting interpretations of the general development of participatory science by examining how people actually participate in them using the case of Faune France – the biggest citizen science biodiversity database in France. The paper aims to challenge the contrasting explanations for motivations that on the one hand highlight the creativity of amateurs (Jennet et al. 2016) and typologies that link participation to ideal types (Millerand 2018), and on the other, the social reproduction of positions acquired in a social field (Bourdieu 1987) or by social capital (Bell et al. 2008). While crowdsourcing claims emancipation through open access to cyberscience by permitting the participation of all, whether scientifically literate or not (Strasser et al. 2019), these same technologies can also reflect inequality of access to activities determined by social stratification (Haklay 2016).

The Faune France initiative is inspired by open access digital technology, including the NatuList smartphone application. This article seeks to demonstrate that the conflict between proponents of the emancipatory ideal of open source and those who claim that social reproduction reinforces inequality of access misses the real meaning of free participatory biodiversity science initiatives such as Faune France: that is, a way to let oneself be affected, voluntarily or not, by the subject of one's passion, be they birds, mammals, frogs, insects, etc. I argue that the vocabulary of attachment and gifting of data more accurately describes what participation in Faune France represents.

My hypothesis is that participation in Faune France lies in a desire to contribute through a pragmatic activity, an attachment to the object of interest and an inclination toward giving. By definition, contributing to Faune France is non-monetary, even for professionals. No one is paid for the data they enter on Faune France. The language of economic or symbolic 'interest' (Buhot 1985), scientific capital (Edwards et al. 2018), or even social capital (Bell et al. 2008) is relatively foreign to the exchange that

occurs on Faune France, which is instead based on a freely given act. To do justice to the meaning attached to contributing to the database requires this free act of volunteering to be taken seriously, not understood as false consciousness, strategic behavior (e.g. to enhance social networks), or a lure.

France has no public or private overarching system to host or support locally organized citizen science protocols. The multiplicity of protocols arises from a fragmented landscape of naturalist organizations, with the exception of 'Vigie Nature', which hosts two dozen of them. Science and technology studies (STS) have shown the importance and ubiquity of these information infrastructures (Bowker and Star 1999), which have no clear center or periphery and are macrostructured by the addition of local practices. This is especially so in the case of Faune France, which encompasses the whole spectrum of fauna, unlike other French protocols that specialize in one taxonomic class or category (birds, mammals, insects, etc.) The literature on information infrastructure tends to unpack this ubiquity by performing an inversion (Bowker and Star 1999) to look closely at their design and restore the context of the forgotten negotiations between the founders. These infrastructure studies focus on the deconstruction of the database architecture, but seldom analyze the behavior or identity of the users.

Describing engagement is problematic with Faune France as there is a relative absence of a naturalist social community or bonding. Faune France was conceived without an ad hoc chat system, in contrast to other digital platforms such as that launched by the Cornell Lab of Ornithology. People participating in Faune France hardly know each other and the system of distinctions that occurs in naturalist clubs (e.g. spontaneous classification regarding who is an expert and who is not) is largely absent.<sup>1</sup> This involvement in an unknown community requires a specific attitude toward one's engagement, which I suggest describing as attachment in the sense of Hennion (Hennion 2007, Gomart and Hennion 1999), as well as indebtedness toward others and animals. What counts is the attraction to – and the perceived responsibility for – the object of passion: music or drugs for Hennion and Gomart, birds or mammals in this case.

To explore these questions, this analysis starts by describing the conflicting social interpretations of Faune France as digital citizen science, and then develops a theoretical framework based on a sociological survey of a sample of contributors to this French database. Focusing on the question of equality and inequality in citizen science contribution, so pervasive in social analyses by both proponents and critics of public participation in scientific research, this article then discusses the terms of attachment and indebtedness, in contrast to the traditional opposing views of this community of amateur biodiversity researchers.

### **Analytical perspectives**

Of the approaches that rely on a limited set of social factors to explain engagement in biodiversity databases, two conflicting reasons are typically invoked. Open access enthusiasts, particularly advocates of participatory science, argue for the decompartmentalization of those contributing to scientific production and the potential for broad-based and ongoing participation in scientific activity (Dickinson and Bonney 2012a). Advocates of analysis based on social variables adopt a critical discourse on technology-driven inequality (Hacklay 2018, Edwards et al. 2018) in terms of access, engagement and interest shaped by a science that reproduces the boundary with civil society.

The very infrastructure of citizen science, simultaneously dedicated to science production, citizen involvement and informal learning, transforms a theoretical question – science versus society, as well as the old assumption that scientists are exempt of emotions, social influences or bias – into a practical one. In science in particular, the act of volunteering can be described as instrumental – a means to a goal – or as transformative, i.e. a process of change (Lawrence 2006, p. 282). Citizen science proponents refer to a ladder of volunteering, triggered by the free will to offer technical assistance at one end and powered by a transformative experience at the other (Dickinson and Bonney 2012b). Faced with the obligation to combine lay and expert knowledge, which STS literature argues leads to a

risk of misunderstanding (Wynne 1996), citizen science involves resolving theoretical questions in practice. It merges, in a do-it-yourself mode, two realities: the sphere of academic knowledge and the sphere of social concern and involvement. These spheres have overlapped in numerous inclusive socio-technical infrastructure systems (Peltola and Arpin 2018). Over the course of its recent existence, Faune France, like many other participatory science initiatives, has avoided a clear-cut abstract conflict between science and society by rendering this encounter a matter of daily activity that plays out in the detail of practice.

One of the cornerstones of the controversy around the social interpretation of citizen participation is that an activity carried out not as a profession but during one's free time is even more receptive to explanation by a set of social factors when it is not framed by a job position or social constraints (Bourdieu 1987). For a first trend of explanation in positivist sociology, judgement and taste in particular, in our case in respect to nature, are determined by either personal strategy or position in a social field. By definition, free time is different from time spent on obligations: family, work, buying essentials, commuting, etc. Hobbies and avocations are usually explained primarily in relation to socially or strategically determined personal expectations fulfilled by the activity. However, my focus is to describe engagement occurring during the course of involvement (Akrich 1992), rather than on social determinations stemming from the prior distribution of the dispositions of volunteers in a system of interrelations; this structure of social relations is relatively lacking in the case of Faune France. My approach restores the element of risk in the act of involvement, rather than the fate implied by deterministic sociology when focusing on the reproduction of habitus or inequalities.

Faune France, as a technical platform, was designed as an easy-to-use digital reporting system for fauna that requires a minimum of time and equipment and a minimum of contact with nature. Most people are able to take part in Faune France during their free time.<sup>ii</sup> According to the designer of its internet platform, it kills two birds with one stone: replacing or standardizing the old recording systems of naturalist clubs and making data available to all without the obligation to join a naturalist association.

As suggested by sociologists of amateur activity (Gomart and Hennion 1999; Bell et al. 2008; Stebbins 1992), initiatives such as Faune France include contributors who are serious about what they do. Accepting self-discipline in their free time can be compared with constraints to their identity at work, or how their education has influenced their values, attitudes and fulfillment. But the difference lies in the fact that in citizen science this is done less for the purpose of symbolic distinction in society than to contribute to science and knowledge production. Participating in Faune France requires following a simple observation protocol, and contributors agree to comply with these guidelines. Free time does not mean free of constraint: the hobby is demanding. It requires intentional investment and personal commitment: in other words, participants are volunteers, a word whose Latin origin *volontarius* means 'wanting to'.

In the second positivist sociological explanation, for the proponents of free and/or strategic actors, personal motivations play a key role in guiding action. But how to identify these? The question of motivation in citizen science has been approached in a more or less causal way (see the two issues of *Journal of Science Communication* dedicated to citizen science, 2016). What makes citizens take part in participatory science? Land Zanstra et al. (2016) adopt a deterministic vision, stating that:

Some participants become involved because they want to contribute to scientific research or to [protect] the environment. Others are motivated by an interest in the scientific topic, in the specific project or in science in general. Other reasons to participate are because volunteers find the citizen science activities enjoyable or fun. Another reason may be because they like the opportunity to get involved with other people with similar interests, either tangibly or virtually through blogs and forums. (p. 47)

In the context of citizen science databases, this positivist version of action emphasizes motivation as an initial intention, at the first contact with citizen science or the subsequent reporting following this. The vocabulary of motives aims to order engagement in citizen science according to reasons, which then define profiles. Rotman et al. follow the work of Batson in identifying the following motives: egoism, collectivism, principlism, altruism (Rotman et al. 2012).<sup>iii</sup> These profiles are presumed to describe the character traits of contributors, which can be easily cross-referenced to social stratifications.

For activities that are intentionally chosen, such as hobbies, understanding one's reasons for acting is not static, as hobbyists can reflect on why they got involved while doing the activity. It is more a question raised by sociologists or citizen science promoters who want to recruit participants; the contributor's understanding of the meaning attributed to his/her action is not necessarily what he/she may have had at the time of initiating the action. In this perspective, Schutz distinguishes two sides to the notion of motivation: an intimation of an action projected in the future (an 'in order to' motive) or a retrospective rationalization of an action (a 'because of' motive) (Schutz 1953). The reasons for acting documented in sociological studies of participatory science belong to the second category (Land Zanstra et al. 2016; Triezenberg et al. 2012). They are not the reasons the participant considered in the process of acting, to ascribe meaning to his/her ongoing action, they are reasons given in surveys or interviews carried out afterward, as retrospective explanations, in a context where the citizen was asked by a third party to account for the action. Motives are actively sought by sociologists (Jennet et al. 2016) or citizen science proponents to make sense of the behavior of those they want to investigate, but in their own frame of reference and for their own purposes (e.g. to attract newcomers, to retain active participants, to understand citizen science in sociological terms, etc.).

Schutz sheds light on the extent to which the social portrait of the volunteer is based on an inherent rationalization of social life, faced with the need to create operating categories as guides to intersubjective relationships with any social actor, scientific or not. As a result, the discordance between social stratification and open access is reinterpreted not only as an epistemic conflict in sociological method – one focused on inequality and the other on the promise of the internet – but as two ways to attribute cause to the behavior of contributors in participatory science.

To explore whether social stratification or the promise of emancipation helps to understand the practice of Faune France, the literature in the field of STS can reorient this confrontation between social stratification and open access, addressing the issue of attachment to the object of interest that is so important in amateur activity. As stated by Hennion (2012 p. 1–2):

That is the problem with words like habitus, motivation or interest: their first move is to cut the fact of liking or valuing from the thing or the practice being liked or valued, in order to define a modality or a proper logic of attachment in general.

An attraction for birds, a species of mammal or a group of insects is just beginning to be viewed as one of the principal characteristics of engagement in citizen science (Brossard and Lewenstein 2005; Charvolin 2011). Through the concept of attachment, sociology can restore the relationship to the object, so that interest, motivation and habitus depend on the type of object they relate to: a music lover will not have the same attachment as a cooking enthusiast, who will have a different engagement than a bird spotter. In each case, the object matters in the sociological description of amateur activity. The exclusivity of attachment to the object of passion is, however, seldom taken into account by proponents of digital citizen science, who spend a considerable amount of time 'objectifying' their data. As Daston and Galison (2007) have shown in an approach of 'mechanical objectivity', the active work of passion is systematically avoided in the presentation of data. Ellis and Waterton (2004) have demonstrated how the embeddedness of practice was removed from requests made by volunteer

naturalist managers in UK agencies, and this can be extended, as subjective information is omitted in most of the literature published in natural science journals.<sup>iv</sup> Scientists acknowledge the importance of a passionate attachment to fauna or flora that inspires those who become amateurs (from the Latin for 'lover': someone who does something for love rather than money), but they systematically exclude this subjective interest in order to present apparently neutral data.

In addition to the various forms of attachment, this interplay of embeddedness and disembeddedness has been described as a matter of giving, going beyond a relationship of exchange. In the case of Faune France, I argue that the context of digital connection with strangers is reinforced by an attitude of offering data for free, with the sole expectation that the data will be correctly handled. This indebtedness felt by participants is similar to that found in Liep (2001) for birdwatching. The apparent 'uselessness' of this data in terms of capital, scientific accuracy or social reward thus requires an exploration of what free exchange means in Faune France.

### **The case study:**

#### *A sociological study of Faune France*

Faune France is a national biodiversity database that aims to record all taxa of fauna. It was organized by a consortium of non-profit organizations and is operated by the French Bird Protection League (Ligue pour la Protection des Oiseaux: LPO), which was created at the beginning of the 20th century. Since 2015, Faune France has been governed by a steering committee made up of all its member organizations (49), with the help of a technical committee called Cotech. The web database was launched in June 2017. Since then, more than 10 million data records have been collected, plus 1 million photographs, from more than 25,000 contributors.

This sociological study of the contributors to Faune France began in 2018. I have been a member of the LPO since the 1990s<sup>v</sup> and work in a team of researchers that includes an engineer in social statistics and a geographer. The first step of the study involved conducting interviews of all Cotech members. The data posted in 2018 was then analyzed to create profiles of the participants according to the metadata left by their connection to the database. Next, a questionnaire was designed that was filled out by 1469 participants, ensuring the statistical validity of the responses.<sup>vi</sup> This body of data was then used to investigate the genesis of this information infrastructure and its inversion (Bowker and Star 1999), its relative success in terms of its public, and the importance of its role as a civil society organization in the production of biodiversity data in France (Fortier and Alphandéry 2011).

Like the British Trust of Ornithology and other NGOs or platforms, it is not relevant to describe Faune France as a top-down or bottom-up organization (Lawrence 2006). As previously mentioned, this infrastructure has no center and no periphery. It operates with numerous local web portals, each with their own specificities (such as the possibility to report on fish on certain portals and not on others), but all made interoperable by their use of the same Visionature platform. Four levels of portals are available for recording data: the 'Naturalist' smartphone application, a 'Oiseaux des jardins' portal for garden birds, numerous 'Faune locale' portals for local fauna, and 'Faune France' at a national level. It is more useful to describe its origin and development in terms of a mix of networking of existing local naturalist organization databases and its openness to the general public via digital technology and the cloud. The members of the Cotech have the role of ensuring this dual nature of the database. While many consider the database's open access an advantage, this aspect also triggers criticism by some Cotech members concerning the private status of the data collected, the unequal ability of the public to interpret it, and the necessity for each member organization to adapt the data to different targets according to the stratified nature of the information demand.

Faune France's heterogeneous nature reflects its history. It arose from a network of naturalist organizations (around 30) that the LPO first brought together in a meeting in November 2013 with the aim of creating a monitoring system of fauna in France. The Faune France database was the main tool of this monitoring infrastructure. It has been instrumental in slowly increasing the interoperability of most French naturalist associations' fauna databases developed locally since the end of the 1990s. The solution of a unique, global database came from the Swiss firm Biolovision, which devised an internet platform called Visionature for submitting, managing, circulating and banking raw data between naturalists. The platform was adopted in the Alps region in 2003 and spread to other regional organizations shortly thereafter before becoming the national standard. It drew on internet developments to dematerialize the storage capacity of data on the cloud. Only later was it promoted as a portal for the public visualization of data, though its users challenge its performance in this capacity even today.

In 2015, an organizational charter was established to register the associations that wanted to be involved in Faune France and use Visionature. Registration and compliance with the charter are mandatory to take part in the management of the database. This organization is unusual in comparison to other large biodiversity databases (such as the Local Environmental Record Centres established by local authorities and the National Biodiversity Network in the United Kingdom [Lawrence 2010] or the Cornell Lab of Ornithology), and leads to the cooperation between organizations of different sizes, practices, scientific fields, revenue types and philosophies.

It is worth noting that the local origin of the Faune France database mirrors the embeddedness of its data: it was produced by local networks of amateurs who know each other and who are used to producing data in relation to managing social status, affective relationships, etc. (Fortier and Alphandéry 2011). At the same time, Faune France has evolved from this database model based on the internal management of amateurs toward an infrastructural database that is online and open access, which involves another type of sociable capacity, other ways of legitimizing information, and another interpretation of raw data.

#### *Involvement in Faune France and the question of equality*

Contributing to Faune France databases requires only registering online, spotting taxa, and reporting them on the website. In this way, participants collectively orient the data gathered by the platform, and the platform frames what is collected. This dual process has been described as platformization (Hagen 2020). The architecture embodies the promise of open access, disembedding the strong ties of naturalist associations and, presumably, freeing up involvement in naturalist reporting and loosening its commitments. This opens its scope to new users, creating a contagion of practice (Triezenberg et al. 2012). As a member of the Cotech explained, the value of data provided by an amateur to a naturalist association was previously embedded in a context of relationships and the status the amateur had with the association. With Faune France, data is validated by an anonymous proofreader, which can trigger tensions with some participants from naturalist associations.

This action at a distance, with fewer occasions for sociability, especially via the smartphone app (Land Zanstra et al. 2016), has resulted in the creation of a relationship between those who are strangers to each other. Our sociological survey attempted to characterize these unknown contributors to Faune France, finding that the typical participant is male, well-educated and older, retired or working in intellectual professions (SOFT Report 2020). This investigation of the participants is made central by the fact the initiative is open access and promotes the contribution of everyone: anyone is theoretically able to take part. Compared to a model based on strong ties specific to the naturalist movement – familial, clubs, etc. – it breaks with cronyism and allegiances of all kinds, offering the 'freedom' to contribute without the obligation to make a major commitment as a condition of equality for all.

Proponents of open access push the idea of formal equal access to contribute, and even social scientists critical of this, share this goal when they measure the distance remaining to reach it. Both groups are interested in the a priori conditions of potential or actual participants. In contrast, our sociological survey explored whether or not Faune France achieves 'processual' equality by working to ensure an equal footing for participants in the course of its activity. The resistance of the Cotech members and many other participatory science structures to categorize differences in the conditions of the contributors (Charvolin 2019) is directly opposed to social stratification analyses, but it is fueled by the same ideal of a layperson's freedom to move, think and act. It is driven by a belief in a blank slate on which knowledge can be imprinted for some, whereas for others, it has become blank through progressive detachment from prior determining factors. For Bourdieu this detachment is a horizon never reached, and it requires the sociologist to objectify it to be in a position to deliver knowledge about it (1987). In contrast, advocates of open access assume that conditions are attributed equally, and they argue for the potential of socio-technical systems to increase scientific literacy, even though an analysis of social stratification reveals the shortcomings of this position. In both cases, equality in conditions, and not 'conditioning' (Gomart and Hennion 1999, p. 227), is the shared perspective – either taken for granted or systematically criticized as lacking.

#### *Understanding involvement by unpacking what happens in contact with nature*

To escape this circular reasoning, it is interesting to focus on how involvement in Faune France changes participants' positions. A relevant question is not how previous ties, whether related to class, family or location, are shed, or how to start anew as a blank sheet, but how these ties can be reassembled and enriched through observation practices. The amount of time and types of focus devoted to activities in nature are key dimensions for a sociological reconstitution of the significance of participant involvement.

This suggests that involvement in Faune France implies a certain training. The act of reporting is not just an online pastime, theoretically accessible to anyone, or a hobby related to class, such as a socially marked taste or cultural value. According to the answers to our study, reporting on Faune France is linked to previous experience observing nature. This requires action, i.e. a form of doing based on physical engagement, cognitive availability, and the time to engage in the activity while out in nature. Another dimension that shows how involvement in Faune France helps realign participants' positions is the frequency of nature outings, which is of course linked to the number of contributions. These elements indicate that more than 80% of contributors had gone on nature outings during the past year at the time of the study. This activity requires certain skills, linked to a given protocol (e.g. for garden birds<sup>vii</sup> or a list survey<sup>viii</sup>). In addition, naturalist observation is usually practiced alone, and is thus not an occasion for bonding with others. The significance of this very contact with nature, which most participants declare having long practiced, but with more intensity since participating in Faune France, requires further description of how these contacts take place. Participants were significantly more likely to declare observing methodically the more they go out in nature. This suggests that those who observe regularly and frequently have acquired an observation methodology that explains the freely offered self-discipline to comply with objective data production.

So if the question shifts from formal equality in social conditions to what kind of action is required to participate in Faune France, the active nature of the involvement is highlighted: i.e. outings, expertise, methodology, etc. Involvement in Faune France can then be defined as a matter of acquaintance – a certain familiarity – with action and nature, rather than as a mastery of biodiversity knowledge or science capital or as a universal skill to learn (Edwards et al. 2018). The key is knowledge by acquaintance (James 1890), in which what is experienced is more important to consider as an attitude of doing rather than a condition fixed by a certain capital or a matter of equally shared free will toward individual knowledge acquisition.



### *The untold story of Faune France: attachment to fauna*

A critical dimension of Faune France reporting is the general disinterest toward the embeddedness of data, present in the way the protocol is organized and perceived. One question in our survey asked contributors if they would like the database to consider other features or aspects of their involvement. Only 10% declared they wanted to add other details, a low level of concern that I will come back to. Below is a list of some of the suggested additions.

- Bird behavior – detailed description when not sure of the species
- Interactions in which the observations take place (with family, colleagues or friends) as well as aesthetic judgements
- Ability to directly add details about the use of playback (playing a recording of a birdcall), for example
- Better data exploration and visualization (for example, currently there is an inability to zoom to a local area to see all the observation sites of a species or to sort all the data by bird pellet analysis: this prevents using Faune France for personal studies)
- For insects, the ability to add notes in a specific field about host plants
- Weather conditions during the observation
- Details about the climate, human presence and practices that have an impact on nature (e.g. to indicate hunting and fishing, excessive visitation, fires, litter, etc.), as well as the presence of predatory domestic animals (in particular, domestic cats)
- Level of attention (to observation)
- For some observers, fishermen, for example, the ability to detail the behavior and interactions with fish
- Abnormal behavior of certain species as well as their reactions to human actions (feeding, presence, noise ... in particular the sound of the piano, which modifies the frequency, intensity and quality of calls)

Note the importance given to details regarding accuracy: the specific setting of the observation, such as information about the biotope, or the company in which the observation was made, or information about human interactions with the observed species. These are all examples of specific attachments that are omitted in the standardized form of Faune France, as it was designed by participatory science proponents for data deemed extractible.

The rather small percentage of participants who felt additions could be made to the information required or permitted by the Faune France database can be explained by the fact that skilled participants develop a mastery of tacit meaning and know-how that gives them a common ground with other members of this loose community, obfuscating the disembodiedness that it requires.<sup>ix</sup> This disinterest in process diverges from the claims of open access advocates, for whom a major goal of citizen science is to sensitize the public to knowledge production and biodiversity conservation. Indeed, if sensitizing involves raising consciousness about scientific work, biodiversity classification and so on – that is, emancipation from a state of ignorance – the disinterest mentioned above indicates an ability to shut down channels of consciousness: for example, the retrievability of tacit knowledge once learned. This very omission can be considered a skilled performance.

### *A relationship of indebtedness*

The relative disinterest of contributors in the practical accomplishment of what they ‘do’ has been described as their reluctance to see ‘data’ as socially constructed by the design of protocols and the performance of observation. For a relatively large group of participants, reporting is an enterprise that requires serious mastery over practice, despite it being free in the primary meaning of the word: an act that is not involved in earning a living for the contributors. For as many as 22 % of contributors who responded (with the possibility of multiple choices) observations were made during work time (Fig. 4).

**Fig. 1 Your observations are made**

	n	%multi
As a hobby	24006	98
During your work time	5438	22
As a family (with children)	5895	24
As a family (without children)	1973	8
As a couple	7221	29
Alone	21155	86
With friends	8099	33
During organized outings	6807	28
Within the framework of a protocol	11012	45

Thus, the offer of freely given effort does not only involve observation by those who are not working, such as retirees or students, although they are an important segment of the contributors to Faune France. From the point of view of participants, free effort is what defines the link between contributors and Faune France, regardless of the context in which they report; thus the trend among sociologists to describe it as an illusion, masking symbolic retribution (Buhot 1985), or as an unconscious influence (Triezenberg 2012, p. 217).

An alternative perspective treats data as something given in the sense that contributors share something with strangers online with no expectation of direct return, be it symbolic or relational. Contributors to Faune France explained that they get involved not only to share the ‘gift’ with their own community, but also with strangers, such as anonymous people involved in promoting science or nature conservation. They do not perceive themselves as part of a system of direct reciprocity. Most declared that they share information with a community of observers or to create a personal observation logbook. Of the 80% of contributors who shared their data, 61% submitted it in a non-reciprocal way: i.e. providing it to another unknown observer. While the majority stated that they wanted to share information with the extended community, it should be noted that this is not a community of direct contact like a family, but principally a mediated community of anonymous ‘others’ (Fig. 2).

**Fig. 2 You share your observation data:**

	n	%multi
On a naturalist internet portal	16364	67
Between friends and/or family	9027	37
On a photo sharing site	2229	9
In publications	1319	5
On social networks and/or a blog	3691	15
Via discussion forums	1086	4

Most contributors (a score of 67) shared their data on an internet portal and some (a score of 15) on internet social networks, which are weak ties in comparison to family and friends. So the attachment described in the previous section is enriched by a gift to a stranger, who is not in a relationship of affiliation or mutual allegiance with the contributor. Interviews with 15 photographers who post photos on Faune France confirmed that they do not use this database for bonding or social relations. If they want to discuss their nature observations, they post their photos on other platforms such as Flickr, personal blogs or Facebook. Reporting on Faune France is seen strictly as sending data for the sake of giving it to a virtual community. Hence the importance of understanding the sense of obligation linked to this gift to strangers.

*The obligation to report or conceal: data sensitivity*

This introduces another aspect of offering data as a gift, which is the reason why being fooled is so often contingent to these relationships: the gift is given by one person to another, but it is neither claimed nor returned except eventually by a third party. Thus, the very nature of ‘giving’ biodiversity data in a voluntary relationship in citizen science implies more than a dual relationship. Data can be used in unexpected ways. The Cotech members stress this when they express fears that at any time the circulation of the ‘gift’ could be interrupted and the data could be transformed into a market commodity. This point is also mentioned by Lawrence (2010, p. 255). So what compels participants to report, given the risk that what they consider as open data may be misused by the receivers, precisely because of its openness and the absence of control?

An element of an answer lies in what motivates the cautious release of data by participants. Contributors exercise self-censorship in their reporting of data on Faune France, which indicates that they observe more than they report and keep certain sightings filed in some other storage system (for example, notebooks, on their computer, etc.). The study found that 41% of contributors did not report sensitive data (Fig. 3).

**Fig. 3 Do you report data that you consider to be sensitive on the Faune France network?**

	n	%
No	7441	41
Yes	10789	59
Total	18230	100

Many contributors seem to be aware of the dangers involved in putting sensitive data into circulation for possible misuse by hunters or other naturalists who may not have the same ethical behavior toward nature. The urge to release data, but with caution, corresponds to a scientific pattern described by Isabelle Stengers: the fact of being indebted to what compels you (Stengers 2015). Participants feel affinity for certain species, making them spokespersons for the frog, the fox or the robin, for whom they feel a responsibility. They report their sightings accurately, passing on the gift that these non-humans have given them by letting themselves be observed. The aesthetic moment of the encounter translates into this emphasis on sharing data. This awareness is highest among people who work in jobs related to the environment, whose reporting of sensitive data is 26% higher than the average. But the level of contribution (the intensity of involvement in Faune France) is a better candidate to explain this awareness. This is shown by a cross-analysis of the number of contributions to Faune France (based on the number of sightings reported in 2018) and whether contributors report sensitive data (Fig. 4).

**Fig. 4 Number of annual contributions to Faune France x Reports sensitive data**

	No	Yes	Total
More than 1000	9	91	100

Between 100 and 1000	28	72	100
Less than 100	50	50	100
Together	41	59	100

Of those who report sensitive data, contributors with more than 1000 sightings are overrepresented by 32%, and those with fewer than 100 sightings are underrepresented by 9%.<sup>x</sup> The more participants contribute to Faune France, the more they are knowledgeable, the more they are likely to feel obligation to report, like a debt felt for fauna; but also the more they are cautious to report properly considering data sensitivity an issue.

But there is another dimension of obligation and concealment of data practiced by participants. The open release of information on nests, or the spotting of rare birds or mammals can lead to the database being used by people who do not feel the same debt to nature that the participants share for the most part. These users do not feel compelled by the same cautionary behavior toward nature and can undermine the meaning of the gift given by Faune France participants. The following quote from a contributor illustrates their reasoning why the gift should only be transmitted to strangers sharing the same sense of gift-receiving and gift-giving:

*Through personal experience, following the disclosure by a friend of the location of a rare species during a sensitive period (feeding the young), we saw people from all over France show up, with a more than dubious respect for the species (even though they were from the LPO) ... it was a lesson for me! Unfortunately, many of my friends have had similar experiences. What's more, the people monitoring are not always 'well chosen', putting their own interests (taking photos, showing the species to others, tickbox spotters, etc.) before the interests of the species. So I'm a little reluctant about sharing information, at least at the time of the sighting, but why not after a certain time lag, once the sensitive period is over.*

Contributors did not question the usefulness of their reporting because, as mentioned by Godbout (2000), in the process of giving, they acknowledge the emotion, sense of connection, care, etc. that they felt by observing and want to pass on. So, what is 'given', the data, is also a result of the spontaneous pleasure that they felt in the field while identifying a species. The spontaneity and the enthusiasm behind the act is part of the gift (Ellis 2011, Bell et al. 2008). Many naturalists want to make this spontaneous emotion available to others, and thus seek to protect the observation site.

## Discussion and conclusion

This article presents a sociological study of contributors to a biodiversity database, exploring aspects seldom considered by those who promote citizen science. In the final section, I would like to discuss the global implications of the paper's focus on attachment and indebtedness of amateur naturalists.

The relative disinterest of those who promote citizen science concerning contributors' characteristics arises from a general priority given to raw data. In contrast to findings by digital citizen science proponents, the analysis of this paper focuses on attachments, such as the different forms of cognitive and emotional acquaintance with nature, which are traditionally reserved to metadata. For Geoffrey Bowker, "Metadata ('data about data') is the technical term for all the information that a single piece of data on the internet carries with it in order to provide sufficient context for another user to be able to first locate it and then use it" (Bowker 2008, p. 116). While metadata is generally used only to reduce

friction in the circulation of raw data, I have operated an infrastructural inversion (Bowker and Star 1999) to put it at the forefront, transforming what is usually omitted into a valid end product of a database. This inversion is a methodological shift restoring the embedded and contingent features of what the infrastructure presents as a fact. It inverts data that is taken for granted as an unquestionable token in the sense of Rosenberg (2013). In this way, my analysis proposes a different take on data compared to traditional studies of proponents of digital citizen science.

In addition, as mentioned in the empirical section, the paper looks at another kind of disinterest to what is embedded in data production: the disinterest of contributors in reflecting on their practice. Their silence on the practical process and achievements of data production raises questions, in particular because they are the first concerned by data reporting. The notion of indebtedness proposed in this paper aims to clarify this silence. I argue that data circulates in the network as a gift, an acknowledgement of a debt to animals and to others, and does not rely on a reciprocal exchange between people who know each other, prefiguring the possible commodification of the data. The freedom of data disclosure to others the contributors do not know, implies that nothing is expected in direct return, and that the receiver is released from the obligation to give back, while the giver may wish (but not expect) a return at a later point (Godbout 2000, p. 264). In order for this gift to strangers – what I call a relationship of indebtedness – to be effective, the relationship has to be implicit and unmentioned. Speaking explicitly about it would break this very unique link of no expectation in return. This explains the relative disinterest in providing an exact account of the relationship.<sup>xi</sup>

Returning to the added value of the notions of attachment and indebtedness, sociologists of science have underlined the fact that data is ‘obtained’ and is not exempt from construction (Latour 2007,<sup>xii</sup> Bowker 2008). This paper stresses another aspect of contributing to Faune France, which is apparent in the etymology of the word ‘data’. The Latin *datum* means ‘given’, recalling the notion of ‘gift’. The fact that involvement in Faune France relies on effort freely given is a major aspect of contribution to this initiative. This origin is mentioned by Rosenberg (2013) and Kitchin (2014), but without developing the concept further.

Envisioned in the perspective of attachment and indebtedness, contributing to Faune France can be seen as a potential site of inequality, since giving is an acknowledgment of an asymmetric relationship as opposed to an equal interaction. But my analysis is not amenable to a deterministic framing of Faune France as a site of social reproduction. Social stratification analysis would explain the volunteers’ silence about the way they contribute in practice as a vivid example of the deception of their claim to act and engage freely. Pierre Bourdieu has claimed, in particular for hobbies and activities involving personal taste, that freely given effort is in fact an unconscious behavior defined by one’s position in the social hierarchy or group (Bourdieu 1987). My analysis takes into account this constant possibility of being ‘lured’ to be a contributor to Faune France, as well as the dichotomy between what is experienced by a volunteer and the proposed explanation of his/her behavior by a third party (Triezenberg 2012; Edwards et al. 2018, p. 383). But there is a twist, in the fact that this lure is not a fate – explainable only by the sociologist whose knowledge is detached from the common sense of the actors – but a risk, consciously taken by those who are attached to animals and others and contribute to Faune France for this reason. Giving is a way of trying to ‘pay back’ the indebtedness that someone feels for the animals he or she observes, and so accepting to be fooled at the end (Godbout 2000, p. 248) in the sense that ‘giving’ may in fact be a trick by the recipient to gain something for free (for example, in the case of Faune France, to collect millions of data records at no cost), which implies not rewarding others who should be paid for doing this job.

This relationship of attachment and indebtedness leaves open the possible significance of contributors’ actions in terms of being manipulated as cheap labor (Kennedy 2016, p. 38) or truly empowered. I argue that these opposing perspectives on citizen science cannot be decided a priori and risk putting each contribution in a position of being pigeonholed in one category or another. The urge to report

and the risk attached to this accounts for contributors' dynamic practice and the questions that arise during their reporting activities much better than a static explanation in terms of social disposition, opportunity structures or motivation profiles.

Contributors to Faune France are aware of their debt to nature and the possible misuse of their data as a commodity or for predatory behavior. The voluntary nature of most sightings reported in Faune France is a way to render this connection to nature and to other naturalists indefinite. This restores the full dimension of risk in engaging in Faune France to offer a digital contribution to a database linking scientists or amateurs who mostly remain unknown to each other. In such volunteering and engaging freely in nature observation, whether the animal is triggering the passionate reaction or the amateur is driven by a personal impetus for contact with the animal is something that must be left open to interpretation (Latour 1999). This very undecidability is what is passed on as a gift, usually tacitly.

This paper is a tribute to citizen science, and in particular to Faune France. My hope is that as we work to improve citizen biodiversity databases, there will be room to invent better ways to acknowledge the role of participants while understanding the embeddedness of their practice as an attachment to nature and a gift to society and science at large.

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<sup>i</sup> While 80% of the respondents in the survey presented in this article stated that they shared their data, twice as many did this via an internet portal (67%) than between friends and family (37%), although these categories were not mutually exclusive (several answers to each question were allowed). This trend was also found in Alender's survey (2016, p. 2) on citizen science water-quality monitoring.

<sup>ii</sup> Half (50%) of the users of Faune France are retired, based at home or are students.

<sup>iii</sup> For example, an altruist "has the goal of increasing the welfare of another individual or group of individuals. Collectivism has the goal of increasing the welfare of a specific group that one belongs to" (Rotman et al. 2012, p. 218).

<sup>iv</sup> As an example, until 2018, the papers published based on the SPIPOLL (Photographic Monitoring of Pollinating Insects) participatory science project launched by France's National Museum of Natural History focused only on insect behavior, with no mention of the social aspect of observation (Charvolin 2019, p. 53).

<sup>v</sup> This author was also able to use his own common sense as a Faune France practitioner to study the epistemological organization of sighting and reporting data in the database (Law and Lynch 1990).

<sup>vi</sup> To conduct our survey by questionnaire on contributors to Faune France, we drew a random sample of 5000 people from the 25,182 active Faune France contributors in 2018, taking into account the type of contributor (less than 100 observations reported, between 100 and 1000 observations reported, and more than 1000 observations reported). We received responses from 1469 people: a response rate of 29.4%. A weighting variable was calculated to fit the responses according to the type of contributor. Thus the data is representative of the overall population of contributors in 2018.

<sup>vii</sup> Of the 'Oiseaux des jardins' contributors, 45% stated that they used a protocol to observe and report data.

<sup>viii</sup> Of the total respondents, 60% stated that they systematically or occasionally used a list survey, i.e. they listed all the species spotted in one sighting and not just the one that was the focus of the observation (SOFT Report 2020).

<sup>ix</sup> Garfinkel calls this the "'uninteresting' essential reflexivity of accounts" (Garfinkel 1967, p. 7). For those involved in 'doing', analyzing how they accomplished this action did not much matter, aside from the standardized way data was collected.

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<sup>x</sup> The survey also included a question on respondents' knowledge about the fact that Faune France itself conceals data considered sensitive. The results showed that avid reporters on Faune France are aware both that the data they report can be sensitive and also that Faune France hides sensitive data.

<sup>xi</sup> Antoine Hennion argues that "attachment is indefinite and must remain this way" (Hennion 2012).

<sup>xi</sup> "The temptation to idealism perhaps comes from the very word 'data', which is the worst possible description of what the ordinary cognitive ability of scholars, scientists and intellectuals is applied to. The word should be replaced with the much more realistic term of 'obtained' and thus refer to 'obtained bases', to *sublata* rather than data." ("La tentation de l'idéalisme vient peut-être du mot même de données qui décrit aussi mal que possible ce sur quoi s'appliquent les capacités cognitives ordinaires des érudits, des savants et des intellectuels. Il faudrait remplacer ce terme par celui, beaucoup plus réaliste, d'obtenues et parler par conséquent de bases d'obtenues, de *sublata* plutôt que de data.") (Latour 2007, p. 609).

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