Preface: the moral foundations of freedom of science[1]

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This volume of essays under the banner of 'freedom of science' constitutes a new direction for science ethics. One fundamental issue has been and remains defending the idea of the freedom of scientific inquiry and research from political, legal and social restraints. The reasons for maintaining this defence are many. Principal among these are the good that science does, the way it relates to fundamental elements of human nature and the hope it offers to humankind and the planet; more concerning all of these in a moment.

Separating the freedom of scientific inquiry and research from questions concerning the application of science – the progress of discovery, research and innovation through proof of principle to products in the clinic and the marketplace, is fraught with difficulty. For one thing these are often a continuous process and often unstoppable from the perspective of individual jurisdictions. For another, science has increasingly become 'democratised'. In part this has been a deliberate choice with a movement from within science now becoming increasingly conspicuous. This movement calls itself 'citizen science' (Vayena et al. 2016) and involves the encouragement of citizen participation in scientific activity essentially conceived and organised, not ground up by the citizens, but essentially top-down by professional scientists of one sort or another.

A more worrying version of citizen science however has also sprung up and involves the increasing ability of scientifically (often self-) educated citizens creating labs in their garage or kitchen to make a wide range of products free from regulation, or codes of ethics or even conceptions of good or even safe practice (Royal Society 2012; *Scientific American* 2017; Prepperzine 2017; Wikipedia 2017). This sort of citizen science, because it is often secret and always unregulated, gives opportunities for terrorists of all sorts, but particularly for bioterrorists to manufacture weapons formerly required professional expertise and often expensive and conspicuous facilities.

A rather different case, which also crucially engages freedom of science, involves research on human stem cells derived from embryos which is illegal

in some jurisdictions and permissible in others (Robertson 2001; EuroStemCell 2008–17; National Conference of State Legislatures 2016). The result is work continues in the UK, for example, which is illegal elsewhere. Scientists move, relatively freely between jurisdictions. What we find is not power without responsibility but responsibility without power. Nations assume responsibility for activities within their borders but turn a blind eye to what their nationals do abroad. The extent to which this is to be celebrated of course varies with attitudes to the substantive ethical issues.

The idea that justice delayed is justice denied continues, rightly, to have currency. But just as justice delayed is justice denied, so therapy delayed is therapy denied, and because illness is confining and health liberating, freedom reappears as inextricably allied to science and medicine. Likewise, 'scientific freedom', freedom to do and publish scientific research, is also often advocated as a basic right (Edsall 1975; Giordano et al. 2012). One reason, to have, not *faith* in science (heaven forbid!), but to put cautious trust in science, is that science has indeed proved to be 'magic that works'. It is the fact that science works, and snake oil does not, that, above all, makes science trustworthy.[2]

Equally fruitless of course is the concentration on protection against real and present dangers, while neglecting preparedness for future threats. Preparedness for the future calls for science and technology and for the habits of mind, free inquiry, reliance on evidence and argument, and above all intellectual honesty, which characterise science broadly conceived.

It is important to remind ourselves of the moral nature of science, threatened, today more than ever, by a culture of reckless deceit, shameless denial of history, and of evidence, and the profligate (Garver 2015; Berrien 2016;[3] Abramson 2017) invention and repetition of more convenient 'alternative facts'. The dishonesty and untruths perpetrated by the culture of alternative facts are polluting every aspect of those freedoms that are worth fighting for.[4] I have been preoccupied with the moral character of science for a very long time (here's why: Harris 1985: especially chs 3, 5 and 6; Harris and Sulston 2004; Harris 2005; Chan and Harris 2009; Chan et al. 2010; Harris 2013).

We all benefit from living in a society, and, indeed, in a world in which science is respected and in which science flourishes. Science and the discovery and innovation it generates, resulting in products in the clinic and the marketplace, no less than the objectivity, rigorous analysis, evidence and respect for truth it promotes, is in the interests of us all (see for example Harris 1997; 2005; Zee et al. 2010).

The other *imperative for science (and for philosophy)*

While there are powerful moral reasons for doing science and philosophy, these activities are not necessarily pursued solely (or even principally) for moral, or even for prudential reasons, powerful as these are. There is a simpler, but perhaps even more powerful, imperative at work (Harris 2018).

We humans are curious birds; we like to understand stuff.[5] We like to know *why*, to know *what* and to know *how* and to know *whether*. We like to know how things work, and what they are for, or what they are good for. We also like to know why things happen and the probability of their occurrence. This includes the question of why we exist at all. We spend a lot of time on such things, and we do so, not because it is good for us, or because either the questioning process, or the answers, conduce to our welfare or well-being or make us happy, or protect our vital rights or interests or confer evolutionary advantage (although they may). We do so because that's the sorts of creatures we are: curious birds who like to ask and answer questions.

True, there are myriad 'rewards' for education, science and curiosity, the reason we pursue these, however, if one were needed, is in our will,[6] our free will – it's what we choose to do and how we choose to live. But if the exercise of our curiosity is not honest and evidence based, then the exercise of our will is thwarted, we simply won't find out the *why*, *what*, *how* or *whether* . . . to questions we ask. We may get 'answers' but they won't be informative, they will simply deliver lies, fantasies or 'alternative facts'.

As Thomasine Kushner and James Giordano (2017) have argued recently:

> It is important to recognize that sound ethical analysis begins with and proceeds from facts. Facts of the context, circumstance, agents, implements, and actions involved. These facts should not be 'alternative', they need to be real. But this is an age of increasing misinformation.

We have been talking about the sorts of creatures we are. But 'we' may be on the verge of creating new unprecedented creatures, not only with powers and capacities comparable to ours, but maybe enhanced beyond those that humans have yet attained, or even beyond those which creatures constituted as we are, with our evolutionary history and maybe also constructed as we are – flesh and blood creatures – can attain. 'We' may soon include both machines and hybrids. But the success of such creations will depend vitally on the nature of the creatures we create and how that nature can develop and relate to or coexist with our own.

If we create beings as smart, or smarter, than us, how can we limit their power to act detrimentally towards us, perhaps deliberately to destroy us, or simply to act in ways that will have this result? Martin Rees (2003) has observed that there may be scientific facts that will never be discovered by beings with brains that have evolved in the way that human brains have so far developed, and scientific theories creatures with our evolutionary history are incapable of postulating. One reason for creating AI persons might then be to solve problems we humans cannot address or even imagine.

How can we ensure that such creatures, if we bring them into being, will act for the best? Some have thought that this problem can be solved by programming them (or us) to obey some version of Isaac Asimov's so-called 'laws' of robotics, particularly the first law: 'a robot may not injure

a human being, or, through inaction, allow a human being to come to harm'. The problem of course is how the robot would be able to obey such a law when ethical dilemmas often involve choosing between greater or lesser harms or evils rather than avoiding harm altogether; or by allowing or causing some to come to grief for the sake of saving others. How would they be able to keep their eyes on the protective prize?

The question of how to combine the capacity for good, with the freedom to choose is probably one of the things Stephen Hawking had in mind when he told the BBC in 2014 that 'the primitive forms of artificial intelligence we already have, have proved very useful. But I think the development of full artificial intelligence could spell the end of the human race' (Cellan-Jones 2016). How might AI persons, who could determine their own destiny, as we humans do, be persuaded to choose modes of flourishing compatible with those of humans? Of course we currently have these problems with respect to one another; but at least we have not as yet shackled our capacity to cope with these by creating AI persons which may be 'programmed' in ways that selectively preclude acting on the basis of genuine choices informed by evidence and argument (Harris 2011; Harris 2014; Palacios-González and Harris 2014).

As we emerge into a post-truth fantasy world, a Trumped-up world of lies and 'alternative facts' this problem becomes acute. In such a world how can there be genuine choices informed by evidence and argument? This post-truth world raises very real questions about the possibility of our long-term survival, either as the sorts of rational moral beings evolution has painstakingly made us, or indeed as beings of any description at all.

Initial scientific predictions on the survival of our planet suggested we might have 7.6 billion years to go before the earth gives up on us. These were Steven Hawking's calculations, but recently Hawking revised his prognosis: 'I don't think we will survive another thousand years without escaping beyond our fragile planet' (Cellan-Jones 2016). And Martin Rees (2003) has speculated that this might be our 'final century'.

In view of threats like these, we need to make ourselves, humankind, smarter, more resilient and more aware that honesty, truth and objectivity are not optional and dispensable extras. And we may need to call AI persons in aid to achieve this if we are to be able to find another planet on which to live when this one is tired of us, or even perhaps develop the technology eventually to construct another planet. To do so we will have to change, but not, we may hope, in ways that risk our freedom, our capacities to choose both how to live and the sorts of lives we wish to lead; and also by making sure we avoid the creation of machines who might choose to be our masters.[7]

These are some of the ethical challenges that are created by science and our freedom (indeed our fate) to pursue truth, facts and evidence by, inter alia, various sorts of scientific method. This pursuit has become more urgent in view of increasing awareness of the dangers that threaten humanity and

indeed our fragile planet and because of the increasingly parochial decisions made recently in many democracies across the world.

A book like this is thus particularly important at this point in history. Its multidisciplinary contents represents its greatest strength; contributors from several disciplines discuss various areas of scientific research, make it accessible to the non-specialised audience but also engage with the broader question of how regulation can promote and hinder a progress of science that can yield significant benefits for ourselves, the future generations and possibly other animals too, indeed providing the human species with a concrete hope for survival. But the other important aspect of this book is *how* it came to exist. Many of the contributors to this volume have been engaged in an ongoing forum for over a decade now, participating over the years in a regular arena of debate, update and discussion, and this book brings some of these discussions, with different spirit, tone and aims, to a broader audience, in this way concretely bridging the gap between science and society.

Notes

1 I outlined this imperative, inter alia, in Harris (2007: ch. 11) on which I draw here. Also, I freely acknowledge and deploy arguments developed in Harris (2018).
2 Other reasons are its openness, its publication of results for further scrutiny, its rigorous peer-review process, and the fact that good science can only be pursued in free societies. I do not of course have room here to justify these claims.
3 There are many more apparent examples of Trump's alternative facts listed at the sites (listed in the references), but I should warn fellow scientists that I have not myself personally checked any of these, either for accuracy or coherence.
4 I am grateful to Tomi Kushner for a stimulating correspondence on the subject of alternative facts.
5 For a recent 'take' on curiosity, see Kahan et al. (2017). See Harford (2017) for a fascinating account both of the mechanisms and history of alternative facts, but also of the importance of human curiosity as an antidote.
6 Julius Caesar, in Shakespeare's play of that name, justifies his decision (which he later reverses) not to attend the Senate on the Ides of March thus: 'The cause is in my will: I will not come' (Act II, Scene ii).
7 In the following paragraphs I draw on work published with my colleagues in Lawrence et al. (2016).

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