Item number	Title/reference *(academic style) name initials (year) title, publisher, volume, pages*	Name of reviewer
9	Elliott, K.C. and Rosenberg, J., 2019. Philosophical foundations for citizen science. Citizen Science: Theory and Practice, 4(1).	Symplexis

Review of findings / main outcome

This paper is about the quality of citizen science, and the main concerns related to it, studied from a philosophical perspective. The authors stress that citizen science being of low quality would pose ethical challenges, as it would mean wasting scarce resources.

The first concern studied is that citizen science is focused on gathering a lot of data, and thus is of lesser value than hypothesis-driven science, that starts with a hypothesis to be confirmed or infirmed. To dispel this concern, the paper cites recent studies challenging the assumption that hypothesis-driven science is always of higher value, and states that the quality and appropriateness of scientific practices should instead be judged on a case-by-case basis, according to their place in a broader network of research practices. Data gathering by citizen scientists can for example be the first step in a research project, building a foundation upon which a hypothesis can be built and then tested.

The second concern examined by the authors relates to the perceived lower quality of the data gathered and the methods used by citizen scientists. The paper argues that several tools can be used by the scientists analysing the data, in order to ensure it is of good quality, namely training volunteers and discarding results of new or inexperienced volunteers. Additionally, the authors argue that the methods used must be evaluated according to their aims; “different kinds of data are needed for different sorts of projects and analyses”.

The third and final concern is that citizen science is too focused on advocacy, and is too “ideological”. The authors argue that no science is “value free”, that is free of any ideological perspective or conflict of interest. On the contrary, the authors state that a bigger awareness of these issues in citizen science can actually shed light on such implicit biases in science, and that the diversity of perspectives it brings can improve science in general. Additionally, they argue that this concern should be the impetus to put into place procedural steps to identify and bring to light implicit values and methodological choices in research protocols.

The paper concludes that citizen science cannot be considered overall to be of lower quality than more traditional science, and that it should be evaluated on a case-by-case basis, taking into consideration its specific aims.

Quotes / very useful statements

1) the quality of scientific work (including citizen science) cannot be adequately evaluated without considering the aims for which it is produced

2) From a philosophical perspective, one cannot evaluate the overall quality of citizen science—or any form of science—without considering the details of specific research

contexts. In many cases, citizen science provides one of the best avenues for achieving scientific goals and moving scientific research forward.

Key references *(academic style) name initials (year) title, publisher, volume, pages*

1) Elliott, KC and Resnik, DB. 2014. Science, Policy, and the Transparency of Values. Environmental Health Perspectives, 122: 647–650. DOI: https://doi.org/10.1289/ehp.1408107

2) Elliott, KC, Cheruvelil, KS, Montgomery, GM and Soranno, PA. 2016. Conceptions of Good Science in Our Data-Rich World. BioScience, 66: 880–889. DOI: https://doi.org/10.1093/biosci/biw115