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What could a human right to participate in science be?

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At first sight, the idea of a human right to participate in science may seem absurd. Many assume science must be the preserve only of those with the training and aptitude to make a substantial contribution. However, feminist philosophy of science teaches that science is a social practice, with norms of inclusion and exclusion, and who, in fact, has the chance to participate depends on political and social assumptions alongside scientific ones. Political philosophers have also introduced the notion of 'contributive justice': that it is an injustice if some lack the opportunity to contribute to the well-being of others. Combining these insights with that of science as a global public good, I explore the possibilities and complications of a human right to participate in science, considering where the duties corresponding to such a right may also fall.

Is there a human right to participate in science? Certainly, the Universal Declaration of Human Rights (UDHR) does include some sort of right to science. The relevant article is this:

> Everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits. ([1], Article 27)

In the International Covenant on Economics, Social and Cultural Rights (ICESCR), the right is set out in the following terms:

> To enjoy the benefits of scientific progress and its applications. ([2], Article 15)

But note the wording. In the UDHR, there is a right to participate in the cultural life of the community but only to share in scientific advancement and its benefits. What 'sharing' in scientific advancement might be is vague, but in the ICESCR, it is clarified as 'enjoying' the benefits of scientific progress and its applications. This seems to me to be a clear statement that the rights are, to put it crudely, those of a consumer and not a producer. Hence, a straightforward reading would suggest

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that in international law, at least according to these foundational documents, there is no human right to participate in science.

However, the international legal community has taken a different path.[1] In a report in February 2024 the special rapporteur in the field of cultural rights, Alexandra Xanthaki, affirmed that there was a human right to participate in science, following earlier authorities who argued that science is part of culture, and Article 27 of UDHR does, as we saw, provide a right to participate in culture, from which it follows there is a right to participate in science [3]. Whether this is the natural reading of Article 27 is surely debatable, as on close inspection it can bear several meanings, but in the light of Xanthaki's report, the current consensus seems to be that there is such a right.

However, this doctrinal point is not enough to determine the normative question of whether, morally, there should be a human right to participate in science, and therefore whether the current interpretation of international human rights law has landed in the right place. In this article, I want to explore what the human right to participate in science might be and some reasons for defending it. I am not trying to make a definitive case, and I do see some problems which I will discuss at the end of the article. This article is, therefore, an exploration of possibilities.

So let me start with the natural resistance many will have to the idea of a human right to participate in science. Why should there be any such right? After all it is very different to rights such as rights to education or nutrition, which address a universal need. If not everyone has the capacity to participate in science, how can there be a human right to participate? There are two obvious directions to go in response to this scepticism. The first is to insist that everyone does have the capacity to participate in some way. The second is to accept that this is not so, but to suggest that the right is conditional. The cases that would concern us most would be where someone does have the capacity, and has, or could easily acquire, the motivation, but finds that they are excluded. If the right is phrased in terms of a right for those who have the capacity and motivation, the objection that not everyone has the capacity, whether or not it is true, is side-stepped.

Even so, some people will feel that the relation between science and the politics of human rights should be one of mutual exclusion. Science has its own norms. It is a realm of intellectual activity. Scientists are people who have developed highly specialized skills and often a type of obsessive motivation, and any individual's opportunity to participate, many will say, depends entirely on their skills and motivation, and there happening to be the right positions available to them. If people lack the skills, or if the positions do not present themselves, no one's rights are violated.

Now, I certainly want to accept that science is a social practice that has its own internal standards of excellence and the people who are best placed to judge the achievements of particular scientists, or indeed their potential, are those who have achieved high standing of their own in science. But the fact remains that if science is a social practice, then like all social practices, it has its own norms also of inclusion and exclusion. That is to say, every social practice engages in some form of gatekeeping. Who can engage in the practice? Who cannot do it? Who can perform what role within it? And who can perform no role? Now, in the case of science, we have adopted a practice in which, ostensibly, qualifications, publications, grant success and so on will lead to a record of achievements and publications that will credentialize individuals to allow them, should the circumstances be favourable, to pursue scientific research and even long-term careers in science. But if a practice has conditions of gatekeeping, that on its own already makes it political. Who is in, who is out? At this point, defenders of existing practice may throw up their hands in horror and say that we know what the standards are: they are purely intellectual standards of scientific training, achievement and rationality, that have been adopted, tested and refined in science over the centuries. Why would this be challenged?

Well, consider a challenge that comes from feminist philosophy of science [4]. Now, of course, there are many forms of feminist philosophy of science and what I'm going to say will be very superficial relative to the sophistication that has been achieved. But we can start with some fairly simple observations. Consider the question of how many world-famous female scientists, throughout history, non-scientists can name. I have asked this question of people from all walks of life. Most people are very confident about the first one, Marie Curie, then they typically get a little bit wobbly and confess they cannot think of another. For some Rosalind Franklin comes to mind early on. A few will name Dorothy Hodgkin, or the film star and scientist Hedy Lamarr. Sometimes people name Jane Goodall (although some ask whether she really counts as a scientist). On the whole, apart from

[1]I thank two anonymous referees for drawing my attention to this point.

specialists, people struggle. Now, if I were to ask those same people to name female novelists of world-class standing throughout history, they would have little trouble in reaching double figures very quickly and could probably go on and on depending on their interests and background.

Why is it that women achieve much more in literature than they have done at the highest level so far in science? I'm going to put aside any questions of natural aptitude. I don't believe that there is some way in which women are less fitted to take part in science than men by nature. And of course, social expectations and socialization will play a large role. But I find myself curious about an important contrast. One thing to observe is that writing novels is something that you can do largely on your own. Of course, you need someone to publish your book, but that's at a very late stage in the process, and a novelist must already have accomplished most of their work, particularly for a first novel, even before the issue of publication arises. Science differs. To get the chance to do science to a significant level, in the sense of leading your own team, you have to convince many people. Now, if there is a general prejudice against women, the prejudice has more opportunities to surface in science than it does in literature, because in literature, women get a chance to prove themselves before they're tested. In science, the test, in a sense, very often comes before the proof, at least the proof of very high independent achievement. So there's at least a case for thinking that internal norms are likely to be responsible for women being less successful in science than men. This difference is consistent with some folk wisdom about everyday sexism: men are judged on potential, women on achievement, which has been supported by research [5].

Now, some will also say that women are less attracted to science, but that may or may not be true. If it is, we need to ask the question why. And within feminist philosophy of science, it is often thought that traditionally the goals of scientific activity are highly coded as male [5]: often looking towards military and commercial ends, and seeking glory for the scientist, rather than achieving models of cooperative activity for social ends, such as addressing world poverty and hunger. The idea that the goals of science are 'male coded' is, of course, a sweeping generalization and would need detailed substantiation, but that not my current goal. What I want to have done is to make plausible the case that science as a practice is not necessarily equally welcoming to everyone. And this can be true even when no practice of discrimination is blatant enough to violate discrimination law, and is enough to make the question of a human right to participate a live one.

I want to try to deepen the analysis somewhat by considering the question of the harms suffered by those who wish to participate in science and have the talent to do so, but are, for whatever reasons, unable to find a way to do so. I do not pretend to give an exhaustive analysis, but here are some suggestions. The first, of course, is a type of personal harm. Not being able to do something you want to do, especially when you see others who are no better than you make a career where you can not, can be very frustrating. You are deprived of a way of flourishing as a human being, taking delight in activities that appeal to you and to which you aspire.

But this is far from all. In political philosophy, there has been growing interest in recent years in the idea of 'contributive' justice [6]. It stems from the thought that many people, perhaps most, have a strong desire to contribute to the lives of others in some way. The concept is discussed primarily in the context of involuntary unemployment. Not only does unemployment deprive people of income, and, perhaps, a fulfilling way of spending one's time and energy, but it also deprives people of one important avenue of contributing to the lives of others. This, of course, assumes that science does make a contribution to the lives of others, but for many that is its main rationale, even if the journey from basic science to life-enhancing innovation is typically a very long one.

And there is a further idea from political philosophy that I would also like to make use of. The South African philosopher H. P. P. Lötter, in his work on poverty, has pointed out that there is a basic human need to be amused and amazed, and therefore those who are in a position to amuse and amaze have a special place in our culture, even if this is not always acknowledged in these terms [7]. Science is a realm of amazement. People engage in science in order to be amazed by the natural world, and those who achieve impressive scientific results are treated with awe, alongside their discoveries. Typically, our idea of the high-achieving scientist, amazing us with their discoveries, is that of a wild-haired man in a lab coat, rather like a secular God. Those deprived of the chance to participate in science are deprived of the chance to amaze others in this way.

In sum, then, being refused the chance to participate in science can lead to at least three (related) forms of harm: lesser opportunity for individual flourishing, or to contribute to the lives of others, or to amaze others. All of these are important and can be added to a better-known argument often made for diversifying the constituency of those given access to scientific practice: that a diversity of perspectives is likely to lead to better science as people will contribute in different ways, seeing things differently.

Hence, there is good reason to take seriously the possibility that there is a human right to participate in science.

Now, one objection is that what I have said about the benefits of participating in science apply to many other activities: performing in the creative arts; writing poetry; and much else. One response is to deny this and to insist there is something special about science. Perhaps its level of cultural prestige, its potential contribution and the 'awesomeness' of its achievement put in on a special level. But I would not wish to diminish other activities in this way. Rather, it may be said that there is also a human right to participate in these other activities too. A natural reply, however, is to suggest that all these activities, including science, should be subsumed under a general human right to participate in activities you value, or some sort of general opportunity principle, and there is no need to posit a special human right to participate in science. For the purposes of this article, I remain agnostic on this point, for my purpose is to consider what a human right to participate in science would amount to, if there is one.

But here we meet another problem. If there is such a right, then, it is commonly thought, there must be a correlating duty. But who has the duty to ensure that everyone's right to participate in science is met? Commonly, it will be said that the duty falls on the state. But drawing on other work I have done, with others, on the human right to health, I think we can do better than this [8]. The idea that there is a single duty that correlates with the right is a rather crude way of explaining the issue. In relation to the human right to health, it is common now not to argue that there is a single duty that falls on the state, but rather to say that we can differentiate duties into (at least) three types: duties to respect; duties to protect; and duties to promote, and this language does appear in the special rapporteur's report, especially in the concluding sections ([3], p. 20), although otherwise the report only mentions duties in passing. How different duties manifest will depend on the particular case in hand, but we can initially illustrate them in the case of health.

Let us first take the case of the duty to respect. What would this be, and which agent, or agents, should hold that duty? Although of course states have a duty to respect the health of their citizens, I would suggest that it also includes a duty not to harm the health of others that each of us hold with respect to all other people. We saw this very clearly in the case of the COVID-19 pandemic. Each of us took on the duty not to harm the health of others, most commonly by observing social distancing and, in many countries, wearing masks or being vaccinated. It might be objected that this was not the type of duty that others could claim by right, but more like a discretionary duty of humanity, but certainly in some contexts, these duties were backed by mechanisms of enforcement and were not considered to be similar to acts of mere charity.

Moving now to the duty to protect, which again is a duty held by the state, we can see how it may not be appropriate to hold individuals responsible for protecting each other's health, unless they hold some special responsibility. But then if they are responsible because of some role they hold—teacher, or prison guard, say— then it seems likely that the duty falls on an institution and an individual bears the responsibility because of their institutional role. And societies are accustomed to assigning such duties: for example, the workplace is strictly regulated by health and safety laws in many countries. Hence it seems straightforwardly accepted that institutions, as well as states, have responsibilities to protect health. Promoting the right to health goes further in that it seems to imply providing the means to health, ranging from healthcare, through public health, to acting on the social determinants of health. Although other organizations, such as charities, can take on part of these functions, typically they can only be robustly supplied by the state.

Now, there are various questions that can be raised about this schema. Can we give precise accounts of what it means to respect, protect and promote? Do they have clear boundaries, or is there overlap or gaps? Is it really sensible to suggest there are three types of duties that match all types of rights in all cases, or can there be more types, or, in some cases, fewer? These are all good questions, but it is not my task here to assess them. My own opinion is that there are significant overlaps and gaps, and we need to dig deeper to identify the range of duties and duty holders in each case in its particularity. But my aim was to make the more general point that it is an unhelpfully abstract to think that the human right to health correlates with a single duty for whom we have to locate the agent. Rather, I want to claim that it aligns with a complex pattern of differentiated duties held by many different agents, and there is careful work to be done to understand this in full detail. And, naturally, I would wish to suggest that a similar pattern applies to the human right to science. It is likely to correlate with a range of duties.

If we remain with the initial schema of duties to respect, protect and promote, we can make some initial suggestions about where the duties correlated to the human right to participate in science could

fall in addition to on the state. Let us start with respecting a person's right to participate in science, and we can begin with the attitude that women, one hopes in the past, may have faced when telling teachers, parents, or even friends that they aspired to a career in science. They may have been told 'it's not for women' or 'it's not for people like us'. Here, I would say that they have failed to meet the duty to respect. Is it a violation of human rights? That may sound like an extreme claim to make, but it does seem to be a violation of a duty associated with a human right. Let us now move to the duty to protect. This, to me, seems most likely to present itself in an institutional setting, such as a lab or a university. If women, to stay with this example, are diminished by, for example, being given less creative roles in research teams, or not being taken seriously when they suggest new ideas, or being patronised or, even more seriously, sexually harassed, then they are not being protected and their right to participate in science is being violated by such a failure to protect. We might say that each individual is failing to respect the right, but the institution, and by delegation, the managers of the institution are failing to protect the right. And where there are professional associations or learned societies understood to have either a role in governance or a leadership role by prestige and influence, such as The Royal Society, it can be reasonable to suppose that they too have a human rights duty to protect marginalised scientists from discrimination, especially in such things as their grant-giving roles, but beyond that too.

The duty to promote is more expansive still. It is a duty to create an environment where all can have a chance, and it falls primarily on the government and its agencies. It will be directed in the first instance at the education system of schools and universities, ensuring that those with talent and motivation have the opportunity. There can be discussions about how deep measures need to be to ensure equality of opportunity, and the role of diversity initiatives, but it is not my task here to enter into such details. Rather, my point is to set out the broad lines of a division of labour of duties.

The cases I have discussed then raise the question of who is currently excluded from participation in science, and might, therefore, benefit from the recognition of a human right to participate in science, although, of course, there could be other mechanisms of inclusion. What I have said about the exclusion of women is also true for members of other marginalized groups, such as those from racial minorities, or people with disabilities, and everything I have said can also be applied to those who are from groups that are under-represented in the scientific community. But beyond these cases one of the most important questions to discuss is the role of indigenous scientists. For example, in her book *The Right to be Cold* Sheila Watt-Cloutier notes the way in which highly experienced indigenous hunters, who understand the local environment and are highly sensitized to warning signs, are ignored by scientific experts who prefer their theoretical models to the teachings of local experience [9]. This example can be replicated throughout the globe in a variety of environments, including Latin America and Africa, but in fact throughout the world.

Here, reactions are likely to be mixed. Few of the knowledgeable members of the indigenous community are likely to have the credentials associated with being a scientist, such as a PhD or having held research grants, although there is of course some mobility between communities. But consider those without a traditional scientific training. Can they really be called scientists? On the one hand, this may look like a verbal question: what does it matter? The question is whether their views are treated with respect, perhaps as informants to scientists. But labels do matter. There is a prestige attached to the term 'scientist', and this is why it is jealously guarded. And hence there can be good reasons for indigenous communities to insist that their experienced and knowledgeable members are scientists and should be welcomed into the scientific community, for mutual benefit.

A much more difficult case, however, is so-called citizen science. Sometimes it can be highly beneficial, such as crowd-sourcing astronomical data. But in other areas, it can be very problematic, especially around questions of health, where some insist that every individual should do their own research. Now 'citizen science' can mean various things of course, but if there is a human right to participate it should be available to all, and so, to start with, I'll take the idea of citizen science in its widest sense. And here the problem is obvious. Without detailed training what passes for individual research can lead to highly problematic results as it largely consists not in careful observation or experiment, but trawling the internet, often looking for research results that seem to back-up a previous held conviction, such as the dangers of vaccination. Hence an untrained citizen researcher may find themselves half-digesting views that are already marginal in the scientific community, ignoring studies that contradict them, and not properly distinguishing industry and interest-group propaganda from carefully researched studies. Citizen science in this sense is the natural habitat of confirmation bias.

Half-way between this type of passive research and 'peer review' science is conducting studies of some sort that do not meet established scientific standards, such as very small studies in special

circumstances that are then extrapolated. One response is to try to 'police' what is to count as science, such as suggesting that the hallmark of science is that it makes falsifiable predictions, taken from Karl Popper [10]. Now there are many problems with this view as a demarcation between science and pseudo-science, such as the fact that many sciences, such as biology, including evolutionary biology, are more concerned with classification and explanation than prediction, but even putting that aside, pseudo-science can also make falsifiable predictions, and some theories recover from failed experiments when it is realized that the test was flawed in some way [11]. There are of course much more sophisticated accounts of the demarcation between science and pseudo-science, but how much help they might be is another matter. Consider this lengthy definition from the report of the special rapporteur cited above:

> Science is defined in the Recommendation on Science and Scientific Researchers of UNESCO as the enterprise whereby humankind, acting individually or in small or large groups, makes an organized attempt, by means of the objective study of observed phenomena and its validation through sharing of findings and data and through peer review, to discover and master the chain of causalities, relations or interactions; brings together in a coordinated form subsystems of knowledge by means of systematic reflection and conceptualization; and thereby furnishes itself with the opportunity of using, to its own advantage, understanding of the processes and phenomena occurring in nature and society. ([3], p. 7)

The mention of peer review would seem to rule out practices of indigenous science, which are often not published, or knowledge passed on by farming communities, which is explicitly mentioned in the report as a form of participating in science. It may also rule out some forms of pseudo-science, but the same problem arises with defining who is in the community of peer-reviewers. Sub-cultures of pseudo-science can mimic the structures and organization of science. The report attempts to bolster its account with an appeal to 'falsifiability and testibility' ([3], p. 7), but that pushes us back to the problems of Popper's theory.

Probably in the end, each branch of science will attempt to specify a range of acceptable methodologies, and claim that to count as science investigations have to follow one of the known methodologies. But this has obvious problems. First methodologies evolve and change over time, with new methodologies regularly proposed. Second, we have already seen that such an approach has been prejudicial against indigenous science.

Where, then, should we turn? On the one hand, the point of advocating for the right to participate in science is not to exclude those with the capacity and motivation. But if this means that all people should be given an equal welcome the result will be a dilution of rigour, and a loss of effectiveness. Hence, to return to the starting theme, there has to be some gatekeeping. Alasdair MacIntrye argued that social practices have their internal standards of excellence that evolve over time [12]. Members of a chess club, for example, will know who the experts are. But for many social practices, there are external standards too. If the expert always loses in competition with people from outside the club we might start to doubt their expertise. Science too has internal standards of excellence, but it also has external standards, most notably in predicting and controlling, or otherwise navigating, the world, albeit often at a very distant remove. But this distant remove means that even if the ultimate test of science is practical, there is no practical test for every contribution to science at every stage.

The dilemma is that while science needs a form of gatekeeping to distinguish what we might call relevant and irrelevant reasons for exclusion, it seems impossible to state what the conditions of that gatekeeping should be. Even professional credentials can be misleading: there are people with PhDs promoting junk science, and indigenous researchers with no qualifications but with much to contribute. We seem to have no alternative to allowing each branch of science to set its own standards. But it must be constantly vigilant to ensure that it applies those standards in a non-prejudicial fashion. There are duties to respect, protect and promote whether or not we think they correlate with a human right to participate in science.

In sum I have argued that denying people the opportunity to participate in science deprives them of a route to a flourishing life, the opportunity to contribute (in this way) to the lives of others, and a route to creating results or other outputs that are capable of amazing themselves and others. If we believe that there is a human right to participate in science, we can see it as correlating with (at least) three types of duties: to respect, to protect and to promote, held by multiple agents. The recognition of such a right would be of great benefit to groups that are currently in whole or part excluded from the scientific enterprise, including women, minoritized groups and indigenous scientists. However, citizen science presents a more difficult challenge. In some cases, citizen science can be highly beneficial. But

when 'conventional wisdom' is challenged on poorly justified grounds, we start to see reasons for exclusion. But finding grounds for inclusion and exclusion is a fraught business, and we must make sure scientists do not replicate the prejudicial grounds that gave rise to the concern of unjustified exclusion in the first place.

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