Preventing the Emergence of Evil in the 'New Eugenics'

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The eugenics movement of the early 20th century resulted in an ultimate evil: the Holocaust. Recent developments in molecular genetics have the potential to allow us to alter the human genome. The power of this technology to fundamentally alter 'human' identity has resulted in critics calling it the 'new eugenics'. Thus the question arises "Who bears responsibility for ensuring that human genetics in the early 21st century does not result in evil?" Analysis of the mechanisms of regulation of science reveals that monitoring developments in science is highly contentious. The specialized education of scientists usually excludes consideration of the history or philosophy of science, resulting in scientists poorly prepared to engage in ethical debates. Thus, in order to monitor science for potentially negative social implications, we need input from scholars who undertake a critical analysis of advances in science. Unfortunately, scientists have not accepted criticism or regulation from 'outside' science well. Critiques of science have lead to strong responses from the science community ('Science Wars') where scientists vigorously defend their turf and perceive concern about outcomes as inhibiting scientific progress. I will discuss the role of scientists, science education and STS scholars in oversight of the new eugenics.

Key Words: eugenics, genetic engineering, Human Genome Project, science education, Science & Technology Studies (STS), the Holocaust, elitism.

There may be many definitions of evil but genocide, the murder of innocents on a massive scale, is surely evil. In the Western world, the systematic slaughter of millions of Jews in the Nazi concentration camps has been recognized as a supreme example of manifest evil[1].

Many important questions emerge in the analysis of such evil events: "How could this have happened?" and "How can we prevent such a thing ever happening again?" One can postulate that particular individuals are evil and commit evil acts, but a massive collective action like genocide requires the involvement of more people than are generally assumed to be inherently evil. Thus, in order to get a large group action like genocide, there needs to be a way of making what to external observers will appear evil, seem logical, or even necessary, to the group. A potent mechanism that has allowed people to cause such suffering operates on the classification of their victims as 'other', to deny the humanity of those to be eliminated. Once members of another sex, race, class, have been determined to be clearly and identifiably different that difference can be invoked as proof of inferiority and thus

justification of unequal treatment. This mechanism is particularly powerful if a group so defined can be stripped of its humanity and become 'unfit' or, better yet, 'sub-human'[2]. In some societies and historical moments, definition of the 'other' can be based on ethnic group or religious affiliation. However in modern secular society, scientific evidence is a powerful tool in persuading people of fundamental differences between groups since scientific knowledge has gained authority as objective truth.

One would hope that a study designed to determine the scientific 'difference' between people(s) would be objective and evidence based, not subject to the social prejudices of the time, and that it thus would not provide justification for discriminatory practices. Unfortunately, there are examples to the contrary throughout history, and biology has a disturbing record of providing 'proof' that the social structures in place at a particular moment are 'natural' and thus justified. Scientists and physicians in the past exaggerated difference between the sexes and races in humans to justify the dominant position of white men in society. Stephen J. Gould gives us an excellent example in his eloquent account of the work of eminent Parisian physician Paul Broca who 'proved' that women and people of African descent are inferior to men from Western Europe through the (incorrect) measurement of skulls and brains and thus provided a 'scientific' basis for the prevailing sexism and racism[3]. Eugenicists of the late 19th and early 20th centuries misused genetics by applying the simple principles of inheritance, discovered by Mendel in his studies on peas, to complex human traits (e.g. 'pauperism') that have, at best, dubious scientific basis[4]. They were also students of Darwin's *Origin of Species* and believed that, once humans are classified as having heritable traits that are desirable or undesirable, human evolution could be controlled by selecting which humans reproduce. Meaning "well-born", eugenics has come to mean the self-directed evolution of humans[5].

Early proponents of eugenics wished to cure the social problems (crime, prostitution etc) arising from the 'unfit' by reducing the number of undesirables believing that 'unfitness' was an inherent property of the individual not the result of the society and environment the person resides in. In the United States eugenic doctrines, adopted vigorously by the political and medical establishments, gave rise to the enactment of laws to curtail the civil liberties of individuals deemed 'unfit'. Laws, which restricted civil rights like freedom of movement (immigration, institutionalization), reproduction (forced sterilization), education, marriage, were introduced and enforced in many states through the early decades of the 20th century[6] [7]. Then in Germany, Hitler and his Nazi party enthusiastically embraced the teachings of the American Eugenics Society, initially using them to justify the 'humane killing' of the mentally and physically disabled in the years preceding World War II. This then led to the systematic slaughter of groups

deemed 'unfit' by the Nazis (Jews, Romany gypsies, homosexuals) in the Holocaust.

There has been a recent resurgence of interest in eugenics because developments in molecular genetics, notably the completion of the Human Genome Project (HGP), have expanded the potential for practicing eugenics through molecular technologies[8]. Since the formal completion of HGP in 2003, technologies for the rapid analysis of an individual's genome have been expanding exponentially and the $1000/genome (complete sequence of the 3 billion base pairs of a person's DNA) is probably no more than 5 years away. Thus, in developed countries where sophisticated health care is available, we can expect the capacity to routinely sequence the complete genome of a newborn (or embryo) within a decade. This will allow us to determine its predisposition to various inherited disorders and traits[9]. We can also expect that the number of 'properties' of the individual that are known to have some genetic component will increase and that attributes like appearance, intelligence and factors of personality will be included in that analysis. Furthermore, it is reasonable to assume that this knowledge could affect the person's future in both positive (preventative medicine) or negative (genetic discrimination) ways.

Beyond determination of the genetic profile of the new individual, technologies that allow the manipulation/ enhancement of the genome of pre-implantation embryos will become available. Our potential to alter the genome of both somatic cells and germ cells through gene therapy is advancing rapidly, and modification of a person's phenotype through genetic manipulation is being developed[10]. Visions of the 'not-too-distant' future, when genetic testing and modification become readily available and accepted in society, have been explored in popular media. Vivid portrayals of a society divided into classes based on who has been 'genetically improved' are given in the movie *GATACCA*[11] and the popular book *Remaking Eden*[12]. The names chosen for the resulting classes, Valid/Invalid or De*gene*rate in *GATACCA* and GenRich /Naturals in *Remaking Eden*, clearly show the value placed on genetic engineering in these imagined societies. Many observers of this 'new eugenics' have raised serious concerns about the potential misuse of molecular biology to provide us with yet another (powerful and scientific!) mechanism for classifying and subdividing people[13].

For example, independent scholar Bill McKibben has argued that there are certain developments resulting from human activity that have the potential to fundamentally and permanently alter human life on Earth. McKibben classifies current developments in human genetics, along with nuclear weapons and environmental degradation, as mechanisms by which humans could fundamentally alter their relationship with themselves, one another and their world[14]. McKibben argues that we should exercise caution and be satisfied with the direct medical applications of using genetic

therapies to treat disease and not allow further developments into human 'improvement'.

> If germline genetic engineering ever starts, it will accelerate endlessly and unstoppably into the future, as individuals make the calculation that they have no choice but to equip their kids for the world that is being made. Once the game is underway, there won't be moral decisions, only strategic ones. If the technology is going to be stopped, it will have to happen now, before it's quite begun[15].

The eugenics of a hundred years ago resulted in great evil and has been thoroughly discredited as a misapplication of scientific principles to perceived social problems. My goal in this paper is not to debate whether the new eugenics will lead to a similar result. Rather I accept that this novel mechanism for classifying people based on their genome, once in the control of the most powerful groups in society, has *the potential to lead to evil consequences*. My concern is how to prevent the emergence of evil as a result of the new eugenics. I argue that any monolithic vision of knowledge is dangerous especially when the topic under study has substantial social capital (racism, elitism) and that the intellectual checks and balances that arise from multiple disciplinary viewpoints are our best defense against the emergence of evil. Furthermore, I believe that it is most important that scientists, as respected 'experts' in this discussion, be cognizant of the potential fallibility of science and of social applications of their work.

If novel applications of bioscience are to be regulated then either the scientists themselves must recognize potential danger in the work they are undertaking and self-regulate or 'science observers' (other scholars, science journalists, the public) must be sufficiently current with the technology to fully understand its direction and implications. I will first consider the various mechanisms by which the social consequences of molecular biosciences might be overseen.

Is it possible, or likely, that scientists would assume that responsibility for regulation of the use of the technologies they are developing? It is certainly not true that scientists are irresponsible, madly pursuing the latest innovations with no regard for safety and society. Scientists were very active in opposition to the nuclear technology that resulted in the development of the atom bomb[16]. More recently biologists, developing recombinant DNA or cell-based technologies, were sufficiently concerned with the possible results of their endeavors that they developed their own voluntary restrictions. One important example of the ability of scientists to monitor the safety of their work was the Asilomar conference of 1975[17]. This conference of leading molecular biologists, journalists and policy makers was called in response to

a proposal to engineer a recombinant DNA molecule containing viral genes. At that time people were legitimately concerned with the safety and containment of these new molecules and devised a set of safety guidelines, which were adopted by government agencies and gradually relaxed as our familiarity with the technologies increased[18].

Another example of concerned scientists advocating for regulation of a technology is that of human reproductive cloning. While this method has been applied with some success to numerous mammalian species since the dramatic introduction of 'Dolly', the first cloned sheep, in 1997, most respected scientists and physicians (including Dolly's creator Ian Willmut) have spoken out publically against attempting this method on humans[19]. Human reproductive cloning has been banned in most countries and is subject to a UN declaration[20] intended to prevent its development in countries without regulations in force. When a complete ban is not appropriate, regulations are enacted by government agencies to control particular controversial technologies and scientists are usually heavily involved in the development of safety guidelines. Somatic gene therapy[21] for specific diseases has been used in human trials with limited success and significant safety concerns. It has been under a moratorium since the death of a trial subject, Jesse Gelsingher[22]. These examples show that scientists can be instrumental in regulating a technology when a significant number of them recognize the potential for undesirable consequences. Ironically one of the strongest motivations for self-regulation is the potential for loss of control to external agencies. It is not the potential danger of a particular technology, but rather the fear of interference by those outside their community, that prompts scientists into establishing guidelines[23].

Beyond recognizing potential problems in the applications of their discipline, it is also necessary scientists accept that the actual science they are currently engaged in *may* itself be wrong ('bad science'). Unfortunately, the construction of a modern education in any scientific discipline emphasizes an extraordinary amount of content which severely limits the access to interdisciplinary criticism that most aspiring scientists can engage in. Living in a world of science where mistakes of the past have been erased, and the limits of today's knowledge are obscured by the certainty of scientific objectivity, it is not surprising that most scientists have unjustified confidence in their worldview.

In order for scientists to be effective critics of the direction their discipline is taking it is important for them to recognize that, at any historical moment, the facts and theories they accept may be misguided or wrong. The Eugenics Movement of the early 20th century is an important object lesson. Perhaps the most frightening, and least well-known, aspect of its history is how mainstream and well supported the science of eugenics was in the

foremost universities of the United States. For example, Professor H.S. Jennings of Johns Hopkins University taught:

> The troubles of the world and the remedy of these troubles lie fundamentally in the diverse constitutions of human beings…..To go to the root of the troubles, a better breed of men must be produced, one that does not contain the inferior types. When a better breed has taken over the business of the world, laws, customs, education, material conditions will take care of themselves[24]

and Professor E.H. Hooton at Harvard University told his undergraduates:

> The solution to the crime problem is the extirpation of the physically, mentally and morally unfit or (if that seems too harsh) their complete segregation in a socially aseptic environment[25]

All current genetics texts contain accounts of the achievements of important historical figures like Mendel, Watson and Crick. The fact that all their accomplishments are still deemed to be correct, and are still part of the current worldview, is the justification of their inclusion in the story. However, only very recently (~10 years) have accounts of eugenics appeared in a few textbooks, and then only as sidebars to the main content without analysis of how important and misguided this branch of biology was. That leading geneticists like Charles Davenport[26] (Director of the Eugenics Records Office, CSHL, Member National Academy of Sciences) believed that 10% of the population[27] of the United States were 'socially inadequate biological varieties'[28] and were in some aspects unfit or sub-human, is a fact that is virtually ignored by current genetics texts. The result of this highly unequal treatment of science movements, where the history of research ideas that turn out to be incorrect are strongly suppressed, gives students the false impression of the infallibility of scientific method and evidence[29].

At an even more fundamental level, scientists also lack education about methods of producing knowledge, in particular the philosophy of science. Science is a branch of knowledge obtained, we are taught, through the application of scientific method where hypotheses or theories are tested by experimentation and rejected when not substantiated by results. The 'correctness' of scientific knowledge is seldom questioned and, as Ruth Hubbard points out, scientists tend to inflate the value of scientific evidence.

> The way we make scientific facts, *by reductionist methodology,* and build them into coherent theories and descriptions sets limits to the kinds of things we come to understand about nature. Scientists do not usually acknowledge these limits, nor do most other people. And the overestimation of science as a way to know, hence of the extent of the knowledge we can gain through science, has led us to undervalue other kinds of knowledge[30].

As long as we have a vigorous scientific establishment controlling the educational program for future generations of scientists, the system is self-perpetuating. As Sandra Harding reflects:

> there are few aspects of the "best" science educations that enable anyone to grasp how nature-as-an-object-of-knowledge is always cultural. These elite science educations rarely expose students to systematic analyses of the social origins, traditions, meanings, practices, institutions, technologies, uses and consequences of the natural sciences that ensure the fully historical character of the results of scientific research[31].

Thus, while it is vitally important that practicing scientists and physicians are broadly educated in the history, sociology and philosophy of their discipline so that they can appreciate the potential for abuse of 'scientific' evidence, it is not likely the situation will change. So, who else might engage in critical analysis of scientific developments? The most likely candidates are ethicists and science studies scholars but, while both groups have been involved in discussions of regulation of biotechnology, they have both been limited in their effectiveness.

Specific to our concerns about the potential misapplication of the new eugenics, when the HGP was being imagined and first funded, 3-5% of the total HGP budget was allocated to the consideration of ethical, legal and social implications (ELSI) of the project. Primarily from this funding, a new field of bioethics has emerged which is primarily concerned with issues surrounding the application of medical technologies (end of life, human subjects experimentation, gene therapy). However, as Francis Fukuyama points out in his 2002 book "Our Posthuman Future:

> This (ELSI funding) can be regarded as a commendable concern for the ethical dimensions of scientific research, or else a kind of protection money the scientists have to pay to keep the true ethicists off their backs. In any discussion of cloning, stem cell research, germ-line engineering, and the like, it is

> usually the professional bioethicist who can be relied on to take the most permissive position of anyone in the room[32].

So, because bioethicists depend on the good will of the scientists they work with, they tend not to be really critical. Bioethicists work within narrow ethical frameworks, which interface well with the scientists' reductionist methodologies. The resulting analyses still exclude large portions of human experience[33]

As I have argued, neither practicing scientists nor bioethicists really critique the fundamentals of the scientific program/ endeavor. Scholars that do are classified in a discipline called Science & Technology Studies (STS) where sociologists, philosophers and historians study and analyze science as a human practice and can offer a very different perspective on the workings of science to that of the 'scientific worldview'.[34] The right of others (non-scientists) to critique the practices of science is not always well received by working scientists, as they claim that non scientists do not/ cannot fully understand the workings of science. For example, the work of philosophers, like Sandra Harding, who present a feminist critique of the principle of objectivity and claim that even paradigmatic physics is not exempt from this critique[35], is rejected and even deeply resented by most scientists. That is, if they are aware of its existence. Similarly, sociologists who have studied science and offered their interpretations on the science enterprise have often encountered the wrath of practicing scientists. Indeed, a major academic dispute (The Science Wars) on who gets to 'define science' has raged over several decades. However, better understanding between practitioners of the different disciplines seems to be developing[36] although scientists remain concerned that science studies serve to undermine the legitimacy and authority of science. As Trevor Pinch relates, most scientists are well aware of the ambiguities of their discipline, of the inconsistencies in their data and will discuss them internally but they maintain the façade of certainty when dealing with those outside the close research community.

> The problem is that scientists have surrounded their enterprise with an aura of certainty. While scientists might be prepared to admit *in private* or to each other that science is human, involves skill, and contains uncertainties and that the idea of simple decisive experiments shooting down rogue theories is at best mythical or at worst a useful fiction for teaching purposes, *in public* they, by and large, maintain the view that science is about certainty[37]. (italics in original)

There is a strong tendency for scientists to isolate themselves in their projects and not engage with other scholars: a 'two cultures' scenario[38]. It has

frequently been the case that scientists are often almost shunned by trying to work on interdisciplinary projects that are critical of science in any way[39]. Many working scientists adopt a very binary position, you are either with us or against us[40], which makes developing new scholarship at the interface a very risky enterprise professionally. The overarching problem then remains. Scientists remain isolated in their intellectual community: too busy with their experiments to learn the history of their enterprise, too engaged in their paradigm to understand its limits, too arrogant and powerful to recognize the intellectual elitism they are practicing.

The 21st century has been called the 'Age of Biology[41]' and one thing is clear: that the rapid progress being made in human molecular genetics, fuelled by the promise of individualized medicine, is resulting in the development of commercialized technologies that could be used to determine the genetic makeup of an existing or future human. With these advances in molecular genetics comes the potential for the creation of new mechanism for classifying people based on their genome, and thus the potential for new forms of discrimination or classification of individuals/groups in society.

In order to understand the issues raised in the new eugenics, scientists must engage with the critiques of their discipline in general and of the new technologies in particular. Then they must honestly disclose the benefits and potential dangers without concern for loss of position or privilege.

In order for other scholars and the public to participate successfully in discussion about the regulation of innovative technologies that have the potential to profoundly affect their lives and the lives of subsequent generations – as the new eugenics does – they need to have a sense of the scope and the limits of what is known and being proposed. As Nobelist Roald Hoffman observes "A world admiring and yet suspicious of science needs an intelligent way to talk about what we know and how that knowledge is gained"[42]. The most important conclusion from the lessons of the past is that all groups involved in the conversation, all groups potentially affected by the scientific developments, should be well informed about, and open-minded to, alternative viewpoints. It is when dogmatic adherence to particular view, when 'scientific evidence' can be used to underwrite a particular social agenda of dominance that the potential for evil emerges.

Notes

1 E O Carlson, *The Unfit: The History of a Bad Idea*, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, 2001, p. 328.

2 ibid., p. 9.

3 S J Gould, *The Mismeasure of Man,* Norton & Co. Press, New York, 1996 p. 103.

4 One can argue, for example, that substance abuse has a genetic component and that substance abuse is linked to poverty.
5 J. D. Watson, *DNA: The Secret of Life*, Knopf, New York, 2004, p. 19.
6 http://www.eugenicsarchive.org/eugenics/
7 Carlson, p. 199.
8 A lot of the popular rhetoric around these technologies is very eugenic as in 'making better babies'. Even the book outlining the early discoveries in molecular genetics was called *The Eighth Day of Creation*, H. F. Judson, Simon & Schuster, New York, 1979.
9 The heritability of, and thus the accuracy of testing for, traits varies greatly. Some mutant forms of genes absolutely ensure that the person carrying that mutation will be affected with disease (e.g. Huntington's Disease mutation). Other mutations are linked to increased lifetime risk, e.g. *BRCA1* mutation carriers have a greatly elevated risk of breast or ovarian cancer. Other associations between a particular version of a gene and a trait can be much more variable and dependent on environmental factors.
10 Mario Capecchi's artificial chromosome work in mice. *DNA: Pandora's Box.* Films for the Humanities & Sciences (2003). Series producer, David Dugan ; editor, Joe Bini.
11 *GATTACA.* Columbia Pictures. (1997). Producers, Danny DeVito, Michael Shamberg, Stacey Sher; director, Andrew Nichol.
12 L Silver, *Remaking Eden: Cloning and Beyond in a Brave New World,* Harper Collins, New York, 1997.
13 Serious concerns arising from new types of biological determinism are outlined in T Duster, *Backdoor to Eugenics,* Routledge, New York, 2003: F Fukuyama, *Our Posthuman Future*, Farrar, Strauss and Giroux, New York, 2002: and P Kitcher, 'Utopian Eugenics and Social Inequality' in *Controlling Our Destinies*, p. Sloan (ed), University of Notre Dame Press, Indiana, 2000.
14 B McKibben, *The End of Nature,* Random House, New York, 1989.
15 B McKibben, *Enough,* Times Books, New York, 2003, p. 35.
16 Many physicists were so disillusioned with their discipline's involvement with nuclear warfare that they left physics after the World War II. Ironically, some of these physicists moved to biology and formed the vanguard of molecular biologists known as the 'phage group' from which most of the basic biology of molecular genetics emerged. H. F. Judson, *The Eighth Day of Creation*, Simon & Schuster, New York, 1979.
17 Watson, p. 97.
18 J D Watson & J Tooze, *The DNA Story: A Documentary History of Gene Cloning*, Freeman & Company, San Fransisco, 1981.
19 R Jaenisch & I Wilmut, 'Don't Clone Humans!, *Science*, vol. 291, March 2001, p. 2552.
20 UNESCO ban on Human Reproductive cloning

21 Introduction of 'foreign' genes into the body cells of a patient in order to treat an inherited disease.
22 L L McCabe and E R B McCabe, *DNA: Promise and Peril,* University of California Press, Berkeley, 2008, p 246.
23 Find one of the examples of this.
24 J Rifkin, *The Biotech Century*, Penguin Putnam, New York, 1998, p. 6.
25 ibid p. 16.
26 E. O. Carlson, 'The Eugenic World of Charles Benedict Davenport*'* in *Davenport's Dream: 21st Century Reflections on Hereditary and Eugenics*, J.A. Witkowski & J.R. Inglis (eds). Cold Spring Harbor Laboratory Press, Cold Spring Harbor, 2008,
27 Note how Jim Watson's also considers that about 10% are stupid and would benefit from genetic engineering to become more intelligent – *DNA: Pandora's Box.* Films for the Humanities & Sciences (2003). Series producer, David Dugan ; editor, Joe Bini.
28 source of Davenport quote? Unfit book?
29 I informally survey my undergraduate genetics students every year to find out how many are aware of the US eugenics laws – in my experience <5% U.S. students realize eugenics was practiced in America, all know about The Holocaust.
30 S Harding, *Whose Science? Whose Knowledge?*, Cornell University Press, Ithaca, 1991, p. 236.
31 S Harding, 'Eurocentric Scientific Illiteracy – A Challenge for the World Community' in *The "Racial" Economy of Science*, S. Harding (ed), Indiana University Press, Bloomington, 1993, p.1.
32 This phenomenon is a common one and is known as regulatory "capture", whereby the group that is supposed to be overseeing the activities of an industry becomes an agent for the industry. This happens for many reasons, including the dependence of the regulators on the regulatees for money and information. In addition, there are the career incentives that most bioethicists face. Scientists do not usually have to worry about winning the respect of bioethicists, particularly if they are Nobel Prize winners in molecular biology or physiology. On the other hand, ethicists face an uphill struggle winning the respect of scientists they must deal with, and are hardly likely to do so if they tell them they are morally wrong or if they depart significantly from the materialist worldview that the scientists hold dear. Fukuyama, p204.
33 For example, the religious. See the critique of human cloning given by L. Kass, 'The Wisdom of Repugnance'*, New Republic,* vol. 216, June 1997, pp. 17-26.
34 For example, Harry Collins and Trevor Pinch characterized science as a craft, a form of expertise similar to other skilled trades like woodworking, where a long apprenticeship is required to master the skills of the practice.

H Collins & T Pinch, *The Golem: What Everyone should know about Science*, Cambridge University Press, Cambridge, 1993.
35 S Harding, *The Science Question in Feminism,* Cornell University Press, Ithaca, NY, 1986, p 43.
36 J A Labinger & H Collins (eds), *The One Culture: A Conversation about Science,* University of Chicago Press, Chicago, 2001.
37 T Pinch, 'Does Science Studies Undermine Science?', in ibid p. 21.
38 C P Snow, *The Two Cultures,* Cambridge University Press, Cambridge, 2nd Ed., 1993.
39 E Fox Keller, *Science and its Critics,* Academe, Sept.-Oct. 1995, p. 10.
40 This resembles the political rhetoric in the U.S. either for the war (patriotic and American) or against it (unpatriotic and un-American).
41 http://www.iob.org/general.asp?section=news&article=AgeofBiology.xml
42 R. Hoffmann in review of *The One Culture,* J A Labinger & H Collins (eds).