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# CITIZEN SCIENCE AND THE DISSOLUTION OF INEQUALITIES IN SCIENTIFIC KNOWLEDGE PRODUCTION

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## ABSTRACT

Recently, a larger public has started to critically discuss scientific knowledge and its role in political decision making. In this discussion, scientific and civic epistemologies are put into connection with each other. Just as post-democratic theory argues in relation to political decisions, the production of scientific knowledge is criticized as a non-inclusive process, too. The Citizen Science movement tries to resolve this deficit by involving citizens into research. In this paper, we introduce agency as an analytical category into the discussion, focussing on how participants are represented in Citizen Science. We highlight the interdependencies between the degree of agency granted to the participants in Citizen Science projects and the degree of their representation in knowledge production.

## KEYWORDS

Citizen Science; Civic Epistemologies; Post-Democracy; Digital Knowledge Practices; Representation

# 1 INTRODUCTION

The relevance of scientific knowledge and expertise in political decision-making processes is commonly acknowledged. Politicians and political bodies legitimise their decisions and arguments referring to scientific knowledge or expert committees that deliberate questions at hand. These negotiations between political stakeholders and experts are central in the process of how societies come to know and have been referred to as civic epistemologies (Jasanoff 2007).

Interestingly, this epistemic dimension of politics has recently become contested in two ways: (i) Political parties and movements increasingly criticize democratic institutions for strong biases and elitist structures, arguing that the governance of stakeholders and experts undermines democratic values, thereby fostering inequalities (Crouch 2004). This critique finds its preliminary climax in the discussions about “fake news” and “alternative facts”, focusing on a lack of representation in the construction of commonly shared social realities (Beck 1992).

(ii) At the same time, not only the democratic institutions but also academia and the practices of scientific knowledge production are problematized. Evaluation processes with their specific logics have become central for academic careers (Espeland and Sauder 2007), undermining ideal scientific values (Merton 1973). For instance, more than half of 1,500 surveyed scientists assumed a significant reproducibility crisis (Baker 2016). As a result, a larger public is questioning scientific authority and expertise.

The critique of expert governance and reliability of scientific knowledge is the starting point of our argument. In this argument, we want to show that both phenomena are expressions of a more general problem that politics faces: a lack of public **representation in civic and scientific epistemologies (Section 2)**. We will introduce Citizen Science as a means of **(digital) participatory knowledge practices (Section 3)**, promising to resolve representative deficits. Furthermore, we will introduce **agency as an analytical**

**category to distinguish two major participatory practices, which are both labelled as Citizen Science (Section 4)**, but are also fundamentally distinct in how they address the issue of (digital) equality.

## 2 REPRESENTATION IN CIVIC AND SCIENTIFIC EPISTEMOLOGIES

In order to understand the commonalities of civic and scientific epistemologies, we draw on insights of science and technology studies. With Thomas Kuhn (1964), the perspective on science shifted from a process of knowledge accumulation, resulting in objective truth, to practices of contingent negotiations of what truth, reality or facts are. The social and material aspects of knowledge production were investigated by Collins (1975), Latour and Woolgar (1979), and Knorr-Cetina (1981), showing multitude logics, values and valuations inscribed in knowledge and technology genesis.

From these investigations, two major insights can be drawn: Scientific knowledge production has its own politics and, more importantly, there are many ways of knowledge production, accompanied by various forms of expertise (Collins and Evans 2004). In conclusion, civic and scientific epistemologies have to negotiate the same constituting decisions: They need to decide whom they consider as speakers and which politics they follow. From this perspective, the critique on scientific knowledge production becomes structurally similar to arguments of post-democratic theory: democratic (and scientific) institutions diminish their representation due to technocratic or scientific governance.

Accordingly, in the discourse of scientific epistemologies, scientific governance is associated with an absence of representation and participation. This perception also aligns itself with feminist STS scholars, who have raised longstanding criticisms against the exclusiveness of scientific knowledge production (Keller 1995).

### **3 DIGITAL, PARTICIPATORY KNOWLEDGE PRACTICES**

The Open Science movement tries to resolve the exclusiveness of science by making research results and data publicly available and by involving citizens into research practices. The latter is referred to as *Citizen Science* and focuses specifically on the social dimension of openness in scientific knowledge production (addressed in section 2). Citizen Science aims to integrate scientists and non-scientists into the research process and therefore offers the opportunity to represent a broader public in scientific knowledge production. Similar to online participation in governance, Citizen Science is an evolving digital practice, mostly utilizing online participation to facilitate research projects. Prominent examples in the US are Galaxy Zoo, Foldit and Polymath (Franzoni and Sauermann 2014). However, there is no definition or theory what Citizen Science is or should be, subsuming a variety of practices, such as crowdsourcing of data analysis (Galaxy Zoo), public participation in policymaking (Irwin 1995, Haklay 2013, Eitzel et al. 2017) or data collection through game play (Foldit).

### **4 AGENCY AS ANALYTICAL CATEGORY**

Since Citizen Science aims to be a democratic way of knowledge production, the symmetry between civic and scientific epistemologies offers the means to distinguish between democratic and post-democratic practices in science (Latour 2004). To understand this difference, we take equality as one of the core values of democracy into account (Dewey 1888). Therefore, we introduce agency as central category to analyse Citizen Science practices. As Bogner (2012) has criticised, participation can be a formal act, without any consequences for the actual political process of deliberation. It is therefore important to not only enable participation, but to distribute power between the participants. That means, to

give them agency. Democratic knowledge production in that sense takes the perspective and expertise of the participating citizens as serious as the expertise of the participating scientists. The central point is the inclusion of all participants equally, without predefined hierarchies and with their individual expertise.

By considering these two elements, we find differences in Citizen Science projects. If citizen scientists act as sensors or data collectors by counting birds (Bonny 1996), the participation is utilized in a predefined hierarchy and without inclusion of individual expertise. In contrast, citizen scientists who analyse and interpret texts (Benoit et al. 2016), bring their own perspective into the analysis – thus their individual social reality is represented. Therefore, the degree of agency given to the participants in Citizen Science projects becomes crucial for their representation in knowledge production.

Taking this perspective, there are currently participatory practices, labelled as Citizen Science but distinct in how they promote the democratic norm of (digital) equality: On the one end, crowdsourcing scientific work, using citizens as sensors or data collectors, and on the other end, empowering citizens by involving their perspectives and expertise into knowledge production. From our point of view, only the latter should be called Citizen Science.

### **5 CONCLUSION**

In our contribution, we highlighted that civic and scientific epistemologies are both contested concerning their structures of representation and knowledge politics. Citizen Science aims to include citizens into knowledge production, increasing representation through participation. We argued that it is crucial that citizen scientists gain agency, meaning that all participants are included equally without predefined hierarchies and with their individual expertise, in order to be involved as scientists. In conclusion, only knowledge practices that give agency to their participants should be called Citizen Science.

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