Comunicação e Sociedade, vol. 36, 2019, pp. 37-55
https://doi.org/10.17231/comsoc.36(2019).2342

Participation in a datafied environment: questions about data literacy

Miren Gutiérrez
Department of Communication Studies, Faculty of Social and Human Sciences, University of Deusto, Spain

Abstract

In politics, participation can be understood as citizen involvement in decision making, including mechanisms for people to intervene in political and social choices, among other areas of action. Those mechanisms are crucial since democracy hinges on civic participation in political life. However, in the big data era, participation is not possible without people's access to and control of data; that is, civil rights become digital rights. This article deals with data literacy as a filter for participation in a *datafied* environment and the role of ordinary people in data processes. Because participation in a datafied world depends of people's ability to enter the fray, questions about where lines can be drawn to separate experts from non-experts (i.e. ordinary citizens) and whether intervention in the data infrastructure requires a degree of data literacy for effective participation constitute a relevant discussion for the practice and theory of activism as a form of political or civic engagement. Political engagement is understood here as coordinated action aimed at problem-solving, campaigning and assisting others. Namely, to rescue political participation in a datafied domain, a degree of skill is necessary. Drawing from a taxonomy of data mining involvement (Kennedy, 2016) and empirical cases of crisis mapping (Gutierrez, 2018a; 2018b), this theoretical article offers conceptualisations to think about what participation entails today.

Keywords
activism; datafication; data activism; ordinary people; participation; technopolitics

Participação num ambiente datificado: questões sobre literacia de dados

Resumo

No contexto político, entende-se por participação o envolvimento dos cidadãos na tomada de decisões, incluindo mecanismos para que as pessoas intervenham nas escolhas políticas e sociais, entre outras áreas de ação. Esses mecanismos são cruciais, pois a democracia depende da participação cívica na vida política. No entanto, na era do *big data*, a participação não é possível sem o acesso e controle de dados por parte das pessoas; isto é, os direitos civis tornam-se direitos digitais. Este artigo trata da literacia de dados como um filtro para a participação e do papel das pessoas comuns no ambiente e nos processos de datificação. Como a participação num mundo datificado depende da capacidade das pessoas de entrar na contenda, questões sobre onde se estabelecem as linhas de separação entre especialistas e não especialistas (ou seja, cidadãos comuns) e se a intervenção na infraestrutura de dados requer um grau de literacia de dados para participação efetiva constituem uma discussão relevante para a prática e teoria do ativismo como uma forma de envolvimento político ou cívico. O envolvimento político é entendido aqui como uma ação coordenada voltada para a resolução de

problemas, campanhas e assistência aos cidadãos. Ou seja, para resgatar a participação política num domínio de dados, é necessário um certo grau de capacitação. Partindo de uma taxonomia do envolvimento em *data mining* (Kennedy, 2016) e casos empíricos de mapeamento de crises (Gutierrez, 2018a, 2018b), este artigo teórico propõe conceptualizações para pensar sobre as implicações da participação na contemporaneidade.

Palavras-chave
ativismo; ativismo de dados; datificação; participação; pessoas comuns; tecnopolítica

Introduction

In politics, participation can be understood as citizen involvement in decision making, including mechanisms for people to influence political and social choices, among other areas of action (Human Rights Council, 2014). There is a current sense of frustration and disappointment with participation, captured by different authors in diverse situations, including low levels of political engagement among young people in Great Britain (Fox, 2015), participatory frustration with institutional processes in Spain (Fernández-Martínez, García-Espín & Jiménez-Sánchez, 2019), and frustration about poor government performance in Asia (Sanborn, 2017), among others. However, participation is still deemed vital for democracy, as it can affect individual and collective interests and well-fare and can make decisions more well-informed and legitimate. The mechanisms that facilitate participation in public life are crucial as democracy hinges on civic engagement in political decision-making (Council of Europe, 2017). Although there is no consensus about how to define it, democracy is all about equal access, opportunities and voice, as well as participation. For example, *The Economist* – a liberal magazine – famously publishes a Democracy Index every year, which, apart from political and electoral freedoms, takes into account the participation of citizens in political life as one of the fundamental factors to determine the level of democratic development of a given country (Kekic, 2007). Participation matters; however, the transformation of the information and communication technologies (ICTs) and datafication – the process of converting many aspects of our life into data (Cukier & Mayer-Schoenberger, 2013) – have altered participation, presenting new challenges and opportunities for citizen involvement in politics.

ICTs have been both celebrated as enablers and criticised as constraints for political participation in recent years. In fact, cyber-participation (i.e. political participation happening online) has been abundantly explored by numerous authors and perspectives, including Alvarez and Hall (2008), Dahlberg and Siapera (2007), deSoto (2014), Mossberger, Tolbert and McNeal (2008), Milan (2013, 2015), Papacharissi (2019), Sampedro (2011), Thomas (2018), and Uldam and Vestergaard (2015), among many others. These authors are part of scholarship dedicated to studying technopolitics, or the various and conflicting employment of ICTs by governments, individuals, civil organisations

and bottom-up movements. Their work involves studies about "the internet-enhanced" politics (i.e. e-government and politics 2.0, which facilitates existing practices) and "the internet-enabled" new politics, which refers to the essential role that ICTs play for the organisation of citizen participation, contentious politics and deliberative processes (Kurban, Peña-Lopez & Haberer, 2016). In a similar vein, referring to cyber-participation in electoral processes, Sampedro distinguishes between cybernauts (i.e. internet users involved typically in online searches) and cyberactivists (i.e. activists involved in petition-signing, lobbying, fora, online deliberative practices and other "technopolitical uses" of the internet) (Sampedro, 2011, p. 22). That is, ICTs can be an obstacle for participation around issues of access, or they may not have an impact on access, but they can also strengthen prevailing ways of participation and support new forms of citizen participation.

The concept of *ordinary* is fundamental in considering the enabling or disabling role of ICTs. Science, technology and society (STS) studies offer different terms and descriptions employed to characterise the types of commonplace technological practices. Dodge and Kitchin refer to software as "everyday objects" increasingly making a difference in people's lives (Dodge & Kitchin, 2008). Referring to the Web 2.0 – known as the *participatory web* or a web environment that eases the creation and exchange of user-generated content –, Beer talks about how software sorts and sinks into aspects of our "everyday lives" (Beer, 2009). Beer distinguishes three levels of research concerning first, the "organisations that establish and activate Web 2.0 applications"; second, the "software infrastructures and their applications on the web"; and third, how the first two levels "play out in the lives of those that use (or do not use) particular web applications" (2009, p. 998). This article builds chiefly on Beer's third level, focusing on the everyday employment of technology for participation.

More specifically in connection with everyday engagement with the data infrastructure – understood as the software, hardware and processes involved in transforming data into value – Couldry and Powell discuss the agency of small "social actors". These agents[1] operate "with social ends over and above the basic aim of generating and analysing data (usually for profit)" (Couldry & Powell, 2014, p. 2). This way, Couldry and Powell establish a fundamental difference between for-profit and non-profit employments of the data infrastructure. Here the interest is the non-profit employments of data. Kennedy uses *ordinary* as a term to typify social media data mining practices (Kennedy, 2016) inspired by cultural studies' resolve to lower the academic lens to capture tangible levels of technological applications (McCarthy, 2008). As scholars zoom in on commonplace data mining practices, "we see actors in ordinary organisations lowering their sights too, in terms of how they imagine that data mining might serve their purposes" (Kennedy, 2016, p. 86). Namely, the observation of data practices at the bottom offers a view of ordinary people's real concerns and how they address them. Ordinary, therefore, is to be

[1] I avoid the word "actor" since it implies male agency; instead, I propose to use "agent".

appreciated here as "the commonplace, the apparently mundane" (Kennedy, 2016, p. 6), contrary to "the extraordinary" (McCarthy, 2008).

To date, the emphasis on structures of and top-down approaches to datafication has implied that attention to the likelihood of ordinary people acting with data agency has been comparatively lacking (Kennedy, 2016). In contrast, this article is focussed on bottom-up, participative data practices. Participation in this context serves as a defence against power imbalances. For instance, the first deployment of the Ushahidi mapping platform to give voice to and visualise the victims of the bloodshed that ensued the elections in 2007 in Kenya managed to bypass the information shutdown imposed by the government and news media (Gutierrez, 2018a). However, in-depth discussions about data power are avoided here since the focus is not empowerment. I talk, instead, of asymmetries and intensities in data agency even though they do create or are a consequence of different distributions of data power. Paraphrasing Castells (2009), data power is to be understood as the ability to impose particular interests on data processes, reaping other people's personal data, and making decisions about and benefiting from them.

The notion of everyday data practices suits the purpose of this article too for two reasons. First, the emphasis here is not the ordinary citizen *per se*, but their ordinary practices of dealing with the data infrastructure. Second, as a previous analysis shows (Gutierrez, 2018a), ordinary citizens seldom engage alone in data-based activity "focused on problem-solving and helping others" (Zukin, Keeter, Andolina, Jenkins & delli Carpini, 2006, p. 7). Datasets are too complex and big, and social causes too complicated to be dealt with unaided, so these social agents typically organise themselves in groups to collaborate for a common cause (Gutierrez, 2018a). Although collaboration in data projects is a relevant matter, the emphasis here is whether data agency can be commonplace.

Another key issue for participation is the idea of equality; the public sphere serves here as a way of thinking about how equal participation looks like. The idealised public sphere was described as a safe space in which participants treat each other as equals to arrive at a mutual understanding; namely, in the Habermasian public sphere, everyone is a *participant* (Habermas, 1991, pp. 33-34). Some authors observe a transition from a normative public sphere to a new networked public sphere (Benkler, 2006; Quintanilha, 2018). But is there equality in these new technology-mediated spheres? Today, challenges in devising participative decision processes within public spheres include enabling diverse participants to exercise similar agency. Bacon defines participation implicitly as a voluntary and open activity, which can be regulated by norms (Bacon, 2009, p. 235). Similarly, these new technological spheres embed rules and filters. Three examples show how this works. In crisis mapping – or the real-time crowdsourcing and charting of citizen data for humanitarianism –, anybody can become a digital humanitarian as long as they register, declare their skills, potential contributions to the map, and then abide by the guidelines to produce actionable, verified information (Gutierrez, 2018c). These spheres are inclusive, but "they establish boundaries for inclusion" (Gutierrez, 2018c). In

the case of the design of Ubuntu – the free and open-source operating system for cloud computing –, Bacon observes that "each prospective member must sign the Ubuntu Code of Conduct" before being permitted to partake (Bacon, 2009, p. 235). And despite the "slow constitution and consolidation of a new networked public sphere" in Portugal, Quintanilha showcases too the appropriation by people of many forms of public participation in the cyberspace (Quintanilha, 2018). Namely, participation in the datafied public spheres is not exactly equal, but it is inclusive as people increasingly cross the threshold to sit at the bargaining table.

The analysis in this article examines, within the above-outlined theoretical framework – which is grounded in the intersection between science, technology and society studies and democracy theory – whether and how political participation is possible in a datafied environment. I first explore how datafication has changed the nature of civic life and the way people engage in datafied participative practices; second, I look at how *ordinary* can be understood in this context; third, drawing on a taxonomy of data mining agents (Kennedy, 2016), I explore collective crisis mapping experiences to offer a classification of data-based roles and their participative intensity; finally, I inspect data literacy challenges and opportunities for participation. Technology has altered the way we think about participation and equality and generated new rules about who can be a participant. Accordingly, datafication introduces specific challenges and opportunities for participation, as explored next.

People as data agents

Datafication has transformed how people participate in political life. First, *the nature of civic life itself shifts,* as in the big data era, real participation –the kind that Arnstein refers to when she talks about "the real power to affect the outcome of the process" (Arnstein, 1969, p. 216) – at least partially depends on people's access to the digital (Sampedro, 2014, 2018). Big data emerge as a "variegated space of action, albeit one very different from the spaces in which pre-digital social actors operated" (Couldry & Powell, 2014, p. 2). The emergence of the big data era has opened the gates for new types of citizen intervention, which could be divided into two categories: the data infrastructure as an area of political deliberation and contention, and as a tool for political action. On the one hand, dataveillance – the big data-based massive government and corporate surveillance (van Dijck, 2014) – and the employment of the data infrastructure to discriminate against minorities and vulnerable groups [e.g. the use of Facebook to stir ethnic cleansing in Myanmar or to manipulate the 2016 US elections (Whittaker et al., 2018)] have been met with opposition by civil rights activists. Big data as a sphere of debate and campaigning has gathered speed recently especially around issues of privacy, fairness, governance and manipulation (Carlson, 2018; Naik, 2017)[2]. The open data movement, for example, has

[2] Information also retrieved from https://privacyinternational.org/long-read/2724/every-police-force-uk-will-soon-use-body-worn-video-cameras-record-us-public

redefined democracy and participation by applying practices from open source culture to the production and use of data, leasing to new rationalities around datafication that "can support the agency of datafied publics" (Baack, 2015, p. 1). Broadly speaking, big data as a debate focusses on data privacy as well as on data rights. On the other hand, individuals and groups are using the data infrastructure politically as a tool to both resist massive data harvesting and manipulation, and to make decisions, generating diagnoses, solutions, counter-narratives and social change (Gutierrez, 2018a). This article focusses on the latter type of citizen intervention in line with Kennedy's preference to observe proactive data practices instead of focussing on the asymmetries, challenges and problems presented by the data infrastructure (Kennedy, 2016).

Second, *participation in the new environment requires more than just interest in contributing to decision-making*; it demands to overcome participation barriers. "Pervasive data and related quantitative rationalities create new pressures on ordinary citizens who wish to participate in civic, social and cultural life as it becomes more data-driven" (Kennedy & Hill, 2017). These pressures include obstacles as well; for instance, a degree of expertise is needed to extract insights from data, since they do not convert into useful information automatically. For example, data mining is the process of discovering patterns in large datasets using machine learning algorithms, statistics and database systems (Association for Computing Machinery, 2006).

While Zukin et al. (2006, p. 7) note the requirement of skills in political engagement, participation in a datafied environment demands specific abilities, and the hurdles for involvement with the data infrastructure seem prominent. For instance, Couldry and Powell observe that data mining processes, which can lead to insights into aspects of everyday life, allow no room for "these insights to be folded back into the experience of everyday life" (Couldry & Powell, 2014, p. 4). Another example is the full employment of Twitter's API – the application programming interface that allows data access; Puschmann and Burgess affirm that if a user does not understand how they can leverage it, they are unable to effectively interact with the platform (Puschmann & Burgess, 2013, p. 11).

Because of these hurdles, the contribution of ordinary people in the data infrastructure is typically limited to the role of unaware producers of data in massive data collection and surveillance efforts, which are led by governments and corporations. Everyday behaviour generates data without entailing meaning-building or even basic awareness and consent from the generators of data, which, aggregated, standardised and analysed, produce information and value for the harvesters. This passive role is not considered *participation* in this article since it does not entail agency. Agency is to be understood, not as simple acts (e.g. clicking on a button), but as "the longer processes of action based on reflection, giving an account of what one has done, even more basically, making sense of the world *so as* to act within it" (Couldry, 2013, p. 13). Data participation involves an effort of reflection and overcoming barriers; it is not something that happens spontaneously.

That is, once access (a prerequisite) is allowed by decision-makers or achieved by participants, real participation in a datafied environment entails cognisance and action.

Despite impediments, some people are exercising their data agency transforming data into everyday objects. In fact, the employment of the data infrastructure by people for problem-solving and citizen engagement can be considered a form of technopolitics from the bottom-up. Data-based action can both enhance traditional types of participation in politics, as well as enable new types of participation. One example of data that enhances an ongoing political campaign is creation of a platform that visualises and maps deliberate forest fires in Spain called *España en llamas* (Garcia Rey & Garrido, 2016). Two projects, one in Indonesia (Radjawali & Pye, 2015) and the other in the Amazonian region[3], are examples of the second type of participation. These projects enable radical cartography (i.e. maps with new, unconventional functions), incorporating warning systems, and generating evidence, alerts and counter-narratives around land ownership, resources and politics.

The new sociotechnical practices of engagement with data demonstrate the possibility of agency in the face of massive data collection by governments and corporates and can be observed as expressions of *data activism*, or the happenstance of data and data-based narratives and tactics with collective action and politics. The availability of tools to collect and employ data by individuals and groups has driven the rise of data activism (Milan & Gutierrez, 2015), which initially was aimed at generating tools and protected areas of communication for *techies* and activists against dataveillance. More recently, a proactive ground of engagement with data and technology has emerged, utilising the potential of data and ICTs to support citizens in the exercise of their democratic agency. People are proactively engaging with the data infrastructure to generate data in their own terms, make alternative maps, create counter-narratives and produce solutions to their everyday problems, challenging top-down approaches (Gutierrez, 2018a). In this context, relevant too are discussions about the intensity of participation. In the case of data-mediated participation, the participative intensity is determined not only by openness on the part of the decision-makers and willingness on the part of the participants but also on the level of data adroitness of the latter, as seen later.

In sum, the daily practices of dealing with data and with the results of data analyses breed questions about participation. Why is citizen participation in data practices important? In what way are people participants in this environment? Which participatory intensity is sufficient, or possible, in commonplace data practices? Because political engagement matters as a buffer against power asymmetries, it seems that thresholds dividing experts from non-experts should drop and participative intensity should increase to rescue participation in a datafied environment. What follows is an analysis of political participation in the big data era and the possible participative intensities drawing from Kennedy's taxonomy of data mining involvement (2016) and empirical cases of data

[3] See http://rede.infoamazonia.org/

activism from previous analyses (Gutierrez, 2018a, 2018b), offering conceptualisations that can serve as heuristic tools to think about what participation via data activism entails today.

Intensities and asymmetries

Examining data mining, Kennedy distinguishes between *worker agency, user agency* and *techno-agency* (Kennedy, 2016). Workers in data mining processes – that is, "software engineers, data scientists and other workers" – are individuals and organisations tasked with the invisible job of producing algorithms (Kennedy, 2016, p. 57). While some authors have *anthropomorphised* algorithms (Kennedy, 2016, p. 57), giving the impression that they act on their own (Lash, 2007; Striphas, 2015), Kennedy talks about the significant workers' role in shaping social life by exercising their algorithmic agency behind the scenes (Kennedy, 2016). But not all workers are located in the same place in the hierarchy. Kennedy quotes Barocas and Selbst to note that data workers can include both decision-makers and simple miners with different responsibilities and control over processes (Kennedy, 2016, p. 57). As seen later, the realm of workers can be even more diverse.

Users, often "conceived as a group whose (unpaid) labour is exploited", are interesting for their "potential for agency", according to Kennedy (2016, p. 57). In the social media platform system – that is, the "commercial, profit-oriented machine that exploits users by commodifying their personal data and usage behaviour" (Fuchs, 2011, p. 304) –, users can be active in self-branding. Self-branders (platform users) engage in the "highly self-conscious process of self-exploitation" for visibility and "material gain or cultural status" (Hearn, 2008, p. 204). Resorting to the tradition of audience research, Kennedy notes that there are other ways to think about users observing what they feel about their employment of social media platforms. Users can censor the content they produce driven by their aspiration to balance their messages or manipulate their profiles to avoid monitoring (Kennedy, 2016, p. 60). Namely, users can do more than just choosing a device, paying to a service provider, clicking on a button or posting a picture.

Indeed, ordinary citizens can act with techno-agency (Kennedy, 2016); I have called them *techno-agents*. People have always strived to "appropriate the technologies" and "adapt them to the meanings that illuminate their lives" (Feenberg, 1999, p. x). Namely, people typically transform technologies into tools that they find useful (Fischer, 1994, p. 25). Kennedy considers techno-agency reflexive and locates the empirical cases she observes in the realm of *ethical agency*, or agency aimed at doing good (Kennedy, 2016, p. 64). She acknowledges the criticism generated by the uses of the data infrastructure for predatory commercial or snooping purposes, as well as the employment proprietary platforms, which embeds asymmetries and gaps, by non-profits (Kennedy, 2016). However, Kennedy prefers to focus on ordinary data mining practices that make "a positive

contribution to social life" (Kennedy, 2016, p. 43). This type of engagement is also the focus here.

Going beyond data mining to include participative mapping (i.e. an employment of the data infrastructure), I have merged into Table 1 the three roles that people adopt around most crisis maps and Kennedy's three data roles. Crisis maps are typically launched in cases of emergency, geolocating volunteered citizen data to support humanitarian operations in near-real time (Gutierrez, 2018b). These maps rely on digital humanitarians, who set up the deployment using different mapping platforms from remote locations (i.e. deployers); humanitarian agencies, who employ the information on the ground, and people affected by the disaster, also on the ground, who report data via different channels (e.g. email, social media platforms, text messages) and use the information (i.e. reporters). Deployers can include salaried workers from humanitarian organisations and volunteering experts collaborating *pro bono* to launch and manage the map, an endeavour that requires skills to adapt the ready-to-use mapping platform and its verification system, categorise alerts and demands for assistance so humanitarian organisations can use them, translate the information into and from local languages, map of uncharted locations, coordinate of the volunteers and deploy a communication strategy, among other tasks (Gutierrez, 2018a). Table 1 compares these roles with Kennedy's workers, users and techno-agents from the points of view of their participative intensity and position in the hierarchy.

	Salaried	Expert/skilful	Intensity	Location in the hierarchy
Workers	Yes	Yes	High	Top
Users	No	No	Low	Bottom
Techno-agents	No	Yes	High	Top
Map's deployers	Some of them	Yes	High	Top
Map's data reporters	No	No (mediated by devises)	Medium	Bottom
Map's users	No	Some of them	Medium	Bottom

Table 1: Characteristics of the different roles in data agency
Source: Elaborated by the author based on Kennedy (2016) and Gutierrez (2018a)

The participative intensity in data practices can be low (e.g. Kennedy's users), medium (e.g. the map's reporters willingly contributing their data) or high (e.g. the map deployers working non-stop as the crisis unfolds). One idea that emerges from this comparison is that top roles – whether salaried or volunteered, independent or working within an organisation – are characterised by high participatory intensities and a high level of expertise and time investment. For example, crisis mapping usually engages remunerated professionals tasked by their organisations to assist in the endeavour working side

by side with professionals and experts working *pro bono*. Both are skilled and dedicated to the point that some experience exhaustion in the effort to assist victims (Gutierrez, 2018b).

The people caught up in a disaster go beyond Kennedy's description of a user when they volunteer their data and information to support the humanitarian effort proactively. The data reporters' participation in crisis mapping is willing, voluntary and cognisant, matching Couldry's definition of "agency" (Couldry, 2013, p. 13). Their access to technology mediates their participation. I have categorised their participative intensity as medium, although these data reporters sometimes invest more than their time and data in supporting the humanitarian operation, as their locations and identities can be exposed in dangerous or conflict situations (Gutierrez, 2018b). Reporters take a deliberate step further beyond witnessing, fulfilling what Schudson calls their "monitorial" obligation to know enough to participate in political affairs (1998). In crisis mapping, the employment of citizen data has signified a change of paradigm: not only are so-called non-experts summoned to participate in humanitarian emergencies alongside with experts; new agents have emerged as a result of this endeavour (i.e. the digital humanitarians or the deployers).

Thus, *ordinary* does not have to do with whether citizens are experts or salaried. For example, victims of disasters are not passive or ignorant; quite the reverse, evidence shows that a significant factor for disaster readiness is not technology or logistic means, but people's experience of having been hit by a catastrophe before and their resulting knowledge[4]. Ordinary, then, is to be associated with whether people have incorporated cognisant data practices in everyday lives, as noted earlier.

Data literacy: barriers and opportunities

Within opportunity structure of participation, there are still a significant number of barriers. As argued before, today's data logics increasingly determine people's lives, while the "means to participate are progressively technology-dependent, increasing the risk to marginalise people in contexts of socio-political, cultural, economic and infrastructural inequality" (Wissenbach, 2019, p. 15). One challenge in data agency, that appear before many others can even materialise, is "number anxiety", which can be so acute that "the mere expectation of doing math" can trigger the brain's pain network (Adelson, 2014). Number or math anxiety is related to data anxiety. Kennedy notes that "addressing data literacy requirements means thinking about how we learn to relate to numbers and statistics" (Kennedy, 2016, p. 235). Some people's negative experience of data and numbers can become an obstacle to attain data agency. Kennedy and Hill talk too about how data visualisations can generate frustration, as well as positive feelings (Kennedy & Hill, 2017, p. 8). Numbers, mathematics, data and statistics anxiety appears

[4] See https://www.odi.org/our-work/disasters

an obstacle for participation in a datafied environment to be addressed when considering rescuing participation.

Other barriers are related to the data infrastructure industry and its lack of (gender) representativeness, which also limits ordinary engagement. Access to these industries is not completely open, which produces inequalities in the industries themselves. For example, the machine learning industry employs an even smaller fraction of women than the rest of the technology sector globally (Simonite, 2018), resulting in data and algorithmic biases (Wachter-Boettcher, 2017). Lack of representatives is another challenge.

But I want to focus here on data literacy, a key condition of possibility for participation, whose absence can impose a formidable barrier. For instance, Turkoglu (2011, p. 141) when discussing "critical media literacy" – and merging the critical tradition of the Frankfurt School with "media literacy" approaches – sees literacy as a precondition to media participation. In the same vein, data literacy could be understood another condition of the possibility for participation in a datafied world. Participative data agency today hinge on three main factors, which are all related to data literacy: a) data skills (understood as competence in the processes that go from determining how data are gathered to using them); b) access to resources, and c) occupying or achieving regimes that allow their ordinary application. Kennedy highlights two of these factors in relation with data mining practices:

> just as data mining can exclude populations from its algorithmic calculations because of its methodological particularities, so it can be exclusive in another way, in terms of who has access to data mining tools and technologies, and the skills needed to participate in data-driven operations. (Kennedy, 2016, p. 64)

The distribution of access to data and the ability to extract value from them is unequal, and this leads to new digital divides, which "highlight the problematically undemocratic character of such inequalities" (Kennedy, 2016, p. 53). How data have been bestowed with certain powers, influence and logics raises political questions. Whoever has the expertise and access to the data infrastructure decides how and who manages the processes and the resulting knowledge, which in turn impacts the social world. Ruppert, Isin and Bigo (2017) place the emergence of practices such as "data science", "data mining" and "data analysis" as a reconfiguration of power and knowledge. Without understanding "the conditions of possibility of data", it is difficult to "intervene in or shape data politics if by that it is meant the transformation of data subjects into data citizens" (Ruppert, Isin & Bigo, 2017, p. 1). Concurring, Hintz, Dencik and Wahl-Jorgensen say that, if citizenship today is based on active data usage and participation, its enactment requires a knowledgeable grasp of the technologies, the structures and agents that make it possible, as well as their interests, and how they might be used in ordinary practices (Hintz, Dencik & Wahl-Jorgensen, 2017, p. 735). Consequently, data literacy involving

data proficiency, access to data and data tools, and the chance to explore and exploit data analysis needs to be tackled as well.

When people have access to skills, means and opportunity, data activism happens. Several examples show how these three factors worked together in data activism. The first is the appropriation and use of drones, conceived originally for military purposes, as a method to produce data and counter-maps that opposed governmental "land-grabbing" in Indonesia (Radjawali & Pye, 2015). Radjawali and Pye state that to make these maps, challenges were acquiring and enjoying a) the specialised skills to operate the drones, produce spatial planning and interpret satellite data and images; b) the funds to generate aerial, high-resolution photographs able to capture clear images (which were made available by external donors); and c) the relative freedom that allowed the communities managing the drones to give testimony before court against large mining corporations in 2009 (Radjawali & Pye, 2015, p. 3). This example also shows that data are not the final objective in data activism too; they are a teleological tool to attain campaign or mobilisation aims. The second example is a study about what makes a map mobilise people, showing that, apart from resources and occasion, the employment of rich, complex datasets is crucial too; that is, in map-based data activism the credibility associated with data is essential to incite followers to act (Gutierrez, 2019a). The cases examined in Gutierrez (2019a) illustrate that even the most participatory activist map depends on technological savvy people participating and collaborating. Yet again, cases in another study indicate that data endeavours – whether activist or not – often rely on the participation of citizens at least as data reporters (Gutierrez, 2019b). These notions – the required of skills to exercise data agency and the *de facto* participation of citizens in data projects of all sorts – suggest that ordinary citizens are much more resourceful than anticipated, and confirms the idea that *ordinary* applies to whether data practices become commonplace, instead of whether citizens display or lack expertise. Besides, non-experts can become experts *by doing*; that is, by participating ordinary citizens acquire new awareness and power (Baum, 2015). Generating the third condition for data literacy, opportunity, seems then another factor to rescue participation.

Data literacy could be employed as a perspective to look into how people engage with data as well, refocusing scholarship's attention to the circumstances in which users act within "proprietary digitised environments" (Pybus, Cote & Blanke, 2015, p. 4). Given the disparity between those who typically generate data, people, and those who gain value from the data, corporations and governments, "there is a need to open up new forms of digital literacies, such as privacy literacies, information literacies, code literacies, algorithmic literacies, database literacies and so forth" (Pybus et al., 2015, p. 4). Gray, Bounegru, Milan and Ciuccarelli (2016) talk about "data infrastructure literacy". These new forms of literacies represent areas for activist opportunity as well. Based on Baack (2015), these areas include a new focus on opening and sharing data, which would disrupt the monopoly of governments and corporations over data; transferring the open

source model of participation – which is decentralised, flexible, collaborative, peer-to-peer and free – to political participation, and a new interest in mediators as necessary means to access data (e.g. data journalists and activists who open their datasets to public and free scrutiny). About the last point, Hintz, Dencik and Wahl-Jorgensen note that "the watchdog function we traditionally attribute to journalism is critical" (Hintz et al., 2017, p. 735). Baack suggests that the practices and ideas of the open data movement are relevant because they "help to understand how datafication might support the agency of publics and actors outside big government and big business" (Baack, 2015, p. 1). The implication is that not only people should integrate data literacy into their set of democratic skills, but also that activism and collaboration with data mediators are needed to open spaces for the application of data literacy.

Discussion

This article ends with the initial questions. How are ordinary people participants in data practices? Which participatory intensity is sufficient, or possible, in ordinary data practices? First, it seems that in this context it is more interesting to use the term *ordinary* in association with whether people incorporate data practices in their everyday lives. That is, whether the exercise of data agency becomes commonplace. Second, citizens are increasingly involved with the data infrastructure, attaining the skills, the resources and the opportunities to exploit it, and progressively transforming it into an ordinary object. However, to occupy the top, decision-making positions in data efforts at all levels (i.e. as workers, deployers, users, reporters and techno-agents), citizens need to boost the intensity of their involvement with the data infrastructure, which also depends on their level of data literacy.

Why is citizen participation in the data infrastructure important today? The datafication of everything presents a new environment for real political participation, which requires cognizant agency and data literacy as entry points, and results in new technopolitical practices. Deterrents to data agency can be purposeful or not. Participation today is endangered by corporate and governmental data-based surveillance (Hintz et al., 2017, p. 732). Datafication provides massively heightened opportunities to understand, predict, address and manipulate citizens as individuals on real-time (Tufekci, 2014). Critical studies have warned about the perils of leaving data decisions up to the free market, corporations or even governments. Whether impediments are intrinsic to the data infrastructure or imposed deliberately, they are part of technology's "ambivalence", which refers on the one hand to how it is employed to perpetuate hierarchies and guarantee the continuation of power, and on the other hand to its potential as a tool for undermining these same hierarchies (Feenberg, 1999, p. 76). Making the data infrastructure *ordinary* – a key issue for democracy because datafication both changes the nature of civic life and increases the requirements for participation – and taking advantage of its ambivalence to

"do good" (Kennedy, 2016, p. 71) requires more than the work of a group of researchers in the critical data studies; it demands active participation of ordinary people and organisations both creating opportunities to use data and putting them to use.

To rescue participation and lower the entry thresholds, issues like data and number anxiety have to be addressed; data literacy – namely, the access to data, means and opportunities – should increase, and new, collaborative spaces for enacting data agency should be created so the data infrastructure becomes an ordinary object in civic involvement. People and organisations are already working on these issues. Examples such as the Medialab-Prado in Madrid, which regularly invites journalists, artists, engineers and data analysis to work together to model data projects and have resulting in ongoing projects, such as *España en llamas*[5]; DataKind, which deploys data scientists to work *pro bono* with social organisations[6]; Data Science for Social Good, which trains data scientists to tackle social problems, transferring data abilities in the process[7], and Good Data, a project and a book that showcases ethical data practices from the bottom-up[8], reveal that it can be done.

References

Adelson, R. (2014, 29th August). Nervous about numbers. Retrieved from www.psychologicalscience.org/observer/nervous-about-numbers

Alvarez, R. M. & Hall, T. E. (2008). *Electronic elections: the perils and promises of digital democracy*. Princeton: Princeton University Press.

Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Planning Association*, *35*(4), 216–224.

Association for Computing Machinery (2006). *Data mining curriculum: a proposal*. Retrieved from www.kdd.org/curriculum/index.html

Baack, S. (2015). Datafication and empowerment: how the open data movement re-articulates notions of democracy, participation, and journalism. *Big Data & Society*, *2*(2), 1-11. https://doi.org/10.1177/2053951715594634

Bacon, J. (2009). *The art of community: building the new age of participation (theory in practice)*. Sebastopol: O'Reilly Media, Inc.

Baum, H. S. (2015). Citizen participation. In J. D. Wright, *Elsevier international encyclopedia of the Social & Behavioral Sciences* (pp. 625-630). London: Elsevier.

[5] See http://medialab-prado.es/article/que_es

[6] See http://www.datakind.org/about

[7] See http://dssg.io/projects/

[8] See http://networkcultures.org/blog/publication/tod-29-good-data/

Beer, D. (2009). Power through the algorithm? Participatory web cultures and the technological unconscious. *New Media & Society*, *11*(6), 985-1002. https://doi.org/10.1177/1461444809336551

Benkler, Y. (2006). *The wealth of networks: how social production transforms markets and freedom*. New Haven and London: Yale University Press.

Carlson, A. (2018, 8th June). *Good data: challenging the colonial politics of knowledge*. Retrieved from https://data-activism.net/2018/06/bigdatasur-blog-33-good-data-challenging-the-colonial-politics-of-knowledge/

Castells, M. (2009). *Communication power*. Oxford: Oxford University Press.

Couldry, N. (2013). *A necessary disenchantment: myth, agency and injustice in a digital world*. Retrieved from http://www.lse.ac.uk/media@lse/documents/MPP/Nick-Couldrys-LSE-INAUGURAL-SCRIPT.pdf

Couldry, N. & Powell, A. (2014). Big Data from the bottom up. *Big Data & Society*, *1*(2), 1-5. https://doi.org/10.1177/2053951714539277

Council of Europe. (2017, 27th September). *Guidelines for civil participation in political decision making*. Retrieved from https://rm.coe.int/guidelines-for-civil-participation-in-political-decision-making-en/16807626cf

Cukier, K. & Mayer-Schoenberger, V. (2013). The rise of Big Data: how it's changing the way we think about the world. *Foreign Affairs*, *92*(3), 28-40.

Dahlberg, L. & Siapera, E. (2007). *Radical democracy and the internet: interrogating theory and practice*. New York: Palgrave Macmillan.

de Soto, P. (2014). *Los mapas del #15M: el arte de la cartografía multitud conectada*. Retrieved from https://tecnopolitica.net/sites/default/files/pablodesoto.pdf

Dodge, M. & Kitchin, R. (2008). Software, objects and home space. Retrieved from https://personalpages.manchester.ac.uk/staff/m.dodge/Software_objects_and_home_space.pdf

Feenberg, A. (1999). *Questioning technology*. London and New York: Routledge.

Fernández-Martínez, J. L., García-Espín, P. & Jiménez-Sánchez, M. (2019). Participatory frustration: the unintended cultural effect of local democratic innovations. *Administration & Society*. https://doi.org/10.1177/0095399719833628

Fischer, C. S. (1994). *America calling: a social history of the telephone to 1940*. Berkeley: University of California Press.

Fox, S. (2015). Apathy, alienation and young people: the political engagement of British millennials. Retrieved from http://eprints.nottingham.ac.uk/30532/1/Final%20Corrected%20Version%20-%20Apathy,%20Alienation%20and%20Young%20People%20The%20Political%20Engagement%20of%20British%20Millennials.pdf

Fuchs, C. (2011). Web 2.0, prosumption, and surveillance. *Surveillance and Society*, *8*(3), 288-309. https://doi.org/10.24908/ss.v8i3.4165

Garcia Rey, M. & Garrido, H. (2016). Datos sepultados bajo la ceniza (metodologia). Retrieved from http://espanaenllamas.es/datos-sepultados-bajo-la-ceniza-metodologia/

Gray, J., Bounegru, L., Milan, S. & Ciuccarelli, P. (2016). Ways of seeing data: towards a critical literacy for data visualizations as research objects and research devices. In S. Kubitschko & A. Kaun (Eds.), *Innovative Methods in Media and Communication Research* (pp. 290–325). London: Palgrave Macmillan.

Gutierrez, M. (2018a). *Data activism and social change*. London: Palgrave Macmillan.

Gutierrez, M. (2018b). Maputopias: cartographies of knowledge, communication and action in the big data society – The cases of Ushahidi and InfoAmazonia. *GeoJournal*, *84* (1), 101-120. https://doi.org/10.1007/s10708-018-9853-8

Gutierrez, M. (2018c). The public sphere in light of data activism. *Krisis*, *1*.

Gutierrez, M. (2019a). Cartographic emotions: how interactive maps mobilize people in geoactivism. In N. M. Engebretsen & H. Kennedy (Eds.), *Data Visualization in Society*. Amsterdam: University of Amsterdam.

Gutierrez, M. (2019b). The good, the bad and the beauty of "Good enough data". In A. Daly, K. Devitt & M. Mann (Eds.), *Good data: theory on demand*, *29* (pp. 54-76). Amsterdam: Institute of Network Cultures. Retrieved from http://ceem.unsw.edu.au/sites/default/files/documents/An%20Energy%20Data%20Manifesto%20-%20Chapter.pdf

Habermas, J. (1991). *The structural transformation of the public sphere: an inquiry into a category of bourgeois society*. Cambridge: The MIT Press.

Hearn, A. (2008). "Meat, Mask, Burden": probing the contours of the branded "self". *Journal of Consumer Culture*, *8*(2), 197-217. https://doi.org/10.1177/1469540508090086

Hintz, A., Dencik, L. & Wahl-Jorgensen, K. (2017). Digital citizenship and surveillance society. *International Journal of Communication*, *11*, 731-739.

Human Rights Council. (2014). *Factors that impede equal political participation and steps to overcome those challenges*. Retrieved from https://www.ohchr.org/EN/HRBodies/HRC/RegularSessions/Session27/Documents/A_HRC_27_29_ENG.doc

Kekic, L. (2007). The Economist Intelligence Unit´s index of democracy. Retrieved from http://www.economist.com/media/pdf/DEMOCRACY_INDEX_2007_v3.pdf

Kennedy, H. (2016). *Post, mine, repeat: social media data mining becomes ordinary*. London: Palgrave Macmillan.

Kennedy, H. & Hill, R. (2017). The feeling of numbers: emotions in everyday engagements with data and their visualisation. *Sociology*, *52*(4), 830-848. https://doi.org/10.1177/0038038516674675

Kurban, C., Peña-Lopez, I. & Haberer, M. (2016). What is technopolitics? A conceptual scheme for understanding politics in the digital age. In *Atas da 12ª Conferência Internacional Internet, Law & Politics*, Barcelona. Retrieved from http://ictlogy.net/presentations/20160707_can_kurban_ismael_pena-lopez_maria_haberer_-_what_is_technopolitics_conceptual_scheme.pdf

Lash, S. (2007). Power after hegemony: Cultural Studies in mutation? *Theory, Culture & Society*, *24*(55), 55-78. https://doi.org/10.1177/0263276407075956

McCarthy, A. (2008). From the ordinary to the concrete: Cultural Studies and the politics of scale. In M. White & J. Schwoch (Eds.), *Questions of Method in Cultural Studies* (pp. 21-53). Oxford: Wiley Blackwell.

Milan, S. (2013). *Social movements and their technologies: wiring social change*. Hampshire and New York: Palgrave Macmillan.

Milan, S. (2015). Liberated technology: inside emancipatory communication activism. In E. Gordon, & P. Mihailidis (Eds.), *Civic media: technology, design, practice* (pp. 107-124). Massachusetts: The MIT Press.

Milan, S. & Gutierrez, M. (2015). Citizens' media meets Big Data: the emergence of data activism. *Mediaciones*, *14*, 120-130.

Mossberger, K., Tolbert, C. J. & McNeal, R. S. (2008). *Digital citizenship: the internet, society, and participation*. Cambridge: MIT Press.

Naik, R. (2017, 3 October). *Let's take back control of our data – it's too precious to leave to the tech giants*. Retrieved from https://www.theguardian.com/commentisfree/2017/oct/03/data-tech-giants-trail-digital-age

Papacharissi, Z. (2019). The virtual sphere: the internet as a public sphere. In M. Stempfhuber & E. Wagner (Eds.), *Praktiken der Überwachten* (pp. 43-60). Würzburg: Springer VS. Retrieved from https://link.springer.com/book/10.1007%2F978-3-658-11719-1

Puschmann, C. & Burgess, J. (2013). The politics of Twitter data. *HIIG Discussion Paper Series*, 2013-01. https://doi.org/10.2139/ssrn.2206225

Pybus, J., Cote, M. & Blanke, T. (2015). Hacking the social life of Big Data. *Big Data & Society*, *2*(2). https://doi.org/10.1177/2053951715616649

Quintanilha, T. (2018). A contribution to the debate on the redefinition of the networked public sphere based on Portuguese public participation in cyberspace. *Comunicação e Sociedade*, *34*, 287-304. https://doi.org/10.17231/comsoc.34(2018).2950

Radjawali, I. & Pye, O. (2015). *Counter-mapping land grabs with community drones in Indonesia – land grabbing, conflict and agrarian-environmental transformations: perspectives from East and Southeast Asia*. Paper presented at International Academic Conference, Chiang. Retrieved from http://www.iss.nl/fileadmin/ASSETS/iss/Research_and_projects/Research_networks/LDPI/CMCP_80-Radjawali_and_Pye.pdf

Ruppert, E., Isin, E. & Bigo, D. (2017). Data politics. *Big Data & Society*, *4*(2), 1-7. https://doi.org/10.1177/2053951717717749

Sampedro, V. (2011). Públicos y recursos tecnopolíticos: minorías insatisfechas y diques a la participación. In V. Blanco (Ed.), *Cibercampaña: cauces y diques para la participación* (pp. 11-39). Madrid: UCM Editorial Complutense.

Sampedro, V. (2014). *El cuarto poder en red*. Barcelona: Icaria.

Sampedro, V. (2018). *Dietética digital: para adelgazar al gran hermano*. Madrid: Icaria.

Sanborn, H. (2017). Broken back? Efficacy and participation in Asia's democracies. *Asian Journal of Comparative Politics*, *3*(1), 13-24. https://doi.org/10.1177/2057891117699091

Schudson, M. (1998). *Changing concepts of democracy*. Paper presented at conference "Democracy and Digital Media", Massachusetts. Retrieved from http://web.mit.edu/m-i-t/articles/schudson.html

Simonite, T. (2018, 17th August). AI is the future – but where are the women? Retrieved from https://www.wired.com/story/artificial-intelligence-researchers-gender-imbalance/

Striphas, T. (2015). Algorithmic culture. *European Journal of Cultural Studies*, *18*(4-5), 395-412.

Thomas, S. (2018). Democratic deficits and digital compensation: the digital promises revisited. In T. Joseph & S. Joseph (Eds.), *Deliberative democracy. Understanding the Indian experience* (pp. 142-159). London: Routledge. https://doi.org/10.4324/9780429486340

Tufekci, Z. (2014). Engineering the public: internet, surveillance and computational politics. *First Monday*, *19*(7). https://doi.org/10.5210/fm.v19i7.4901

Turkoglu, N. (2011). Mediated public voices need theory to be heard. *Management Communication Quarterly*, *21*, 141-158.

Uldam, J. & Vestergaard (Eds.) (2015). *Civic engagement and social media: political participation beyond protest*. London: Palgrave Macmillan UK.

van Dijck, J. (2014). Datafication, dataism and dataveillance: Big Data between scientific paradigm and ideology. *Surveillance & Society*, *12*(2), 197-208.

Wachter-Boettcher, S. (2017). *Technically wrong: sexist apps, biased algorithms and other threats of toxic tech*. New York: Norton & Company.

Wissenbach, K. (2019). Accounting for power in transnational civic tech activism: a communication-based analytical framework for media practice. *The International Communication Gazette*, Online First. https://doi.org/10.1177/1748048519832779

Whittaker, M. et al. (2018). *AI now report 2018*. Retrieved from https://ainowinstitute.org/AI_Now_2018_Report.pdf

Zukin, C., Keeter, S., Andolina, M., Jenkins, K. & delli Carpini, M. X. (2006). *A new engagement?: political participation, civic life, and the changing American citizen*. Oxford: Oxford University Press.

Biographical note

Miren Gutiérrez holds a PhD in Communication. She is the director of the post-graduate Programme "Data Analysis, Research and Communication" and Lecturer at the University of Deusto. She is also an Associate Researcher at the Overseas Development Institute (ODI) in London and at Datactive at the University of Amsterdam. The central theme of her research has to do with data activism or how people and organisations use data infrastructure, in combination with other technologies, for social change. She is also the author of the book *Data activism and social change*, recently edited by Palgrave-Macmillan.

ORCID: https://orcid.org/0000-0003-1527-3434
Email: m.gutierrez@deusto.es
Address: University of Deusto, Faculty of Social and Human Sciences, Department of Communication Studies, Camino de Mundaiz 50, 20012 San Sebastián, Spain

*** Submitted: 30/03/2019**
*** Accepted: 30/06/2019**