

ON THE IDEAL OF AUTONOMOUS SCIENCE

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INTRODUCTION: THE PROBLEM OF FUNDING

Something is wrong with the way science is funded. Our era is one of fantastic science – science that uses unthinkable quantities of energy to crack open subatomic particles and describe the origins of the universe, science that dedicates thousands of brilliant minds to ‘deciphering the code of life’, science that in our nightmares is capable of destroying the biosphere of an entire planet, and in our hopes is the only thing capable of saving it. Fantastic science that requires mundane but still amazing amounts of financial support. And this financial support has had an effect on science. Our fantastic science has become polluted, distorted, corrupt, and biased by the very forces that enable its existence.

At least, so we are told, by philosophers, public intellectuals, journalists, and scientists themselves. These voices speak from the political right¹ and the political left², and from the ‘politically neutral’ standpoint of ‘science itself’. In such a politically partisan and divisive era – and our partisanship is even more fanatic than our science is fantastic – such a chorus of warnings ought to be taken seriously.

But what does it mean to say that science is polluted, distorted, corrupt, and biased? Just what is the ‘problem of funding’? Such a question will be answered, implicitly or explicitly, by appeal to a philosophy of science. Not philosophy of science in the narrow sense of (right-wing) logical empiricism or the philosophical programmes that immediately succeeded it, but in the thicker sense of a philosophy of science that describes the way science ought to be, and the way science ought to relate to society. That is, a philosophy of science in the sense of being a regulative ideal of science, what Philip Kitcher has called³ an account of ‘well-ordered science’.

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¹Happer, 2003

²Union of concerned scientists, 2004

³Kitcher, 2001

In this paper, I will consider one such ideal. It is a common ideal, though an increasingly controversial one. It is the ideal that science is, or should be, free, independent, and untouched by debates over political and cultural values – what I will call *socio-political values*. It is the *ideal of autonomous science*. I will first make an important distinction, state two versions of the ideal, and identify it in both philosophical and non-philosophical literature. I will explain what account the ideal can give of the problem of funding. I will then, however, go on to criticise this ideal. It is not independent of socio-political values in the way that it purports to be. It is not *value-neutral*. It is, in particular, closely tied to an extreme and, at best, highly controversial version of libertarianism. I will conclude by asking what implications this has for the status of the ideal, and our efforts to use it to account for the problem of funding.

1. TWO DEFINITIONS AND TWO IDEALS

When we talk about ‘science’, we mean one of at least two distinct things: the practice of science, and the body of theory that this practice produces. These two definitions of science correspond to two different ideals of autonomous science. In this section, I will first present the two definitions of science, and then the two ideals.

1.1. Theory and practice. There are a variety of ways of defining a scientific theory. A metaphysician might want to talk about a theory as a set of propositions – an abstract collection of abstract objects. Other, more metaphysically adverse philosophers might prefer a slightly more concrete set of sentences. Still others have criticised both of these approaches as inappropriately narrow, and argue that a theory should be understood as a model or set of models, with further disagreement over just what a model is.⁴

While I have a slight preference for one of the model approaches, I do not need to choose between these different definitions of theory here. Whatever definition of theory we adopt, we can define *science as theory* as one theory or a collection of several closely related theories. On this definition, to speak very roughly, physics is the theory or collection of theories presented as the content of physics textbooks,

⁴Cf. Longino, 2002, 113-5

chemistry is the theory or collection of theories presented as the content of chemistry textbooks, and so on. There may be difficulties distinguishing one theory from another – is a textbook of quantum chemistry physics or chemistry or both? – but I think these difficulties are best parsed once a definition of theory is in place, and are not important here.

Science as theory is contrasted with *science as practice*. Here I do have a particular definition of the technical term in mind: Alasdair MacIntyre's.

By a 'practice' I am going to mean any coherent and complex form of socially established cooperative human activity through which goods internal to that form of activity are realized in the course of trying to achieve those standards of excellence which are appropriate to, and partially definitive of, that form of activity, with the result that human powers to achieve excellence, and human conceptions of the ends and goods involved, are systematically extended.⁵

Physics, chemistry, and biology are among the handful of examples MacIntyre gives of practices. For our purposes, a practice has three crucial components:

- (1) a socially organised set of practitioners;
- (2) a set of 'goods internal to that form of activity'; and
- (3) a set of 'standards of excellence' for those goods.

As a first pass, biology has all three: the biologists themselves, organised into a network of labs, departments, and institutions; biological theory (in the open-ended sense we left 'theory' above); and the epistemic standards by which biological theory is judged.

MacIntyre makes an important distinction between two kinds of good in terms of practices:

There are thus two kinds of good On the one hand there are those goods externally and contingently attached . . . to . . . practices by the accidents of social circumstance . . . such as prestige, status and money. There are always alternative ways for achieving such goods, and their achievement is never to be had *only* by engaging in some particular

⁵MacIntyre, 1984, 187

kind of practice. On the other hand there are the goods internal to the practice . . . which cannot be had in any way but by . . . [engaging in practices] of that specific kind.⁶

For a given practice, call the first type of goods *external goods*, and the second type *internal goods*. If science is indeed a practice, and does indeed have a distinctive set of internal goods according to MacIntyre's definition, then science as theory is the most obvious candidate for those internal goods.⁷ While external goods are certainly important for science as practice – one needs a great deal of money if one is going to build a superconducting supercollider, after all – they are not its *raison d'être*. Instead, the proper purpose of science as practice is the pursuit of excellent science as theory.

Beyond internal goods, science as practice also has standards of excellence for those goods. I will refer to these standards as *the internal standards of science as practice*. If the internal goods of science as practice are science as theory, then the internal standards are the standards by which science as theory is judged. As a first pass, these are the standards given by normative epistemology: one might say, for example, that excellent biological theory is biological theory produced by a reliable belief-forming mechanism. Just as choosing between definitions of theory was not necessary here, choosing between normative epistemologies is not necessary here.

All together, then, the first pass conception of science as practice involves an organised community of scientists pursuing excellent science as theory, where this excellence is understood epistemologically.

When I refer to science as practice in the remainder of this paper, I will usually have in mind primarily the set of practitioners – scientists – conceived as an agential community. For example, when I talk about biology or biology as practice engaging in stem-cell research – thereby treating biology as an agent – I mean some subcommunity of biologists collaboratively engaging in stem-cell research.

⁶*Ibid.*, 188, his emphasis

⁷There are subject-verb agreement problems here: 'science as theory' is a mass noun, and hence has no plural, while 'internal goods' is, grammatically speaking, the plural of a count noun. I hope the reader will indulge the occasional awkward phrase that results from this usage.

1.2. **Two ideals of autonomy.** Each of the definitions of science has its own ideal of autonomy. In this subsection, I will present the ideals as though *ex nihilo*; I will connect these ideals to specific texts in the next section.

First, recall from the previous subsection that science as practice has both internal goods and standards for those internal goods. As a first pass, those internal goods are science as theory, and those standards are given by normative epistemology. The ideal of autonomous science as theory is stated as a restriction on the standards – as a restriction on the normative epistemology.

The ideal of autonomous science as theory: The internal standards of science as practice are independent of any set of socio-political values.⁸

This definition is closely related to MacIntyre’s second definition of internal goods: ‘they can only be identified and recognized by the experience of participating in the practice in question. Those who lack the relevant experience are incompetent thereby as judges of internal goods.’⁹ Another useful gloss here is to say that science (as practice) has and pursues its own, private conception of the good.

If normative epistemology gives the internal standards, this ideal rules out any normative epistemology that incorporates – either implicitly or explicitly – socio-political values. For example, it would be inappropriate, according to this ideal, to call a piece of science as theory ‘excellent’ (or not) because it implied that global warming is primarily anthropogenic, and hence supported (or not) one’s political programme. The intuition here is that this gets the direction of fit between theory and belief backwards: one should adjust one’s political programme to fit the best available science as theory, not fit science as theory (by declaring it excellent or not) to one’s political programme.

The ideal of autonomous science as practice requires more subtlety. As a first pass,

- (1) Science as practice determines which internal goods to pursue only by the anticipated quality of those goods according to the internal standards of science as practice.

⁸While I use the declarative ‘are’, this ideal is to be understood as an imperative.

⁹*Ibid.*, 189

Combining this ideal with the ideal of autonomous science as theory gives us

- (2) Science as practice determines which internal goods to pursue only by the anticipated quality of those goods according to standards that are independent of any set of socio-political values.

This ideal is an attempt to answer the question ‘What research programmes does science pursue?’ The ideal counsels the questioner to pursue research programmes according to the standards of excellence internal to science as practice – standards which, according to the ideal of autonomous science as theory, are independent of any socio-political values. Hence, taking the global warming example up again, we should not pursue a research programme investigating the causes of global warming for any of the following reasons: because we want to pursue a public policy of reducing net carbon emissions, because we expect to make a lot of money off of trading carbon taxes, because someone will give us a lot of money to pursue this research, because we hate Al Gore, or because we are worried about the socio-economic consequences of rising ocean levels. Instead, we should pursue a research programme in global warming only if we anticipate the resulting science as theory to be of high epistemological quality.

This ideal is problematic for at least two obvious reasons.¹⁰ Consider, first, the infamous Tuskegee Syphilis Study. Suppose that, in this case, the understanding of syphilis the researchers anticipate from the study is of the highest quality. As per (2), the ideal of autonomous science as practice counsels the researchers to pursue this study. But clearly this study is ethically abhorrent, and should not be pursued. Ethical considerations constrain which research programmes should be pursued, and the ideal ought to reflect this.

Next, consider a group of particle physicists interested in investigating certain kinds of high-energy collisions between subatomic particles. They anticipate that the resulting science as theory will be excellent according to the internal standards of the practice of particle physics. However, this research programme requires an enormous investment of resources – everything and everyone needed to construct,

¹⁰Kitcher presents – and goes on to criticise – a similar view with similar qualifications in Kitcher, 2001, ch. 1.

power, and run a superconducting supercollider. The particle physicists are unable to legally procure these resources, and decide that the best way to do so is to kidnap and hold for ransom the five wealthiest people in the world. Again, the ideal counsels them to follow through with this ethically abhorrent plan.

What's gone wrong in these two cases? In the first, the methodology of the research programme itself was unethical. In the second, the resources needed to pursue the research programme cannot be legally acquired. For the ideal of autonomous science as practice to be even *prima facie* acceptable, these ethical side-constraints must be recognised.

This leads us to the following revised definition:

The ideal of autonomous science as practice: Science as practice determines which internal goods to pursue only by consideration of three factors:

- the anticipated quality of those internal goods according to the internal standards of science as practice;
- the legal and ethical permissibility of the proposed means of pursuing those internal goods; and
- the legal and ethical availability of the external goods needed to pursue those internal goods by the proposed means.

The ideal recognises that scientists do not automatically have access to all the resources needed to pursue their research programmes. They will need, for example, to petition governmental and commercial sponsors for the resources needed to build large and expensive pieces of equipment – their governments will not just spontaneously decide to build a superconducting supercollider and then look around for a physicist interested in using it.

At the same time, the ideal places limits on how far scientists can go in their pursuit of science as theory. Socio-political values have a legitimate, though extremely limited, rôle to play in *restraining* scientific research. Just as the ideal of autonomous science as theory was glossed as the thesis that science as practice has and pursues its own conception of the good, the ideal of autonomous science as practice can be glossed as the thesis that science as practice is as free as possible in pursuing its own conception of the good. It is, in particular, not permissible

for science as practice to harm others in its pursuit of its conception of the good, but this is the only real restriction. Since the ideal does not incorporate any other socio-political values – and, indeed, deliberately excludes them, and does so in an equal-opportunity manner – it is still reasonable to call it value-neutral.

I conclude this section with a few notes on the scope of these ideals and the scope of this paper.

These ideals are only meant to apply to ‘pure science’ or ‘basic research’, as opposed to ‘applied science’ and ‘applied research’. The development of a more efficient car engine might be based on new developments in materials science, but the car engine is a piece of technology while the materials science is, properly speaking, a development in pure science. At least, this distinction is taken as a background assumption by the ideal. If it is rejected, or if all ‘pure science’ is assimilated into ‘technoscience’, then the ideal can still be maintained as trivially or vacuously true. Hence, for the sake of argument and for the sake of deep criticism, I assume the distinction is non-trivial here.

These ideals can operate independently of each other. The ideal for science as practice uses only the abstract term ‘internal standards’, and does not presuppose that these standards are independent of socio-political values, as per the ideal for science as theory. One might, therefore, reject the ideal of autonomous science as theory, and embrace an essential rôle for socio-political values in the internal standards used to evaluate science as theory, while continuing to embrace the ideal of autonomous science as practice. On this view, the internal goods and standards of science of practice are not independent of socio-political values, but are still unique to and partially constitutive of science as practice. Science as practice still has its own particular conception of the good; it’s just that this good is not independent of socio-political values.

Continuing, as per the ideal of autonomous science as practice, science as practice is still as free as possible in pursuing its own conception of the good. While socio-political values inform the choice between research programmes, they do not determine this choice. Society is not dictating to science as practice what goods should be pursued. Instead, internalising these socio-political values and making

them part of its own conception of the good, science as practice decides *for itself* and *on its own* which internal goods to pursue. On this view, the ideal of autonomous science as practice is still a value-neutral ideal for science. The relationship between science as practice and society is not regulated in any direct and positive way by any socio-political values, but instead for the sake of producing the best possible science as theory (or whatever conception of internal goods science as practice has on this view) according to the internal standards of science as practice.

Finally, recall that we began by worrying about the problem of funding. Both ideals can be used to give an account of the problem. With the ideal of autonomous science as theory in mind, one can argue that funding has distorted the internal standards of science as practice. Science as theory is evaluated according to the socio-political values of the funders, and hence not independently of any set of socio-political values. As a result of the way it is funded, science as practice has failed to achieve, or has fallen away from, the ideal.

Similarly, with the ideal of autonomous science as practice in mind, one can criticise the way scientists choose which research programmes to pursue. Rather than choosing the most promising research programmes according to internal standards, scientists choose the research that will yield the most external goods – the most funding, the most fame, and so on, either for themselves or for their funders. This can be further specified in two ways. First, the problem might be with the community of scientists themselves: they have become corrupt, and are pursuing science for the sake of money, fame, and other external goods, rather than pursuing internal goods, pursuing science for its own sake.¹¹ Alternatively, the problem might be with the relationship between science as practice and society. If there are no non-partisan sources of funding – if funders only distributed resources on the basis of the potential for the research to confirm their socio-political values – then scientists are unable to pursue internal goods as the ideal counsels. In the first case, science has been *corrupted from within*; in the second case, science is being *interfered with from without*.

¹¹Cf. MacIntyre, 1984, 190

None of these three possibilities – the one for the ideal for science as theory and the two for the ideal for science as practice – are mutually exclusively, of course. They are also independent. One can readily imagine, for example, science as theory that is perfectly in line with the ideal for science as theory, but produced by science as practice that has been either corrupted or subject to external interference. Arguably, Nazi science looked like this.¹² In this case, one cannot appeal to the ideal for science as theory to identify the problem. One must appeal to the ideal for science as practice (or something to replace it).

The literature already contains substantial criticisms of the ideal of autonomous science as theory.¹³ Criticisms of the ideal of autonomous science as practice are much harder to find, and generally seem to be much less developed. However, as the two ideals are independent, a criticism of the ideal of autonomous science as theory may not apply to the ideal of autonomous science as practice. Hence, there is a need for well-developed criticisms of the ideal of autonomous science as practice. For the rest of this paper, I will therefore focus on this ideal. When I refer to science without qualification, I will mean science as practice.

2. THE IDEAL OF AUTONOMOUS SCIENCE IN THE LITERATURE

In the last section, I put forth the ideal of autonomous science without any philosophical context. Since my primary aim in this paper is to criticise and reject this ideal, it is incumbent on me to show that I am not attacking a strawman. In this section, I will identify the ideal in three works: a classic article by Michael Polanyi¹⁴, a chapter from Derek Bok's book on the problems of academic funding and commercialisation¹⁵, and James Robert Brown's recent discussion of the problem of funding from an epistemological perspective¹⁶.

2.1. Polanyi's autonomous republic. In 'The republic of science', Polanyi views science as a practice: 'scientists ... are in fact cooperating as members of a closely

¹²Cf. Proctor, 1988, ch. 10

¹³See, for instance, Longino, 1990, Harding, 1993/2004, and Dupré, 2007.

¹⁴Polanyi, 1962

¹⁵Bok, 2003

¹⁶Brown, 2008

knit organisation'¹⁷, guided by the structures of this community 'towards the joint discovery of a hidden system of things'¹⁸. Polanyi's first (but not primary) concern in this piece is the way scientists choose which research programmes to pursue. Polanyi says that 'the decisions of a scientist . . . are designed to produce the *highest possible result* by the use of a *limited stock* of intellectual and material resources'¹⁹. I think it is reasonable to read the reference to a limited stock of material resources as paralleling the second and third factors from the ideal of autonomous science as I presented it above.

In speaking of the 'highest possible result' of a decision, Polanyi has in mind some evaluation of the resulting science as theory. He does not think we can make any predictions about applied research: science 'can advance only by essentially unpredictable steps, pursuing problems of its own, and the practical benefits of these advances will be incidental and hence doubly unpredictable'²⁰. The scientist can still make some reasonable, albeit fallible, predictions about her research by appeal to 'professional standards': she 'assesses the depth of a problem and the importance of its prospective solution primarily by *the standards of scientific merit* accepted by the scientific community'²¹.

Polanyi identifies five standards of scientific merit, though he collects three of them together. The first is 'plausibility' – a standard designed to keep out 'cranks, frauds and bunglers'²². The second and third are 'accuracy' and 'systematic importance'²³, which certainly sound like the classical theoretical virtues of empirical adequacy and theoretical scope²⁴. The fourth is 'intrinsic interest', which is not defined. Polanyi asserts, in illustration, that 'The inanimate things studied by physics are much less interesting than the living beings which are the subject of biology'²⁵. The fifth is 'originality' which, according to Polanyi, is the mechanism by which science makes

¹⁷*Ibid.*, 54

¹⁸*Ibid.*, 55

¹⁹*Ibid.*, 56, my emphasis

²⁰*Ibid.*, 62

²¹*Ibid.*, 57, my emphasis

²²*Op. cit.*

²³*Ibid.*, 58

²⁴Cf. Quine, 1976

²⁵Polanyi, 1962, 58

theoretical progress – original contributions ‘encourage[] dissent’ and ‘encourage rebellion against’²⁶ scientific orthodoxy. At least four of these are entirely internal to science, and arguably ‘intrinsic interest’ is a matter of ‘intrinsic scientific interest’ rather than an appeal to some socio-political values. Hence Polanyi is arguing that decisions about which research programmes to pursue are made by consideration of the anticipated quality of the resulting science as practice according to standards (at least as I read them) that are entirely internal to science.

2.2. Bok on commercial science. Derek Bok’s *Universities in the marketplace: The commercialization of higher education* is concerned, as the title suggests, with the way the ‘commercialization’ of American universities is corrupting scientific research and scholarship more generally. In chapter four, ‘Scientific research’, Bok discusses three ways in which corporate sponsorship has compromised scientific research.²⁷

First, corporate sponsorship has dramatically increased secrecy. Bok reports, for example, that ‘58 percent of corporate sponsors in one large study admitted to insisting regularly on delays of more than six months’²⁸ and claims that ‘the likely effect [of such increased secrecy] is to inhibit scientific progress, at least to some extent, by limiting the flow of information and ideas that investigators need in order to advance their work’²⁹. Most significantly, ‘The delays involved sometimes cause investigators to *give up in disgust*, especially when they need to borrow from several sources to proceed with their research’³⁰. In this case, scientists are not choosing what research to pursue based on epistemological promise, but in an effort to minimise what I called external interference at the end of the last section. Science is trying to live up to the ideal of autonomy, but this effort is limited by external interference.

²⁶*Op. cit.*

²⁷*Ibid.*, 58

²⁸*Ibid.*, 65

²⁹*Op. cit.*

³⁰*Ibid.*, 66

Second, both the appearance and reality of conflicts of interest cause problems. Bok's claim here is fairly obvious, and also fairly obviously in line with the ideal of autonomous science:

All these [financial] relationships provide reasons to favor the company involved and hence create conflicts that threaten the *objectivity* of scientists when they advise the government or publish research results on matters of financial significance to their corporate sponsor. Even if the scientists involved are completely *honest* and *unbiased*, their financial interests may give the *appearance* of bias and hence undermine the credibility of their work.³¹

Bok focusses on the possibility that less-than-excellent science as theory will be produced, and the temptation to ignore ethical restrictions on permissible methods, eg, recruiting patients into dangerous drug trials without obtaining informed consent. There is also the fact that scientists funded by, for example, drug companies are unlikely to pursue research that will produce disfavoured results for those drug companies.³² That is, the process of deciding which research programmes to pursue is being subject to external interference.

Third, Bok decries 'corporate efforts to influence research results'. He gives a number of examples where commercial interests attempt to suppress or squelch scientific findings. Part of the concern is with the epistemological quality of the goods produced: commercially-funded scientists 'may be subtly affected when they decide how strongly to word a conclusion, how much to emphasize possible qualifications and contrary interpretations, or whether to mention potential (but unproven) new risks'³³. These effects are best understood as problems according to the ideal of autonomous science as theory. But there is another concern: 'industry funding can magnify the voice of those who receive it and encourage them to continue their research and be more outspoken and more vigorous in expounding their views'³⁴. In this case, commercial interests are having a two-step distorting effect on the scientific

³¹*Ibid.*, 67, my emphasis

³²*Ibid.*, 68

³³*Ibid.*, 76

³⁴*Op. cit.*

community. First, they directly encourage scientists to pursue favourable research programmes by offering financial rewards for such research. Second, they indirectly encourage other scientists not to pursue disfavourable research programmes by giving favourable scientists incentives to vigorously and vocally challenge the disfavourable scientists and their research. Here we see actually see interference from without leading to corruption within.

Bok is not completely critical of the effects commercial interests have had on science. He claims that the ‘commercial incentives [of patents and royalties] have succeeded in encouraging universities to do a much better job of serving the public interest’³⁵, though he does not explain compared to what these incentives have done a better job. Setting this last point to one side, here we seem to see Bok departing from the ideal of autonomous science: good things have come from the external influence of commercial interests on science, though bad things have also resulted. Since good things have resulted, this external influence cannot be described simply (and negatively) as interference. Science should not completely ignore these sorts of commercial interests and the potential benefits for society, as the ideal of autonomous science counsels; it just needs to be sure to balance these considerations with the ones the ideal does indicate. So long as ‘the values that have traditionally inspired academic scientists have generally been strong enough to withstand the desire to grow rich’³⁶, things will be fine.

However, this reading is too quick. Certainly it is entirely compatible with the ideal of autonomous science to recognise that some good can come of imperfect or even bad situations. The question is whether or not the ends of better serving the public interest are sufficient to *justify* the use of commercial incentives to direct scientific research. Bok focusses primarily on how things are going wrong in science, and rarely if ever indicates an ideal towards which science should be striving. And, as I have presented above, there is an entirely straightforward way to understand Bok’s account of how things are going wrong in terms of the ideal of autonomous science. Without a more explicit statement of the ideal towards which Bok believes

³⁵*Ibid.*, 77

³⁶*Ibid.*, 62

science should be moving, I see no inconsistency in attributing to him the ideal of autonomous science.

2.3. Brown and external influence. In ‘The community of science[®]’, James Robert Brown gives an epistemological critique of the funding of science by commercial interests. Brown begins by making many of the same points as Bok – there are conflicts of interest and problems of secrecy³⁷, for example. Brown identifies two sets of ‘concerns’ regarding the funding of science: ‘ethical’ and ‘epistemic’³⁸. While Brown is worried about the ethical concerns, as an epistemology, he will focus his paper on the epistemic concerns. There are four such concerns (I am paraphrasing, not quoting, here):

- (1) The funding structure makes it difficult to do research that is independent of commercial interests.
- (2) Incompetent researchers compromise the quality of the resulting science as theory.
- (3) The improper selection of research subjects also compromises the quality of the resulting science as theory.
- (4) Since commercial interests only fund research programmes that are likely to be favourable, there is a lack of rivals to accepted science as theory.

It is not immediately clear how the first is an epistemic problem in itself, and the second and third are more concerned with the ideal of autonomous science as theory. I will therefore focus on the fourth concern.

The fourth concern is a problem of choice of research programmes: because it is so difficult to do research without the support of commercial interests (this is where the first concern comes in), and because commercial interests only fund favourable research, science pursue research programmes because they are favourable to commercial interests rather than because they the most promising according to the internal standards of science. This is an example of external interference on science: the relationship between science and society has forced science to abandon the ideal of autonomous science. ‘There is such a thing as objective science . . . and its canons

³⁷*Ibid.*, 260

³⁸*Ibid.*, 266-7

are being seriously violated in current medical research *because of the way research is socially organized*³⁹.

It is clear that autonomous science is Brown's ideal. Brown is speaking ironically when he writes that

The ideal observer [according to seventeenth century English science] is, as you might imagine, the English gentleman: rich, independent, and possessing sufficient moral fiber as to *resist all corruption*. His observations, and his alone, we can trust.⁴⁰

but clearly Brown's own ideal scientist is capable of resisting all 'corruption'. What is needed, according to Brown, are forms of funding that 'guarantee the *independence* of the researchers'⁴¹. The agencies responsible for funding research and guiding public policy 'must be *free* of any sort of governmental or industry influence'⁴².

Furthermore, Brown sees his ideal as value-free. 'I consider the whole business a question of good methodology, not morals'⁴³. Speaking of double-blind testing, he says that 'it's not a social or moral value, though it is certainly an epistemic value. The practice of blind testing . . . is best seen as science simply adopting *what it has itself established* as appropriate methodology'⁴⁴. He goes on:

We have learned empirically that research sponsored by commercial interests leads to serious problems, so serious that the quality of that research is *severely degraded* The switch to public funding solves many, if not all, of these *epistemic* problems. Therefore, as an *epistemic* norm we should have public funding for medical research. This line of reasoning is no different than . . . adopting the methodological norm of employing blind tests.⁴⁵

Recall his distinction between ethical and epistemic problems. An epistemic problem, in and of itself, has nothing to do with ethical problems or ethical values.

³⁹*Ibid.*, 281, my emphasis

⁴⁰*Op. cit.*, my emphasis

⁴¹*Op. cit.*, my emphasis

⁴²*Ibid.*, 283, my emphasis

⁴³*Ibid.*, 288

⁴⁴*Ibid.*, 289, my emphasis

⁴⁵*Op. cit.*, my emphasis

In short, Brown is concerned, at least in part, with the way commercial interests have interfered with science from without, guiding research away from what is epistemologically valuable and towards what is financially lucrative. By contrast, science should determine which internal goods to pursue by considering the anticipated quality of those goods according to its internal, value-neutral, standards. Science should be free and independent – autonomous – in its pursuit of its own particular set of goods. I see no way to read Brown except as embracing the ideal of autonomous science as I have presented it.

3. A POLITICALLY NEUTRAL IDEAL?

Now that I have defined the ideal of autonomous science, and located it within the literature, I turn to criticism of it. In particular, I will argue that the relationship between science and society in the ideal is the same as the relationship between the individual and the state in an extreme form of libertarianism. Rather than being neutral with respect to socio-political values, then, the ideal actually involves some extremely controversial socio-political values.

I will begin by analysing the ideal in isolation, and then relate the features that are uncovered to libertarianism.

3.1. Some features of the ideal. First, the ideal requires scientists to make decisions about which research programmes to pursue with no regard to the consequences of those actions except the quality of the theories produced. Consider a research programme into ‘innate’ differences in mathematical ability between men and women and between various racial and ethnic groups. The science as theory produced by any such research programme, whatever its actual content, is quite likely to have a pernicious effect on the education and careers of female and non-Anglo-American mathematicians and scientists.⁴⁶ But suppose (counterfactually) that there is a significant community of scientists (perhaps psychologists and neuroscientists) interested in such a research programme simply because they anticipate

⁴⁶Caplan & Caplan, 2005; see Kitcher, 2001, ch. 8 for a criticism that starts in much the same place. Note that, while the view Kitcher defends in that chapter does not have this first feature, it still exemplifies the second feature I identify in this sub-section. Since Kitcher does not pretend his view is value-neutral, having this second feature is not an immediate problem for him.

that the quality of the science as theory that will be produced will be quite high according to the internal standards of their discipline. The ideal of autonomous science indicates that these scientists should observe the appropriate legal and ethical restrictions on the way they treat their human research subjects, but does not counsel against the research programme on the grounds that it is liable to have pernicious effects. Indeed, it specifically requires the scientists to completely ignore such effects, in exactly the same way it requires the scientists to ignore positive effects – eg, technological innovation – in deciding whether to pursue a research programme in pure science. Anticipated effects, both positive and negative, are specifically ruled out as grounds for pursuing a certain research programme.

This point is not new. Indeed, defenders of the ideal have made the connection. The Nobel-winning physicist and philosopher of science Percy Bridgman, for example, ‘believed that any restriction, any external imposition of an agenda, would corrode the purity of the scientific enterprise’ and ‘challenge[d] any social philosophy that required the *individual* scientist to be responsible for the use of his [*sic*] creations or the consequences of his discoveries’⁴⁷. Schweber has argued that this was actually the appeal of the ideal in the wake of the development of the atomic bomb – Bridgman, for example, argued for the ideal at a meeting of the American Association for the Advancement of Science in December 1946, responding to Oppenheimer’s argument in November 1945 that the Los Alamos physicists must take responsibility for the atomic consequences of their actions.⁴⁸

Herbert Mehrtens⁴⁹ has made a similar argument, though from the other direction, regarding the community of ‘pure mathematicians’ in Nazi Germany. By defining ‘itself through the process and product of work in pure research as an exclusively cognitive entity’, mathematics as practice ‘obscures political or moral considerations, so long as they do not immediately concern the productivity of the discipline. *The identification of the individual scientist with the discipline produces the type of scientist who can still consider himself [*sic*] apolitical even when acting in the*

⁴⁷Schweber, 2000, 6, his emphasis

⁴⁸*Op. cit.*

⁴⁹Mehrtens, 1990/1994

*political interests of his discipline.*⁵⁰ Under the Nazi regime, ‘The best *political* strategy for the sciences appeared to be to define themselves as *indifferent to the world of the political*’⁵¹. Mehrtens’ most haunting example is to consider ‘a Nazi bureaucrat involved in the extermination machine . . . [who] refer[s] to the *purity and neatness* of his index-card system’⁵². The ideal of autonomous science, in requiring scientists to ignore the ethical consequences of their research, enables them to avoid responsibility for their actions. Their work as scientists, and hence their concerns, are value-neutral.

Scientists *qua* scientists are therefore literally not responsible for their actions in any ethical sense – they can only be judged by the quality of the science as theory they produce. But, far from being value-neutral, clearly exempting someone from ethical responsibility *is* a matter of ethics, and *does* reflect certain values – to say that it is right to sacrifice human lives for the sake of the goods produced by pure mathematics is to make an *ethical* judgement.

Second, in the ideal, society is sharply distinguished from and external to science. Society provides restraints on science, preventing it from harming others in pursuit of its good, and guarantees some basic enabling conditions – that is, it provides funding and other resources. As per the second and third factors, science cannot do ‘whatever it wants’ in pursuit of its good. But these limitations are minimal, and negative – they tell science where it *cannot* go, not where it *should* go. Society, when things are going well, also prevents others from harming science. As in Brown’s paper, discussed above, the ideal is best respected when external interests do not try to direct or appropriate science, when external interference in science is minimal.

In return for this, science owes society nothing, or almost nothing. Science produces goods for society only insofar as these are accidental (technological innovations) or as society has embraced the internal goods of science as its own, ie, as society has learned from science to value pure scientific knowledge as a good in itself. Society cannot expect, much less require, science to make social contributions. Science has its own conception of the good, and society should not challenge or

⁵⁰*Ibid.*, 332, my emphasis

⁵¹*Ibid.*, 333, my emphasis

⁵²*Ibid.*, 329, my emphasis

change that conception, merely enable science to autonomously pursue that good. Bridgman, for example, argues that society does not have ‘the right to exact “disproportionate service from special ability”’⁵³.

This is closely related to the first point: among the consequences not to be taken into account when choosing between research programmes is the anticipated positive social value and applicability of the resulting science as theory. Again, the scientist *qua* scientist is responsible for neither the positive or negative ‘side effects’ of her research. (One wonders whether Bridgman would be equally rigorous about not taking responsibility – that is, credit and claim – for positive side effects of his research *after the fact*.)

3.2. The libertarian connection. In right-libertarian and ‘minarchist’ political philosophy, the state’s sole purpose – the rôle of the ‘night watchman state’ – is to maintain the order needed for individuals to freely pursue their own conceptions of the good. The requirements the state can make of an individual are minimal – typically nothing (or almost nothing) more than restraining them from performing actions that would interfere with the autonomy of others. In particular, the state is (almost) never justified in appropriating the goods produced by the individual’s labour, and cannot expect the individual to produce any goods simply for the sake of the public good.

And this is precisely the second feature of the ideal identified above. Just as the state cannot expect the individual to produce any goods simply for the sake of the public good, society cannot expect science to produce any goods simply for the sake of the public good. The state respects the individual’s autonomy by allowing him to pursue his own conception of the good without requiring anything from him and with minimal interference – just enough to keep him from directly or actively harming others – and society respects science’s autonomy by allowing it to pursue its own conception of the good without requiring anything of it and with minimal interference – just enough to keep it from directly or actively harming others. The state/society cannot require significant sacrifices of the individual/science for the sake of others’ basic needs. As Kitcher puts the point – apparently failing to realise

⁵³Schweber, 2000, 7, quoting Bridgman

that there are right-libertarians who explicitly argue for the parallel point – ‘one must believe that the duty to seek the truth [resp., the duty to respect property rights] is so strong that it is binding, even in situations that will adversely affect the underprivileged’⁵⁴.

By contrast, left-libertarian political philosophies will require individuals to make some contribution to the public good, typically by requiring the sacrifice of non-basic needs for the sake of satisfying the basic needs of others.⁵⁵ Welfare liberal and communitarian approaches to political philosophy will require even more of individuals. Individual freedom, including the right of the individual to pursue her own comprehensive conception of the good, while still (typically) a basic good, is not the overriding basic good that it is in right-libertarianism. The relationship between science and society articulated by the ideal is closer to the right-libertarian than the left-libertarian view, and even further from the welfare liberal and communitarian view.

The more abstract point I made in discussing the second feature also applies to both relationships. In the ideal, society is treated as something sharply distinguished and external to science – an alien force that is liable to be oppressive and distorting of science if its rôle is not severely restrained. In libertarian political philosophy, the state is similarly an alien force that is liable to oppress the individual if its rôle is not severely restrained.

In welfare liberal and communitarian political philosophies, by contrast, the state can be conceived as a means of agency for individuals, rather than an alien and potentially oppressive force. Martha Nussbaum, looking to Grotius, has argued that the agency individuals gain by forming a state together is an important part of their freedom:

The ability to join with others to give one another laws is a fundamental aspect of human freedom. Being autonomous in this sense is no trivial matter: it is part of having the chance to live a fully human life. In our day, as in Grotius’ time, the fundamental unit through

⁵⁴*Ibid.*, 103

⁵⁵See, for instance, Otsuka, 2003

which people exercise this fundamental aspect of human freedom is the nation-state: it is the largest and most foundational unit that still has a chance of being decently accountable to the people who live there [T]he nation-state and its basic structure are, as Grotius has already argued, a key locus for persons' exercise of their freedom.⁵⁶

In the ideal of autonomous science, society's ability to enable science is limited to providing funding and limiting external interference. A rival ideal could find a more positive rôle for society in enabling science, a relationship modelled, perhaps, on Nussbaum's Grotian conception of the relationship between individual and state.

Alternatively, one might find inspiration in Aristotle's doctrine of the unity of the virtues. For Aristotle, exemplifying any one of the ethical and intellectual virtues requires exemplifying all of the others. One cannot 'specialise' in courage, neglect *phronesis*, and expect to be successful in exemplifying courage, for example. Similarly, one might think that the internal goods of science are basic but can only be pursued as part of a more general project of pursuing a flourishing and just human society. Science cannot 'specialise' in pursuing knowledge, neglect the pursuit of such other goods as relieving suffering, and expect to be successful in producing knowledge. Unfortunately, space does not permit me to develop these positive proposals here.

I already argued above that the first feature of the ideal – that science need not, and indeed should not, take into account the likely consequences of its research – is not value-neutral. Is it also right-libertarian in spirit? This seems to be the case, insofar as libertarians hold that the individual's property rights take precedence over the life and well-being of others. This form of libertarianism would hold that, at least at the level of political philosophy, a wealthy person is not in any way responsible if her failure to sacrifice some of her private property results in the death by starvation and preventable disease of a poor person. In particular, the state cannot appropriate some of her wealth in order to save his life, no matter how minimal the percentage of her net worth to be appropriated. His death is among

⁵⁶Nussbaum, 2006, 257

the consequences of her actions, and certainly a bad consequence. But she has no politically enforceable ethical responsibility for it.

Not all libertarians hold this view. Left-libertarians, for example, reject it. Welfare liberals and communitarians would probably find it abominable. It is therefore a controversial and perhaps extreme view in political philosophy. And yet it is the view of the proper relation between science and society articulated in the value-neutral ideal of autonomous science. This ideal is no more value-neutral than the political philosophy of Ayn Rand.

4. CONCLUSION: WHERE DO WE GO FROM HERE?

In this paper, I have identified two ideals of autonomous science: one corresponding to science understood as theory, and one corresponding to science understood as practice. I have focussed on the latter, identifying it especially in discussions of problems with the way science is funded. I have argued that it is in no way a value-neutral ideal, and in particular is closely related, at least ideologically, to a controversial form of libertarianism. In this final section, I shall briefly consider one major implication this has for philosophy of science.

This ideal cannot be maintained as value-neutral, and in particular cannot be taken to be consistent with all sets of socio-political values. Brown's commitment to 'scientific socialism', with explicit references to Marx and Engels, is especially jarring given his commitment to the ideal of autonomy. His political philosophy is radically at odds with his philosophy of science.

Furthermore, the dramatic failure of the neutrality of this ideal should be taken as a sign that no normative epistemology for science, whether for science as theory or science as practice, can be independent from all sets of socio-political values. The ideal is designed to secure the independence of science from socio-political values and social and political controversy; but it did so (to the extent that it did) only by adopting an extreme political philosophy. If an ideal designed to be value-neutral fails to be such this profoundly, how much more likely is it that an ideal not designed with this purpose in mind will similarly fail?

Hence, I consider the ‘meta-ideal’ of a value-neutral epistemology of science to probably not be viable. In its place, then, we need an epistemology of science that wears its ethical commitments on its sleeve. The ideal of autonomous science might be acceptable as such an epistemology – but only for a certain sort of libertarian.

This does not mean that all epistemology must start from a set of ethical principles. It simply means that epistemology must be aware of its relationship to ethics, and there is a strong potential for an extremely fruitful collaboration between epistemology and ethics.

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