Democratic Values: A Better Foundation for Public Trust in Science

S. Andrew Schroeder

Abstract

There is a growing consensus among philosophers of science that core parts of the scientific process involve non-epistemic values. This undermines the traditional foundation for public trust in science. In this paper I consider two proposals for justifying public trust in value-laden science. According to the first, scientists can promote trust by being transparent about their value choices. On the second, trust requires that the values of a scientist align with the values of an individual member of the public. I argue that neither of these proposals work and suggest an alternative that does better. When scientists must appeal to values in the course of their research, they should appeal to democratic values: the values of the public or its representatives.

1 Introduction

The American public's trust in science is a complicated matter.[1] Surveys reveal that trust in science has remained consistently high for decades, and scientists remain among the most highly-trusted professional groups (Funk [2017]). However, within some segments of society (especially the politically

---

[1] I focus on the American context because it is the one with which I'm most familiar. The story in many other parts of the world is similar.

conservative) trust has declined significantly (Gauchat [2012]), and there are serious gaps in trust on certain issues, such as climate change, vaccine safety, and GM foods (Funk [2017]). The picture, then, is a complex one, but on balance it seems clear that things would be better if the public placed greater trust in science and scientists, at least on certain issues.

As a philosopher, I am not in a position to determine what explains the lack of trust in science, nor to weigh on what will in fact increase trust. Instead, in this paper I will look at the question of what scientists can do to merit the public's trust — under what conditions the public should trust scientists. Indeed, it seems to me that we need to answer the normative question first: if we take steps to increase public trust in science, our goal should not simply be to make scientists trusted, we should also want them to be trustworthy.

In what follows, I will first explain how recent work in the philosophy of science rejecting the so-called 'value-free ideal' undermines the traditional justification given to the public for trusting science. I will then consider two proposals that have been offered to ground public trust in value-laden science: one calling for transparency from scientists about values that have influenced their work, the second calling for an alignment of values between scientists and members of the public. I will argue that the first proposal backfires — in many cases, it rationally should decrease trust in science — and that the second is impractical and, even if it could be made to work, would lead to an undesirable politicization of science. I will then present a proposal that is imperfect, but better than the alternatives: when scientists must appeal to non-epistemic values in the course of their work, they should appeal to democratic values — roughly, the values held by the public or its representatives.

2 Trust and the Value-Free Ideal

Why should the public trust scientists? The typical answer to that question points to the nature of science. Science, it is said, is about facts, and not values. It delivers us objective, verifiable truths about the world — truths not colored by political beliefs, personal values, or wishful thinking. Of course, there

are scientists who inadvertently or intentionally allow ideology to influence their results. But these are instances of bad science. Just as we should not allow the existence of incompetent or corrupt carpenters to undermine our trust in carpentry, we should not allow the existence of incompetent or corrupt scientists to undermine our trust in science. So long as we have institutions in place to credential good scientists and root out corrupt ones, we should trust the conclusions of science.

There is, unfortunately, one problem with this story: science isn't actually like that. In the past few decades, philosophers of science have shown that even good science requires an appeal to non-epistemic values. Without wading into the nuanced differences between views, I think it is fair to say that there is a growing consensus among philosophers of science that non-epistemic values can appropriately play a role in at least some of the following choices: selecting scientific models, evaluating evidence, structuring quantitative measures, defining concepts, conducting statistical analyses, and preparing information for presentation to non-experts.[2]

These value choices can have a significant impact on the outcome of scientific studies. Consider, for example, the influential Global Burden of Disease Study (GBD). In its first major release it described itself as aiming to 'decouple epidemiological assessment from advocacy' (Murray and Lopez [1996], p. 247). In the summary of their ten volume report, the authors describe their study as making 'a number of startling individual observations' about global health, the first of which was that, '[t]he burdens of mental illnesses…have been seriously underestimated by traditional approaches… [P]sychiatric conditions are responsible…for almost 11 per cent of disease burden worldwide' (Murray and Lopez [1996], p. 3). Many others have cited and relied on the GBD's conclusions concerning the extent of mental illness globally (Prince *et al.* [2007]). And nearly two decades later, the same GBD authors, in commenting on the legacy of the 1996 study, proudly noted that it 'brought global, regional, and local attention to the burden of mental health' (Murray *et al.* [2012], p. 3).

---

[2] On these points see for example (Reiss [2017]; Elliott [2017]).

It turns out, however, that the reported burden of mental health was driven largely by two value choices: the choice to discount and to age-weight the health losses measured by the study. Discounting is the standard economic practice of counting benefits farther in the future as less significant than otherwise similar benefits in the present, and age-weighting involves giving health losses in the middle years of life greater weight than otherwise similar health losses among infants or the elderly. Further details about discounting and age-weighting aren't relevant to this paper. For our purposes, what is important is that the study authors acknowledged that each reflects a value judgment, and that those value choices could reasonably have been made differently, or even omitted from the study entirely (Murray [1996]; Murray *et al*. [2012]).[3] Given other methodological choices made by the authors, these two weighting functions combine to give relatively more weight to health conditions which (1) commonly affect adults or older children (rather than the elderly or young children), (2) have disability (rather than death) as their primary impact, and (3) have their negative effects relatively close to the onset or diagnosis of the condition (rather than far in the future). It should not be surprising, then, that when the GBD authors ran a sensitivity analysis to see how the decision to discount and age-weight affected the results, they discovered that the conditions most affected by these choices — unipolar major depression, anaemia, alcohol use, bipolar disorder, obsessive-compulsive disorder, chlamydia, drug use, panic disorder, post-traumatic stress disorder — were largely composed of mental health conditions (Murray and Lopez [1996], p. 282). Overall, the global burden of disease attributable to psychiatric conditions drops from 10.5% to 5.6% when the results are not age-weighted or discounted (Murray and Lopez [1996], p. 261, p. 281).

I don't want to comment here on the wisdom of the GBD scientists' decision to discount and age-weight.[4] They offer clear arguments in favor of doing so and many other studies have done the same, so

---

[3] Indeed, in 2012 the GBD ceased age-weighting and discounting. There was also a third value choice that drove the large burden attributed to mental health: the choice to attribute all suicides to depression (Murray and Lopez [1996], p. 250). Because I do not know precisely how this affected the results, I set it aside here. For much more on discounting, age-weighting, and other value choices in the GBD, see (Murray [1996]; Schroeder [2017]).

[4] I offer some commentary in (Schroeder [*forthcoming*]).

at minimum I think their choices were defensible. The point is that what was arguably the top-billed result of a major study — a result which was picked up on by many others, and which was still being proudly touted by the study authors years later — was not directly implied by the underlying facts. It was driven in large part by a pair of value judgments. Had the GBD scientists had different views on the values connected to discounting and age-weighting, they would have reported very different conclusions concerning the global impact of mental illness.[5]

This case is not unique. The dramatically different assessments given by Stern and Nordhaus on the social cost of carbon can largely be traced to the way each valued the present versus the future (Weisbach and Sunstein [2009]). Similar conclusions are plausible concerning the value choices involved in classifying instances of sexual misbehavior in research on sexual assault, the value choices impacting the modeling of low-level exposures to toxins (Elliott [2011]), and the value choices involved in constructing price indices (Reiss [2008]).

A natural — and not implausible — response to these cases is to suggest they are outliers. Although some scientific conclusions are sensitive to value choices, the vast majority are not. The Earth really is getting warmer and sea levels really are rising, due to human activity. Vaccines really do prevent measles and really don't cause autism. These conclusions are not sensitive in any interesting way to non-epistemic value judgments made by scientists in the course of their research. The problem, however, is that there is no clear way for a non-expert to verify this — to tell which cases are the outliers and which are not. This, I think, justifies a certain amount of skepticism. 'Although some of our conclusions do depend on value judgments, trust us that *this* one doesn't,' isn't nearly as confidence-inspiring as, 'Our conclusions depend only on facts, not values.'

I conclude, then, that rejecting the view of science as value-free, combined with high-profile examples of scientific conclusions that do crucially depend on value judgments, undermines the claim of

---

[5] Although the sensitivity analysis referenced above was conducted by the original study authors, they did not go on to temper or qualify their prominent claims concerning the global impact of mental illness. To my knowledge, this paper is the first to draw attention to it.

science to public trust in a significant way. In other words, it explains why it may be rational for the public to place less trust in the conclusions of science on a broad range of issues — including on issues, such as climate change and vaccine safety, where major conclusions are not in fact sensitive to different value judgments.[6]

3 What Kind of Trust?

Before moving forward, it is important to get clearer on what I mean when I speak of trust in science, and the trustworthiness of scientists. Philosophers have come up with insightful and nuanced analyses of trust, and some philosophers of science have brought those accounts to bear on the matter of public trust in science.[7] I think these complex accounts of trust capture something important, and I agree that they should (ultimately) be brought to the discussion of trust in science. In this paper, though, I will work with a much more modest and flatfooted account — much closer to what many philosophers working on trust call (mere) reliance.[8] As I will understand it, a reliably-obtained scientific result is trustworthy to a non-expert to the extent that it is reasonable (or rational, or justifiable) for the non-expert to accept that result as a premise in practical reasoning.[9] Concretely: the scientific consensus on climate change is trustworthy to some person, to the extent that it would be reasonable or rational or justifiable for her to act on the basis of that consensus.

---

[6] For similar conclusions see (Douglas [2017]; John [2015], [2017]; Wilholt [2013]; Irzik and Kurtulmus [*forthcoming*]; Elliott and Resnik [2014]; de Melo-Martín and Intemann [2018], ch. 9).

[7] See, for example, (Irzik and Kurtulmus [*forthcoming*], [*forthcoming-b*]), whose views I will discuss later, and (Almassi [2012]).

[8] Why do I still frame this as a paper about *trust*, rather than about reliance? Because, for the reasons I give later in this section, I think that my proposal is responsive to the concerns that often motivate people who lament the lack of public trust in science. So I believe my proposal is appropriately characterized as a contribution to the literature on public trust in science.

[9] Compare the account of trust in (John [2017]). I include the 'reliably-obtained' caveat to set aside cases where scientists employ epistemically faulty research methods, since such cases are not the focus of this paper. I am interested in cases where deficits in trust can be traced to different value judgments. I thank an anonymous reviewer for suggesting this addition.

Why work from such an admittedly impoverished account of trust? My main justification for doing so is that if science were trustworthy in the sense I describe, we would avoid most of the practical problems which have led people to lament the lack of trust in science. Children would be vaccinated and taught the theory of evolution in schools. We would take significant action to curb CO_2 emissions. So it seems to me that if we could figure out how to make science trustworthy (and, ultimately, trusted) in the sense I identify, that would be a huge advance — and it would remain an important achievement even if it turned out that science still lacked some of the characteristics picked out by more sophisticated philosophical accounts of trust.

Further, it seems likely that an account of scientific trustworthiness in my sense will prove useful to philosophers looking to define scientific trustworthiness in a more robust sense, since trustworthiness in my sense is plausibly a necessary condition of trustworthiness in a more robust sense. (Could a scientist be trustworthy in the robust sense if it was not rational for non-experts to accept her conclusions as bases for action?) So, if it is possible for science to be trustworthy in a more robust sense, we might expect that such an account will grow out of, or have some other close relationship to, scientific trustworthiness in my sense.

Finally, it is worth clarifying that trustworthiness as I have defined it is a matter of degree. A scientific result isn't trustworthy or untrustworthy *simpliciter*; it is more or less trustworthy. This suggests a number of important questions. (Just how trustworthy do we want science to be? Should we measure the success of an account of trustworthiness by how much it increases public trust? If so, relative to what baseline?) I am not sure how to answer such questions, or even if we have the philosophical tools to do so in a precise way, and so I will largely leave them in the background. My main goal will therefore be to argue that, all else equal, adopting my proposal would render science trustworthy to a significantly greater degree than would adopting either of the competing views I will consider.

4 Grounding Trust in Transparency

Good science is not value-free, which undermines the standard justification given for trust in science. What, then, can scientists do to merit the public's trust? The standard response has been to appeal to transparency. If values cannot or should not be eliminated from the scientific process, scientists should be 'as transparent as possible about the ways in which interests and values may influence their work' (Elliott and Resnik [2014], p. 649; see also Ashford [1998]; Douglas [2008]; McKaughan and Elliott [2018]). Obviously, in order for this proposal to work, scientists would need to be aware — much more aware than most are today — of the ways in which value judgments influence their work. But, since we have independent reason to want such awareness, let us assume that calls for transparency are accompanied by a mechanism for fostering such awareness among scientists.

Would such a proposal work? Transparency about values can help ground trust in some situations, but I see no reason to think that it should broadly support public trust in science. Transparency is generally useful in supporting — as opposed to eroding — trust if it enables the recipient of that information to determine how it has affected the author's conclusions. (Knowing I have a conflict of interest will typically reduce your trust in what I tell you, unless you can determine how that conflict influenced what I say.) Transparency, then, will promote trust in a broad, robust way only if the public understands how value choices influenced the results, and understands what alternative value choices could have been made and how they would have influenced the results. These criteria may be satisfiable when the effect of a value choice is relatively simple. Suppose, for example, that a scientist classifies non-consensual kissing as 'sexual assault', rather than placing it in a broader category of 'sexual misconduct', on the grounds that she believes it has more in common with rape (a clear instance of sexual assault) than it does with contributing to a sexualized workplace (a clear instance of sexual misconduct). The value judgment here is relatively simple to explain, an alternative classification is obvious, and (if the statistics involved are simple) the effect of alternative classification on the study may be relatively straightforward. So transparency could work here.

Many value choices, however, are much more complex. Think about choices embedded in complex statistical calculations — for example, those involved in aggregating climate models (Winsberg [2012]) or in calculating price indices (Reiss [2008]). In cases like these, it will be very hard to clearly explain the importance of any individual value choice and harder still to explain what alternative choices could have been made. Further, many studies involve a large number of value choices. I have identified, for example, more than ten value choices which non-trivially influenced the Global Burden of Disease Study's results (Schroeder [2017]). Even if each of those value choices could be explained individually, it would be virtually impossible for a non-expert to figure out the interaction effects between them.

What these cases show is that even if scientists make a serious effort at transparency — not simply listing their value judgments, but attempting to explain how those judgments have influenced their results — in many cases it simply won't be possible to communicate to the public how those values have impacted their work.[10] And, if the public can't trace the impact of those values, transparency doesn't amount to much more than a warning — offering, in many cases, a reason to distrust, rather than to trust. A parallel realization can be seen in the way many medical schools and journals have handled researchers' conflicts of interest. Whereas in the past disclosing conflicts of interest — essentially, transparency — was often regarded as sufficient, many have now realized that merely knowing about such conflicts does not appreciably help a reader to interpret a study. It is for that reason becoming more common for medical schools and journals to ban significant conflicts of interest.[11]

5 Grounding Trust in an Alignment of Values

---

[10] See (De Melo-Martín and Intemann [2009]) for a similar dissatisfaction with transparency. McKaughan and Elliott ([2018]) suggest that scientists, through a particular sort of transparency, should seek to facilitate 'backtracking' — that is, to enable non-experts to understand how values have influenced scientists' results and to see how those results might have looked given alternative values. They suggest that, at least in the cases they consider, this will frequently be possible. I am claiming that this will not generally be feasible.

[11] For examples, see Harvard Medical School's conflict of interest policy (<https://ari.hms.harvard.edu/interim-policy-statement-conflicts-interest-and-commitment>), and (Godlee *et al*. [2013]).

The previous section argued that transparency about values is not typically a solution to the problem of public trust in science. There is one case, though, where transparency — even about complex value judgements — does seem suitable to ground trust. If a scientist discloses her values to me and I see that they align with my own, then (assuming I have reason to trust her scientific competence), it seems that I should accept her conclusions even if I don't understand how her value judgments impacted those conclusions. This suggests that the initial distrust was not caused by the fact that values were hidden (a problem that would be resolved through transparency); it was caused by the fact that the values of scientists may diverge from the values of any individual member of the public.[12] To promote public trust in science, then, it seems that we need to eliminate that divergence. This is the insight that motivates Irzik and Kurtulmus ([*forthcoming*]; see also (Douglas [2017]; Wilholt [2013]), who argue that what they call 'enhanced' trust requires that a member of the public know that a scientist has worked from value choices that are in line with her own.

If this proposal were feasible I think that it would provide a good foundation for trust. And, in certain limited cases, it may be feasible. When science is conducted by explicitly ideological organizations, members of the public may be able to make quick and generally accurate judgments about what values scientists hold, and accordingly may be able to seek out research done by scientists who share their values. (A pragmatic environmentalist, for example, might be confident that scientists employed by the Environmental Defense Fund are likely to share her values.) And in cases where the same conclusion is reached by scientists working from a wide variety of evaluative perspectives, a member of the public may be able to conclude that one of those perspectives likely aligns with hers (even if, due to the complexity of the value judgments, she can't easily determine which).

---

[12] It is important to note here that distrust in science is greatest among those who identify as politically conservative, while studies show that university scientists in the U.S. overwhelming support liberal candidates for political office. Whether or not this in fact explains the distrust conservatives have in science, the argument thus far shows why such distrust could have a rational foundation.

Most science, however, is not conducted by explicitly ideological organizations; and it is uncommon to find the diversity required in the second case (and more uncommon still for a member of the public to be able to identify this).[13] In the remaining, large majority of cases, it will typically be very hard for members of the public to confidently determine whether a given study relied on value judgments similar to her own. Even when this can be done (perhaps as a result of admirable transparency and clarity on the part of a scientist), it will require sustained and detailed engagement from the public, who will have to pay close attention not just to the conclusions of scientific studies, but also to their methodology. Although such close attention to the details of science would be beneficial for a great many reasons, it unfortunately is not realistic on a broad scale. There are simply too many scientific studies out there that are potentially relevant to an individual's decisions for even attentive members of the public to keep up. If our model for trust in science requires an alignment of values between the scientist and individual members of the public, trust in science can't be a broad phenomenon. Further, I don't think we want our foundation for trust in science to make that trust accessible only to those with sufficient education and leisure time to explore the details of individual scientific studies.

I also worry that adopting this proposal would exacerbate another problem. Suppose the proposal works and, at least on some issues, members of the public are able to identify and rely on science conducted in accordance with their own values. This, I think, will likely lead to a further politicization of science, as each side on some issue relies only on scientists who share their values. Of course, once we allow a role for values in science, value-based scientific disagreement isn't necessarily a problem. Faced, for example, with one experimental design that is more prone to false positives and another that is more

_____

[13] Note that ideological diversity *within* scientific teams or research groups is not sufficient; it needs to be *across* research groups. On the aligned values proposal, what a member of the public needs to know is that science was grounded in values she shares. Since in many cases conducing a scientific study requires making a particular methodological choice (e.g. concerning what classification scheme or inductive risk threshold to use), trust (in the aligned values sense) requires that her values carried the day — and weren't, for example, ignored or watered-down or out-voted. I suspect that in practice it will typically be easier for a member of the public to directly identify studies grounded in values she shares, rather than determining that this sort of diversity across research groups obtains.

prone to false negatives, either choice may be scientifically legitimate. It may therefore be appropriate for more environmentally-minded citizens to rely on different studies than citizens more concerned about economic development. I worry, though, that in a culture where the public specifically seeks science done by those who share their values (and are told to do so by philosophers of science!), the result will be political gridlock. Further, it will be too easy to write off any differences in scientific conclusions as traceable to differing values — too easy for environmentalists to assume that any time pro-environment and pro-industry scientists reach different conclusions, it must be due to different underlying, legitimate value judgments. In reality, though, most such disagreements are the result of bad science. The worry, then, is that if we grow too comfortable with each side of an issue having its own science, it will be harder to distinguish scientific disagreements that can be traced to legitimate differences in values, from disagreements that are based on illegitimate value judgments or simple scientific error. This would be a major loss.

6 Grounding Trust in Democratic Values

I have argued that neither transparency about values nor an alignment of values can provide a broad foundation for public trust in science. Let me, then, suggest a proposal that, though imperfect, can do better. From what has been said so far, we can note a few features that a better solution should have. First, both the transparency and aligned values proposals ran into trouble because they require a great deal of attention and sophistication from the public. Most individuals simply don't have the training to understand more technical value choices or value choices embedded within complex calculations. And, even when such understanding is possible, it will often require a level of attention that will in practice be accessible only to the well-off. We should therefore look for a foundation for public trust which doesn't require such detailed understanding of or close attention to the methodology of individual scientific studies. Second, I suggested that the aligned values proposal, in telling individuals to seek out studies conducted in accordance with their own values, could reinforce a kind of politicization that would have

bad consequences. It would be better to find a proposal that wouldn't so easily divide scientists and the public along ideological lines. Third, the problem with the transparency proposal (which the aligned values proposal tried, impractically, to address) was that values, even if transparent, can be alien. In order for an individual to truly trust science, that science must be built on values that have some kind of legitimacy for her.

I think scientists can resolve two-and-a-half of these three problems by appealing to democratic values — the values held by the public and its representatives — when value judgments are called for in the scientific process. The details concerning democratic values go beyond what I can say here.[14] But, briefly, the idea is that we look to political philosophy to tell us how to determine the (legitimate) values representative of some population.[15] In some cases, those values might be the output of a procedure, such as a deliberative democracy exercise, a citizen science initiative, or a public referendum.[16] In other cases, it might be more appropriate to equate a population's values with the views currently held by its members, as determined through opinion surveys. In either case, the resulting values may need to be 'filtered' or 'laundered': 'filtering' may be necessary to remove politically illegitimate values (such as racist values), and 'laundering' to clean up values that are unrefined or based on false empirical beliefs. In cases where

_____

[14] Many other philosophers have argued that there should be an important place for democratic values in science. See, for example, (Kitcher [2011]; Intemann [2015]; Douglas [2005]). De Melo-Martín and Intemann ([2018], p. 126) briefly suggest that democratically endorsed values might promote trust in science. But they don't go into much detail, and they present their endorsement of democratic values alongside endorsements of transparency and promoting diverse values within the scientific community (echoing the aligned values proposal). Irzik and Kurtulmus [*forthcoming-b*] develop Kitcher's view, aiming to show how it could promote public trust in science in our non-ideal circumstances. Though I agree with much of they say, I don't think they provide a full discussion of one of the main cases I'll address: cases where individuals hold values that diverge from the majority. Further, I don't find their fallback position that 'basic' trust can still be had in such cases satisfactory. But their argument merits more discussion that I can offer here.

[15] Representation here should be interpreted in a normative (rather than mere statistical) sense.

[16] The extensive literature on 'mini-publics' offers a promising starting point. See (Escobar and Elstub [2017]). For an application to science, see (Kitcher [2011], pp. 222-226; Irzik and Kurtulmus [*forthcoming*-b]). Elliott [2017, chapter 7]) discusses many cases in which scientific research has in some significant way been informed by the values of the public. Though in some of these cases the 'public' is not appropriately representative, such examples may also provide useful starting points for working out the details of a democratic values approach.

there is a broad social consensus, that might count as the relevant democratic value; in cases where there is a bimodal distribution of values, we might say that there are two democratic values; and so forth.[17]

Suppose, then, that political philosophers, informed by empirical research, can give us a way of determining democratic values. I suggest that when value judgments are called for within the scientific process[18] — when scientists need to set standards for inductive risk, establish classification schemes for value-laden concepts like sexual assault, or choose an economic discount rate — scientists should use democratic values when arriving at their primary or top-line results (the sort of results reported in an abstract, executive summary, or in the initial portions of the analysis). Scientists could then offer a clearly-designated alternative analysis (perhaps in an appendix or online supplement) based on another set of values. (Obvious candidates would be their own values, or the values of their sponsoring agency.) I think this proposal can address two of the concerns with which I began this section, and can make some progress towards answering the third.

Let us first consider the too-much-attention and politicization problems. On the democratic values proposal, if an individual can trust that a study was competently carried out — a matter I'll return to below — then without digging into its methodological details she can know that its conclusions are based on objective facts plus democratic values.[19] This means that, in most cases, the public need not pay attention to the details of individual studies. All they need to look for are signs that a study was well-conducted, such as that it was published in a reputable journal. This solves the too-much-attention

_____

[17] There is obviously a problem here about determining the relevant population - a problem especially salient for work with international relevance. I leave this challenging problem for future work. If the democratic values proposal succeeds in the domestic case, we can then consider how to expand it to international issues.

[18] This proposal is restricted to value judgments that arise within the scientific process. In particular, I do not mean for it to apply to the choice of research topic. I believe that scientists should generally be free to choose research projects that are not the projects that would be chosen by the general public. (The public, however, is under no obligation to fund such projects.) I treat the choice of research topics differently than choices that arise within the course of research because I think that scientists have different rights at stake in each case. I discuss related issues in (Schroeder [2017b]).

[19] There may also, of course, be methodological choices not based on non-epistemic values (including choices based on epistemic values). I set these aside here, since they don't raise the same problems of trust I'm concerned with.

problem. Further, if scientific conclusions are based on objective facts plus democratic values, any two scientists investigating the same problem in the same social and political context should reach roughly the same conclusion.[20] This recovers a kind of objectivity for science — not objectivity as freedom from values, but objectivity as freedom from personal biases. On this picture, the individual characteristics of a scientist should have no impact on her conclusions — a conception of objectivity that has been defended on independent grounds (Reiss and Sprenger [2014]; Daston and Galison [2007]).[21] If they are both doing good science, the environmentalist and the industrialist should reach the same top-line conclusions. And if the environmentalist and industrialist reach different top-line conclusions, it means that one or the other has made some sort of error. This, I think, provides a solution to the politicization problem: on the democratic values proposal, good science (at least in its primary analyses) will speak with a single voice, or will offer a common reference point — common ground that can serve as a starting point for public discourse.

The democratic values proposal therefore solves two of the three problems we noted above. Of course, it only does so if the public can be confident that scientists really are making use of democratic values. Why should the public assume that? Right now, of course, the answer is that they shouldn't. For the democratic values proposal to work, it would have to be accepted and enforced by a significant portion of the scientific community, or by an easily-identifiable subset of the scientific community. If that were to happen, though, then the problem of identifying science grounded in democratic values becomes the more general one of how the public can trust scientists to enforce their own norms. The procedures and policies now in place work reasonably well, I think, to expose unethical treatment of research

---

[20] This may depend on the details of how we determine democratic values. If, for example, democratic values are determined through sampling the views of randomly-selected citizens, then it is possible that two scientists working in the same social and political context could settle on different democratic values. I set this problem aside for now. I suspect it will not be a serious one, and in any case determining how serious it is will depend on the details of how democratic values are to be determined - a task I cannot attempt in this paper.

[21] Boulicault ([2014]) suggests an 'Idiosyncrasy-Free Ideal' (IFI) for science (in contrast to the Value-Free Ideal) which matches this conception of objectivity. Boulicault and I ([forthcoming]) discuss the importance of the IFI and note that the democratic values proposal is one of several approaches to managing values in science which share a commitment to the IFI.

subjects, falsification of data, and certain other types of misconduct. I am therefore optimistic that, given a greater awareness of the role value judgments play in scientific research, a system could be devised to identify scientists who depart from a professional norm requiring the use of democratic values. In any case, though, this problem — of whether the public can trust scientists to enforce their own norms — is a more general one, not tied specifically to the recognition that science is value-laden.

7 Science, Values, and Democracy

I have argued that the democratic values proposal can address two of the problems that faced the alternative views. But what about the third? On the transparency proposal, the values of scientists can be alien. If a scientist conducts research based on her own values, then, unless I happen to share those values, I have no meaningful relationship to those values and so it is unclear why I should accept the conclusions that flow from them. There is, however, a relationship between my values and democratic values, even in cases where they diverge. If democratic procedures or methods were carried out properly, then my values were an input into the process which yielded democratic values. My values are, in a sense, represented in the output of that process. This, at least according to many political theorists, means that those values should have a kind of legitimacy for me. In a democracy, we regularly impose non-preferred outcomes on people when they are out-voted. So long as democratic procedures are carried out properly, this seems to be legitimate — not ideal, perhaps, but better than any available alternative. On the democratic values proposal, then, when a particular scientific conclusion is uncontested, the public can trust that that conclusion is one drawn solely from the facts, plus perhaps the values that we as a public share. For most of us, who don't have the time, inclination, or ability to dig into the details of each

scientific study we rely on — or else who have a strong commitment to democracy — that will usually be enough.[22]

I think that the foregoing provides a reasonable answer to the alien values concern. It is of course not a perfect answer. It would be better, in a certain sense, to give each member of the public access to 'personalized' science conducted in accordance with her values. This, however, is usually impractical, as we saw when discussing the aligned values proposal. So long as that is the case, there is no way to accommodate everyone. Democratic values seem like a reasonable compromise.

All of that said, the above account seems much more compelling in some cases than in others. Suppose a pesticide is declared to pose no health risks on the basis of a study grounded in democratic values. Sally, however, is an extremely risk-averse person when it comes to health and strongly suspects that her level of risk aversion is much higher than that of her co-citizens. I think that the above arguments can plausibly establish that (despite dissenting from the majority) Sally ought to recognize that for policy purposes the pesticide should be considered safe and accordingly the government should permit its use. But Sally's acceptance of this conclusion for policy purposes doesn't seem like it should extend to her personal decisions. If she is deciding whether to use the pesticide in her own garden, it seems reasonable for her not to place much stock in this study.[23] She might reasonably insist on knowing whether the pesticide would be declared safe by a study that adopted her lower tolerance for health risks. Generally, I think the above response to the alien values concern is reasonably convincing when it comes to public or policy-relevant decisions. But it isn't very convincing when offered to individuals who know their values

---

[22] One further advantage of the democratic values proposal is that it removes a legitimate reason for distrust in scientific conclusions. As many scholars of science have shown, organizations with an agenda will often try to use science to further that agenda. That is commonly done through strategically making value choices (e.g. choosing extremely high or low standards of evidence, or unusual classification schemes). By taking value choices out of the hands of scientists or sponsoring agencies, this proposal would prevent such strategic and often misleading value choices.

[23] See (Irzik and Kurtulmus [*forthcoming-b*], section 3.3) for a similar observation. They trace the difference to a distinction between 'basic' and 'enhanced' trust, where the former is primarily a matter of meeting epistemic standards, while the latter also requires aligned values. I think, however, that the crucial difference is about political legitimacy: Sally should accept the results of the study for policy purposes not merely because of the epistemic qualifications of the scientists, but because the value choices used in the study were democratically legitimated.

lie far outside the political mainstream on some issue and who need to make personal decisions based on scientific conclusions. I will use the remainder of this section to, I hope, make the case that this concern, although serious, is not quite as serious as it might seem.

The first thing to note is that, in cases like these, the democratic values proposal fares no worse (or at least not much worse) than the transparency or aligned values proposals. The democratic values proposal is fully consistent with transparency - something we have independent reason to want.[24] So, in cases where the transparency proposal works (cases where the value choices are few, easy to understand, and computationally simple), the same advantages can be had with the democratic values proposal. If Sally has the time and expertise to do so, she can look at the pesticide study to determine whether the pesticide would have been declared safe, given a lower tolerance for health risks.[25] Also, recall that I am proposing only that primary or top-line results be based on democratic values. In cases where value judgments can make a big difference — as in the Global Burden of Disease Study case discussed earlier, or in the choice of economic discount rate in climate models — we might hope that scientists who hold contrary values will note the dependence of those results on values by offering secondary, alternative analyses that begin from different value judgments. In this case, if the pesticide would have been declared unsafe given a lower tolerance for risk, we might hope that scientists or organizations with views similar to Sally's will call attention to that. If she has the time and ability to do so, Sally can seek out the secondary analyses done by risk-averse scientists, as the aligned values proposal would recommend.

If the foregoing is correct, the democratic values proposal does better than the alternatives in most respects, and no worse in others. That should be sufficient reason to prefer it. But I think we can say a bit more. In what cases is a complaint like Sally's most compelling? It is not, I think, when it comes from people whose values lie outside the mainstream on some issues, but within the mainstream on many other

---

24 John ([2018]) questions the value of transparency in scientific communication, arguing that any value it has is contingent and merely instrumental. I largely agree with John, though I suspect I am more optimistic than he is that a full account of the ethics of scientific communication will include robust norms of transparency.

25 In McKaughan and Elliott's ([2018]) parlance, she can 'backtrack'.

issues. People like that are generally well-served by the democratic values proposal, since they will 'win' more often than they 'lose'. The much more compelling complaint comes from people whose values consistently lie outside the mainstream — people who are consistently out-voted. Oftentimes (though of course not always) when this happens, it involves individuals who are members of groups that are or have been marginalized by mainstream society. Think, for example, of cultural or (dis)ability-based groups whose values and ways of life have been consistently treated as being less valuable and worthy of respect than the values and ways of life of the majority.

I think the democratic values proposal has two important features that can partially address these especially serious complaints. First, remember that the democratic values proposal launders and filters the actual values held by the public. Certain values — for example, racist or sexist ones — conflict with basic democratic principles of equal worth, and so cannot be candidate democratic values. Thus, even in a racist society, telling scientists to work from democratic values will not tell them to work from racist values. Second, in what I regard as its most plausible forms, democracy is not a form of government based on one person-one vote. It is a form of government based on the idea that all citizens are of equal worth and have a right to equal consideration. This suggests that in cases where minority values are held by a group that is or has been the subject of exclusion or discrimination, democratic principles may sometimes require giving those values extra weight, or a voice disproportionate to their statistical representation in the population, as a way of accounting or compensating for their past or present exclusion. Thus, democratic principles may in some cases require treating the values held by an excluded minority as democratically on a par with the conflicting values held by the majority.[26]

These considerations, I think, lessen the force of the complaint from people with minority values making personal decisions, especially in its most serious incarnation. But they don't eliminate it. There will still be people whose values will consistently be marginalized by the democratic view. In such cases, the main recourse available is an appeal to the alternative or secondary results, grounded in other values,

---

[26] See (Kelman [2000]) for an example of this sort of argument in the context of disability.

permitted by the democratic values proposal. If individuals with minority views can count on there being scientists who share those views, they can expect that the kind of analysis they would prefer will be out there, at least in cases where it makes a difference. Of course, scientists are currently a rather homogeneous bunch along many dimensions. So this suggests that the call to work from democratic values provides (yet further) support for the importance of increasing diversity within the scientific community.

8 Grounding Science in Democratic Values

The foregoing sections have, I hope, established that the democratic values proposal is a better option than the transparency and aligned values proposals, which I take to be two of the most prominent and promising alternatives.[27] It isn't perfect, especially in handling cases where people who know their values lie outside the mainstream look to science for information relevant to personal decisions. But I argued that even in those cases the democratic values proposal fares no worse than the transparency and aligned values proposals. The most serious objection to grounding science in democratic values, I think, is a practical one. To ground science in democratic values, scientists need to determine what those values are. This proposal therefore places an additional burden on scientists, beyond those required by the transparency and aligned values proposals.[28] Is this a reasonable thing to ask of them?

The short answer to this question, I think, is: we don't know! Until we work out the details of how to implement a democratic values approach, it is hard to know how burdensome it would be, and it is

---

[27] Of the other options out there, the most promising, I think, is Stephen John's high epistemic standards proposal ([2015], [2017]). John proposes that, to ensure scientific results are trustworthy, scientists should employ uniformly high epistemic standards in inductive risk cases — essentially, scientists should endorse claims only if they are highly certain they are true. One concern I have with John's proposal is that while it may work for inductive risk cases, it can't easily be applied to the many other value-laden determinations scientists must make, such as determining classification schemes, tuning models to different features, and so forth. John's proposal therefore is less comprehensive than the proposals discussed here. Further, in inductive risk cases, John acknowledges that his proposal has trouble dealing with scenarios where it seems appropriate for scientists to report results that are far from certain — to report, for example, that a substance is 90% likely to cause cancer. For a more in-depth comparison of the democratic values approach with John's proposal, see (Boulicault and Schroeder [*forthcoming*]).

[28] For a different, ethical sense in which democratic values may be burdensome, see (Schroeder [2017b]).

also hard to know whether there are ways to lessen any burdens while keeping the benefits of the democratic values approach. The argument I have given, though, shows that the democratic values proposal would yield important benefits when it comes to trust. It seems to me that these benefits are more than sufficient to justify fleshing out and piloting the democratic values approach, in order to determine how burdensome it would be. I cannot do that work here, but let me close with a few reasons for thinking that, at least in many cases, it wouldn't be especially difficult to at least approximate a democratic values approach.

On some issues, such as the economic discount rate, we already have a wealth of data about the public's values. On other issues, I don't think it would be especially challenging to piece together what the public values from existing data. It wouldn't be hard, for example, for scientists studying sexual harassment to construct a classification scheme that was reasonably faithful to how the public views different violations. Further, in many cases we at least know enough to rule out some approaches as inconsistent with democratic values. We may not, for example, know the public's standards for inductive risk when it comes to serious health hazards, but when tobacco companies continued to say, despite mounting evidence, that the connection between smoking and lung cancer was unproven, they clearly were appealing to a standard of proof much more stringent than what the public would want.

In cases where data is lacking, it is true that the democratic values approach will direct scientists to collect it. It would probably be onerous to require individual scientists or research groups to do this, but, fortunately, I believe that a proponent of the democratic values approach shouldn't usually recommend this. As persuasively argued by Wilholt ([2013], [2016]), we have independent reason to want consistent standards across scientific studies. It would be very confusing and epistemically detrimental for scientists if epidemiological studies each used their own disease classification schemes, or if economic studies on the same topic used idiosyncratic discount functions. This suggests that the job of determining democratic values should, at least in the most important cases, reside not with individual scientists or research groups, but rather with scientific societies. These larger bodies often do have the

resources to conduct or commission studies to determine what the public values (or, to determine what the public would value if they were informed) on the questions that come up most commonly in their respective fields. This makes me optimistic that we could at least go a long way towards implementing a democratic values approach without placing undue burdens on individual scientists. In light of the potential benefits of grounding science in democratic values, I think it is worth seeing whether that optimism is well-placed.

S. Andrew Schroeder

Department of Philosophy,

Claremont McKenna College

Claremont, CA, USA

aschroeder@cmc.edu

References

Almassi, B. [2012]: 'Climate Change, Epistemic Trust, and Expert Trustworthiness', *Ethics and the Environment,* **17**, pp. 29-49.

Ashford, N. [1988]: 'Science and Values in the Regulatory Process', *Statistical Science,* **3**, pp. 377-83.

Boulicault, M. [2014]: *Science, values and the argument from inductive risk: in favour of a social alternative to the value-free ideal,* M.Phil Dissertation: University of Cambridge.

Boulicault, M. and Schroeder, S.A. [*Forthcoming*]: 'Values, Idiosyncrasy, and Trust in Science', in K. Vallier and M. Weber (eds.), *Social Trust,* London: Routledge.

Daston, L. and Galison, P. [2007]: *Objectivity,* Cambridge, MA: MIT Press.

De Melo-Martín, I. and Intemann, K. [2018]: *The Fight Against Doubt: How to Bridge the Gap Between Scientists and the Public,* Oxford: Oxford University Press.

—. [2009]: 'How do disclosure policies fail? Let us count the ways', *The FASEB Journal,* **23**, pp. 1638-42.

Douglas, H. [2017]: 'Science, Values, and Citizens', in A. Adams, Z. Biener, U. Feest, and J. Sullivan (eds.), *Eppur si muove: Doing History and Philosophy of Science with Peter Machamer,* Dordrecht: Springer.

—. [2008]: 'The Role of Values in Expert Reasoning', *Public Affairs Quarterly,* **22**, pp. 1-18.

—. [2005]: 'Inserting the Public into Science', in S. Maasen and P. Weingart (eds.), *Democratization of Expertise? Exploring Novel Forms of Scientific Advice in Political Decision-Making*, Dordrecht: Springer.

Elliott, K. [2011]: *Is a Little Pollution Good for You? Incorporating Societal Values in Environmental Research,* Oxford: Oxford University Press.

—. [2017]: *A Tapestry of Values: an Introduction to Values in Science,* Oxford: Oxford University Press.

Elliott, K. and Resnik, D. [2014]: 'Science, Policy, and the Transparency of Values', *Environmental Health Perspectives,* **122**, pp. 647-50.

Escobar, O. and Elstub, S. [2017]: 'Forms of Mini-Publics: an Introduction to Deliberative Innovations in Democratic Practice', NewDemocracy Research and Development Note, available at <www.newdemocracy.com.au/research/research-notes/399-forms-of-mini-publics>.

Funk, C. [2017]: 'Real Numbers: Mixed Messages about Public Trust in Science', *Issues in Science and Technology,* **34**, [np].

Gauchat, G. [2012]: 'Politicization of Science in the Public Sphere: A Study of Public Trust in the United States, 1974 to 2010', *American Sociological Review,* **77**, pp. 167-87.

Godlee, F., Malone, R., Timmis, A., Otto, C., Bush, A., Pavord, I., and Groves, T. [2013]: 'Journal policy on research funded by the tobacco industry', *BMJ,* **347**, f5193.

Intemann, K. [2015]: 'Distinguishing between Legitimate and Illegitimate Values in Climate Modeling', *European Journal for Philosophy of Science,* **5**, pp. 217-32.

Irzik, G and Kurtulmus, F. [*Forthcoming*]: 'What is Epistemic Public Trust in Science?' *British Journal for Philosophy of Science*, https://doi-org.ccl.idm.oclc.org/10.1093/bjps/axy007.

—. [*Forthcoming-b*]: 'Well-ordered science and public trust in science', *Synthese,* https://doi.org/10.1007/s11229-018-02022-7

John, S. [2018]: 'Epistemic trust and the ethics of science communication: against transparency, openness, sincerity and honesty', *Social Epistemology,* **32**, pp. 75-87.

—. [2017]: 'From Social Values to P-Values: The Social Epistemology of the Intergovernmental Panel on Climate Change', *Journal of Applied Philosophy,* **34**, pp. 157-71.

—. [2015]: 'Inductive risk and the contexts of communication', *Synthese,* **192**, pp. 79-96.

Kelman, M. [2000]: 'Does Disability Status Matter?' in L. Francis and A. Silvers (eds.), *Americans with Disabilities: Exploring Implications of the Law for Individuals and Institutions,* London: Routledge.

Kitcher, P. [2011]: *Science in a Democratic Society,* Amherst, NY: Prometheus.

McKaughan, D. and Elliott, K. [2018]: 'Just the Facts or Expert Opinion? The Backtracking Approach to Socially Responsible Science Communication', in S. Priest, J. Goodwin, and M. Dahlstrom (eds.), *Ethics and Practice in Science Communication*, Chicago: University of Chicago Press.

Murray, C. [1996]: 'Rethinking DALYs', in C. Murray and A. Lopez (eds.), *The Global Burden of Disease*, Cambridge, MA: Harvard University Press.

Murray, C. and Lopez, A. (eds). [1996]: *Summary: The Global Burden of Disease*, Cambridge, MA: Harvard University Press.

Murray, C. *et al*. [2012]: 'Supplementary appendix to GBD 2010: design, definitions, and metrics', *Lancet*, **380**, pp. 2063-66.

Prince, M., Patel, V., Saxena, S., Maj, M., Maselko, J., Phillips, M., and Rahman A. [2007]: 'No health without mental health', *Lancet*, **370**, p. 859-77.

Reiss, J. [2017]: 'Fact-value entanglement in positive economics', *Journal of Economic Methodology*, **24**, pp. 134-49.

—. [2008]: *Error in Economics: The Methodology of Evidence-Based Economics*, London: Routledge.

Reiss, J. and Sprenger, J. [2014]: 'Scientific Objectivity', in E.N. Zalta (ed.), *Stanford Encyclopedia of Philosophy*, available at <plato.stanford.edu/entries/scientific-objectivity/>

Schroeder, S. A. [2017]: 'Value Choices in Summary Measures of Population Health', *Public Health Ethics*, **10**, pp. 176-87.

—. [2017b]: 'Using Democratic Values in Science: an Objection and (Partial) Response', *Philosophy of Science*, **84**, pp. 1044-54.

—. [*Forthcoming*]: 'Which Values Should We Build Into Economic Measures?' *Economics and Philosophy*, https://doi.org/10.1017/S0266267118000317.

Weisbach, D. and Sunstein, C. [2009]: 'Climate Change and Discounting the Future: A Guide for the Perplexed', *Yale Law and Policy Review*, **27**, pp. 433-57.

Wilholt, T. [2013]: 'Epistemic Trust in Science', *British Journal for Philosophy of Science*, **64**, pp. 233-53.

—. [2016]: 'Collaborative Research, Scientific Communities, and the Social Diffusion of Trustworthiness', in M. Brady and M. Fricker (eds.), *The Epistemic Life of Groups: Essays in the Epistemology of Collectives*, Oxford: Oxford University Press.

Winsberg, E. [2012]: 'Values and Uncertainties in the Predictions of Global Climate Models', *Kennedy Institute of Ethics Journal*, **22**, pp. 111-37.