

Biotechnology as Cultural Meaning:
Reflections on the Moral Reception of Synthetic Biology *

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Perhaps the fundamental question before us in science policy today involves the extension of human power into the realm of life, this time at the molecular level—human power and artifice confronting life and nature writ small. The general question itself is not new. Shakespeare’s Prospero pondered it, as did Mary Shelley’s Frankenstein and H. G. Wells’ Dr. Moreau. But the gap between fantasy and actual technological capacity is closing, so that now the morality of power must speak to the governance of power; ethics must inform public policy.

Synthetic biology constitutes a significant extension of the human capacity to manipulate the conditions of life at several levels—the molecular and cellular level, the level of organ systems and metabolic pathways, the traits and behavior of individual organisms, and the level of ecosystemic interactions and interdependencies. Overall this advance of human knowledge and the capacity to intentionally influence the conditions of life is generally referred to as “biotechnology,” and the extension of the domain of human agency that it brings about may be referred to as “biopower.”¹

A quest for cultural meaning—sometimes traditional and recovered meaning, sometimes innovative and radical—arises whenever society must come to grips with the significance and implications of any innovative, substantial and rapidly advancing extension of human power. We try to make rules to protect ourselves and we try to fashion a story about this new kind of power that will domesticate and civilize it. This is necessary for in its raw or wild form such power is too exhilarating, too frightening, too dangerous, and too open to abuse to coexist comfortably

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with our settled ways of life. To be sure, in the United States, if not in Europe, thus far the narrative framing of biotechnology is largely positive, except perhaps within the sensitive and highly charged symbolic and semantic domain of human reproductive medicine and its next door neighbor, embryonic stem cell research. And yet, despite its aura of technological progress and advance, an unease surrounds biotechnology generally, and I think synthetic biology throws that unease into sharp relief. There is something uncanny about fabricating life with nearly the same facility that inorganic matter and energy are manipulated. I believe that this unease does not stem solely from the concern that biotechnology will be misused by human agents. It also grows out of the realization that institutionalized structures of power (state or corporate) have an agency of their own, so that power is not something we use or abuse, *it is something that uses—or abuses—us*.

I

The advent of synthetic biology therefore requires consideration from a political and cultural perspective and not merely a scientific or technical one. In this chapter I propose to focus on the cultural and social meanings of synthetic biology, which are various and highly contested, and on the ethical implications of this exercise in cultural hermeneutics. This kind of interpretive inquiry is important because it plays a key, albeit oftentimes overlooked, role in the formation of science policy in a democracy. This is due to the fact that democratic governance is based not solely on expert knowledge and opinion but also on a broader kind of public perception and legitimacy.

In order to grasp how synthetic biology will be received and reacted to in the political culture of the United States today, we should not concentrate on what is most specific and distinctive about it biologically and technologically, but focus instead on the broader

significance, interpretations, and concerns that are being imputed to biotechnology writ large.² The semantic and symbolic framing of synthetic biology and its political narrative will not be based on synthetic biology as a unique *type* of research and technology but more as a *token* of a larger technological revolution, with all the confusion, hope, and anxiety that revolution is now stirring in our moral and social imagination. Moreover, no technology (including a biotechnology like synthetic biology) should be defined in terms of its apparatus and instrumentality alone. Beyond machinery or physical apparatus, technology is a complex system incorporating both engineering and sociological elements. In its social aspect a technology is a specific formation of human organization, institutional power, and symbolic meaning.

I wish that these remarks and this orientation were a commonplace, but in fact they go against the grain of many influential approaches to social theory and technology studies. In the mid-twentieth century, during the hey-day of scientific American social science, many theorists, such as the noted anthropologist, Leslie White, developed what was sometimes referred to as the “layer cake” model in which the meeting of material needs via technology was at the base, social institutions and rules were the middle layer, and symbolic meaning was, as it were, the top layer and icing.³ Again, the upshot of this tradition, in what has been called the “first wave” of science and technology studies, was to understand culture as a projection of underlying material conditions, including the physical (or biological) requirements of the economically dominant technology of a given society, in a given environmental setting, at a given time.⁴

On the other hand, more recently various schools of thought in the social sciences have stressed the role of symbolic formations in a given culture—normative discourse, intellectual traditions, metaphysical or ontological beliefs, the use of metaphor and other kinds of figurative and narrative reasoning both in lay understanding and in the process of scientific discovery and

creativity, and the like. These symbolic formations shape technology and the material conditions of the production and reproduction of human social life as much as they are shaped by these conditions. This reciprocal interplay between material conditions and cultural meaning, what the social theorist Anthony Giddens refers to as the “double hermeneutic” sheds an interesting light on the historical question of which specific technologies are discovered and even conceivable as such at particular times, and which are not.⁵ Societies never develop all the technologies or material possibilities open to them in a given time and place; the actual array of technologies discovered, invented, and deployed is always a subset of the possible array. There is no reason to think that this selection is merely accidental or fortuitous.

I am inclined to side with the culturalists against the materialists in this ongoing debate within history and social science. The social interpretation and meaning of biotechnological innovation are often overlooked in policy analysis, but they are key to a deliberative process of social learning and adjustment, and to the normative consensus formation that will allow any regulation of biotechnology to be truly effective. The policy process, as is well known, is often attuned quite differently from the cultural and political world, and the dissonance between these worlds often frustrates and confounds policy elites and technical experts, who seek propositional assertions and linear reasoning in what is more fundamentally a narrative and figurative mode of discourse. Ethics, as I understand it, regularly must assume the rather awkward posture of straddling these distinct modes of discourse and their practical applications.

Moreover, there is a dimension to the governance of biotechnology, the taming of biopower, that mainstream policy thinking regularly overlooks, but which is well established in our philosophical, ethical, and religious traditions. Policy analysis has a tendency to see power and technology as neutral tools for the extension of human agency and intentional use. But from

other perspectives, which I believe are widespread and influential in American political culture today, power must be tamed and governed, not only—or even primarily—because it will be misused by human agents, but because, as I noted at the outset, institutionalized structures of power have an agency of their own that stands over above the will and control of the individual human agent.

II

What is the best way to organize an exploration of the semantic framing and the political narrative of biotechnology? The first step is to place the cultural reception of biotechnology and synthetic biology in a historical and ideological context. Following that I propose to discuss some of the salient types of questions or concerns that guide the development of these frames and narratives.

Background context

There are four broad factors that I wish to single out in the recent historical and ideological context affecting the cultural reception of biotechnology. First, the return and politicization of value questions in science. Second, the sense of loss of self-determination. Third, the sense of the loss of self-control, which is not the same thing as self-determination. Fourth, the loss of trust in the functioning and the integrity of major social institutions.

1. The end of value neutrality and the end liberal optimism concerning science and technology.

In the post war period, a consensus gradually developed, especially in the United States, perhaps somewhat less enthusiastically in Europe, concerning authority, expertise, and progress in science and technology. It was a consensus centered around progressive values, economic

growth, social modernization, and the betterment of life through technological advance. This consensus emerged during a buoyant time in the political culture of liberalism, a time of optimism about the ability of the social sciences to inform public policy, a time of enthusiasm for endeavors such as urban planning and social engineering. Speaking to the White House Economic Conference in 1962, President John F. Kennedy articulated a then widely held view of the challenge facing government in the United States:

The fact of the matter is that most of the problems, or at least many of them that we now face, are technical problems, are administrative problems. They are very sophisticated judgments which do not lend themselves to the great sort of ‘passionate movements’ which have stirred this country so often in the past. Now they deal with questions which are beyond the comprehension of most men.⁶

Less than a decade after President Kennedy declared their irrelevancy, passionate movements returned to the domain of public policy with a vengeance and shattered the notion that significant social policy areas, such as foreign policy, economics, health, the environment, and science, were merely “technical problems.”

For social and cultural conservatives, (often referred to as the “religious right”), the framing of the right to life movement—based on a theology of the dignity of the human person—has clearly grown beyond the legalization of abortion to encompass much of the new biotechnology, at least insofar as it touches in any way on human reproduction or germ line genetic or cellular substances. In addition, controversies have flared up over the cultural meaning of evolutionary biology and the control of basic science education.

Yet, critiques of biotechnology and biopower are not confined to the cultural right. On the cultural and intellectual left, within the orientation often called “post-modernism” but not

limited to it, there has been a turning away from the scientific rationalism and progressivism that not only informed the tone of President Kennedy's remarks in the early 1960s but have been integral to the liberal philosophical tradition for over two centuries. Thus John Stuart Mill spoke for the whole of liberalism when he saw in nature and in the frailty of the human body sources of suffering and limitations to be overcome by science and intellect. Concerns about being "unnatural" or "playing God," have never had much resonance and have rung hollow on liberal ears.⁷ However, a new kind of cultural and political framing has emerged in recent years which sees in the control, the overcoming of nature not the amelioration of the human condition, but the development of new forms of power and totalitarian control over individuals as material bodies—reproducing, laboring, neuro-chemically behaving bodies. This frame narrates the advance of biotechnology not in terms of the nineteenth century liberal notion of progress, but in terms of the much, much darker twentieth century political regression into totalitarian dehumanization of racism, genocide, eugenics, euthanasia, and mind control.

2. Anxiety concerning normative chaos in the external landscapes of our lives.

Just as there has been a loss of confidence in the notion that science and technology equate with progress in human health and freedom, so too there has been a parallel loss of confidence in the fundamental elements of what was once referred to, without any sense of irony whatsoever, as "the American dream." The dream has faded as its basic components have receded in people's perceptions of the conditions of their own lives and of the social condition overall. These components include, fairness, meritocracy, unlimited economic growth and future betterment in terms of upward social mobility, educational and employment opportunity, a secure and dignified old age. Perhaps most central of all is the work ethic, which is not simply a

legacy of a Protestant or Puritan outlook in which toil was a way of disciplining naturally sinful human beings, but is also, as Max Weber discerned, a notion about the social conditions under which an individual could control, at least to some degree, the conditions of his or her own life.⁸

Today the global economy is shifting perhaps as drastically as it did at the dawn of the capitalist era. It has become an enormous mechanism for churning individual lives. Marx once remarked that capitalism evaporated solid traditions and social relationships—all that is solid melts into air. Updating the simile, Zygmunt Bauman refers to the “liquid” nature of our society; everything—from electrons to day laborers—is fluid, fungible, flowing.⁹ Each of us is replaceable and displaceable. Even in the most affluent societies and the most powerful nation states individuals today are being confronted with institutional experiences and cultural images of social and personal dislocation that challenge, to put it mildly, their sense of personal efficacy and control.

These experiences ultimately grow out of structural forces over which indeed individuals as such have little or no control. These are forces include global competition and the global mobility and manipulation of finance, the transition from mass production industrial economy to electronic, service, and finance driven economy; the widening disparity and growing concentration of wealth and power in society and its political manifestation in the media attention to scandal, cover-up, and institutional abuse. Ordinary adults today cannot be secure in their employment no matter what level of effort or even productivity they achieve. They cannot control what they ingest or what health hazards they are exposed to. They cannot control the images their children see. They cannot rely on the promise of pensions, and they have witnessed the value of their investments and equity cut in half on the basis of reckless decisions by literally a handful of profit seeking individuals and investment banks. They perceive the precariousness

of lives that cannot avoid economic ruin if something should arise to disrupt their household income stream. Does biotechnology liberate us from this structure, or does it mesh into this brave new world all too seamlessly?

3. Anxiety concerning the moral disorder of the internal landscapes of our selves.

If the work ethic lies at the heart of our market society and capitalistic culture so does the profit motive, the notion that “Greed works.” Overall, human progress and well-being comes, not from the taming, civilizing, or repression of desire, but from its creative channeling via an impersonal, amoral mechanism—namely, the market. The market today is becoming a God that has Failed in the eyes of an increasingly large number of disillusioned believers. The truly interesting aspect, however, is not market failure, even on a global scale, but what this failure portends. Is it a cyclical feature, an inevitably adjustment, a temporary patch of poor oversight and government regulation? Or is it that the very successes and excesses of the market during the last fifty years have deeply transformed and corrupted society and the personality structures engendered by this society? Historians a generation ago, such as Christopher Lasch and Daniel Bell, warned of this phenomenon.¹⁰ Have we now created a culture of narcissism and desire so insistent that it cannot be regulated, channeled, or constrained?

As this concern matures and spreads throughout the culture, it does so not because there is clear and convincing evidence of it, but because it is a framework that helps people make sense of what is happening to them and of what they perceive going on around them in the community and the nation. And it presents biotechnology with a significant three-pronged challenge. First, biotechnology is being developed and marketed by private corporations that we can no longer trust to be publicly responsible nor even constrained by market competition. Next,

the biotechnology industry is being regulated by government agencies that are captured and whose ideological heart is not in the activity of regulation. Finally, the consuming public has no moral compass to serve as a restraining force on biotechnology either, for they cannot say no, neither as citizens or as private consumers, to anything that offers them or their families health, enhancement, or longevity. If industry, government, and private consumers in the marketplace cannot regulate biotechnology responsibly, to whom should we turn? Who can be trusted?

4. Loss of trust.

There has been an erosion of trust in the functioning of government at all levels and across all functions—loss of trust in executive branch regulation, in a fairly representative legislative process, in an objective judiciary; skepticism concerning the social responsibility of corporate and private sector institutions, academic experts and professionals, including scientists.¹¹

However, behind specific forms of skepticism, disappointing policy failures, and occasional scandals, a broader ideological shift seems to be occurring, which, like the loss of optimistic faith in technological progress mentioned above, again involves a crack in the foundation of liberal reason itself. For some time much of our political culture has rested on a principled, progressive liberalism of reason, mutual cooperation, and fairness. This way of thinking was exemplified a century ago in the writings of John Stuart Mill and in our own time by John Rawls, Mill's worthy successor in the liberal tradition. Liberal reason holds out the promise of the preservation and promotion of the dignity, respect, justice and fair equality of opportunity of all. It presides over a well ordered society structured by just institutions; a society worthy of consensual cooperation and support by free and equal persons. In so far as this

framework provides us with a vibrant source of our ideals, values, and expectations (and I believe that it does and should), there is a growing and exceedingly important perceived gap between these standards and the actual facts of contemporary governance, policy, and practice. This gap between values and the use of power—this gap between what we believe we should be and what we actually are as a society—is creating a widespread form of cognitive dissonance in America today. This perceived failure of principled liberalism and reason to prevail over the dynamics of neoliberalism (an ideology in which market competition and success are the only normative standard for economic and political life) and the forces of corporate power has led to a breakdown of popular trust in social elites across the board, and this includes scientists. This has been exacerbated by extreme partisanship and paralysis of government at the federal and state level, and egged on by the fragmentation of the sources of information and ideological interpretation in the media. We are simply unable to answer the age-old question—*Quis custodiet ipsos custodes?* “Who guards the guardians; who watches the watchers?”

These contexts present a most turbulent and inhospitable cultural climate for the arrival of a major new technological innovation (some even say a major new technological age) like synthetic biology. But, for good or ill, this is the petridish, so to speak, within which biotechnology has been born, has developed, and is continuing to grow apace. Certain aspects of biotechnology, such as embryonic stem cell research in the US and genetically modified food in Europe, have been focal points for controversy, while arguably more important economic, ecological, and scientific innovations have been carried on virtually under the radar of this general political culture. But no aspect of biotechnology is privileged or immune from this maelstrom of contested meanings.

Some scientists persist in the belief that if only policy makers and the attentive portions of the public understood the scientific facts and the reasonable scientific risks and benefits accurately, then the controversies over biotechnology would largely fade away, because after all they are grounded in misinformation, misunderstanding, superstition, and irrational animus, in the first place. The phenomena that I have been considering thus far suggest that this belief is naïve. Controversy arises as much out of the lived experience of people in different locations within our economy, society, and culture as it does from scientific ignorance. And biotechnology is controversial not just among those who consider the practice of human molecular manipulation of life to be intrinsically wrong, but also—and I would even say primarily—among those who actually support its promise, the values it could serve, and the means that it uses, but who doubt that it will be controlled and governed properly so that those ends are in fact beneficially and equitably achieved. My notion is that the main kind of friction that biotechnology and synthetic biology will encounter in the future will not come so much from principled, ideological, or doctrinal rejection of the enterprise root and branch, but from a narrative of mistrust and what has been called a “hermeneutic of suspicion.”¹²

IV

I now turn from the general and diffuse cultural background confronting biotechnology to some more systematic and conceptually well-developed modes of critical response. These offer counter-narratives to biotechnology, or at any rate to some of its recent forms of self-presentation or deployment. I call these the precautionary frame, the liberal humanist frame, and the ontological frame. Stated differently, these are the argument from prudence, the argument from dignity, and the argument from nature. These modes of response have had relatively little traction in the policy debates over biotechnology regulation in the United States. (They have

been more salient in discourse in the European Union.) Nonetheless, they are worthy of serious attention.

1. The precautionary frame, or the argument from prudence.

This framework presents an attempt to break out of the logic of cost/benefit and risk/benefit analysis that has developed in mainstream economics and policy studies as a rational mode of decisionmaking under conditions of uncertainty.¹³ The gist of the “precautionary” critique is that this type of analysis is biased in favor of innovation and short-term benefits, while unduly discounting long-term and emergent systemic risks. The remedy, often referred to as the precautionary principle or precautionary policymaking, is to place the onus on the demonstration of beneficial outcome rather than on the demonstration of harmful outcome. Note that the concept of “harm” is defined broadly in this perspective. It includes biological risks and harms to functioning ecosystems, biodiversity, and human health, but it also encompasses a damage or loss to cultural resources and meaningful ways of life. A clear and distinct way of speaking of these kinds of risk or harm—the physical, material, or biologic and the cultural, the meaningful, the symbolic—is something that each of these four modes of critique wrestle with, but have not yet found.

This orientation also raises skeptical questions about the capacity of insiders, self-interested experts, or peer review mechanisms to judge whether this reversed burden of proof has been met. Accompanying the precautionary approach, therefore, is often a call for more public transparency, engagement, and participation in the governance process, so that at least some watchdog functions will be performed by the skeptical gaze of outsiders and disinterested parties.

(One does not have to agree with the precautionary approach to favor some more transparent and broader forms of public engagement in science and technology governance, of course.)

2. The liberal humanist frame, or the argument from dignity.

The focus of this frame is centered mainly on human dignity, and the preservation of the precious and hard won orientation that makes the individual human person the subject of ethical concern and political rights. One part of the liberal humanist critique has centered around ecological and health risks, the malicious and weaponized use of biotechnology, and the problem of distributive justice in the access to beneficial biotechnological resources, products, and drugs.

Another dimension of the liberal humanist critique is perhaps more conceptually radical. Its doubts concerning biotechnology revolve around the cultural and semantic dangers or risks of the technology and the reductionism of the science upon which the technology is based. This involves the prospect that biotechnology will undermine the conceptual foundations for our traditional notions of the moral worth of the human individual, human dignity, equal rights to liberty, respect, and justice.¹⁴ This line of argument is also deeply concerned about the cultural effects of institutionalizing and using the technology in certain ways that might undermine individual freedom and dignity. This critique has been developed in relation to such biotechnology applications as cloning (Habermas) and enhancement of normal human traits and abilities (Sandel).

What if, these critics suggest, an application of biotechnology does not so much harm human interests but undercut the rationale for saying that human interests, individual human interests at any rate, are things of moral value and significance? The liberal humanist critique concludes that ethical governance of science and technology must have standards of rightness

and wrongness as well standards of benefit and harm. Furthermore, ethics should challenge the largely materialistic conception of moral goodness and benefit that has been promulgated by modern science, or at any rate, by the cultural identity, the public image, of modern science and technology. A thicker and more robust conception of the moral good and moral possibility is needed to inform the governance of science.

Here debates within bioethics and the ethics of biotechnology have revealed tensions that are interesting and important for contemporary political theory more generally. Earlier I mentioned the growing cultural skepticism about the traditional liberal notion of progress and about the optimistic faith in science and technology evinced in what I have called the “progressive liberalism” of the nineteenth and twentieth centuries. In the debates over biotechnology this progressive liberalism comes into conflict with liberal humanism. The moral vision about the betterment of the human condition through the growth and application of science and human control based on scientific understanding articulated by Mill and Rawls, also finds acute expression in the following formulation by Ronald Dworkin who finds in biotechnology not a threat to the foundations of liberal individualism but a fulfillment of our historic, even evolutionary duty to preserve it:

There is nothing in itself wrong with the detached ambition to make the lives of future generations of human beings longer and more full of talent and hence achievement. ...On the contrary: if playing God means struggling to improve our species, bringing into our conscious designs a resolution to improve what God deliberately or nature blindly has evolved over eons, then the first principle of ethical individualism commands that struggle, and its second principle forbids, in the absence of positive evidence of danger, hobbling the scientists and doctors who volunteer to lead it. ¹⁵

Note a key phrase in Dworkin's argument above, "improve our species." From the point of view of the nature-centered or biocentric semantic frame discussed below, both progressive liberals like Dworkin and liberal humanists like Sandel, Habermas, and Kass all are limited by the human-centered or anthropocentric perspective they adopt. Here we touch on an issue with a detailed historical past and multi-faceted contemporary significance. Again Dworkin is clear and instructive on the logic of the anthropocentric vision. He argues that there is nothing wrong with focusing human design and action on improving a creation that God deliberately left imperfect or that nature blindly evolved.

So the theocentric and the biocentric (nature transcendent and nature alive) are set aside. Is biotechnology all about the human? Does nature, or creation, or what once was called cosmos really have nothing to do with it? The third framework of cultural meaning and critique that I want to discuss answers these questions with a resounding, no.

3. The ontological frames, or the argument from nature.

Ethical analysis is deeply affected by the initial ontological starting point or orientation one assumes. The cultural reception of science is deeply affected by ontological orientations that pose the question of the "right relationship" between human agency and the rest of being. To answer this question, natural being (nature or the natural) must be conceptualized. In general, there are three concepts of nature that are germane to our topic. I would call these nature dead, nature transcendent, and nature alive.

Nature dead is dualistic and anthropocentric. According to this ontology or worldview nature, or natural being, is material without meaning, except insofar as it serves human purpose. This is the ontological frame most often used to defend and promote advancing biotechnology

and augmenting biopower. Biotechnological engineering is “natural” because nature is simply raw material to be “improved” by human intelligence in the service of human well-being.

Nature transcendent places all being in a teleological narrative, being in a becoming toward fulfillment. The norm of right relationship for humanity is to accommodate and live in accordance with that narrative. When that narrative is thought to have a transcendent author, a divine Creator, the Being of all being, this ontological frame may be said to be religious, as well as philosophical and ethical. This ontology assesses human activity in the context of conceptions of the purpose for which human beings exist, the transcendent (divine) plan for human existence, and the proper relationship between human and nonhuman modes of being, both animal and divine. Generally, from this point of view all created being has intrinsic ethical value, but human being may take on either special value or special obligation depending upon the theocentric tradition in question.

Nature alive is bio-centric or eco-centric. It holds that value in the world resides in the natural and biotic context of which human individuals and societies are a part. Therefore, there is a natural standard of ethical rights and duties, and the good for which ethical agency and action strive can be understood in terms of systems of interdependency, relationship, sustainability, and resilience.

Obviously, I have only scratched the surface of these three orientations. The important thing to note, even with this simple sketch, is that biotechnology is interrogated by this ontological frame from the point of view of its effects on other forms of being but also from the point of view of boundaries, demarcations, and transgressions. Does biotechnology as human agency bespeak arrogance or humility? Does it represent a kind of ontological narcissism or an openness to the recognition of the being of the other? Does this new form of agency threaten to

break open our traditional ontological categories altogether, radically increasing the reach of our power, but also shattering the vessels of meaning within which we have traditionally understood the nature of the responsibility that accompanies power? Something like this question, I believe, was posed rather presciently about biotechnology as early as 1958 by Hannah Arendt, who writes:

The human artifice of the world separates human existence from all mere animal environment, but life itself is outside this artificial world, and through life man remains related to all other living organisms. For some time now, a great many scientific endeavors have been directed toward making life also ‘artificial,’ toward cutting the last tie through which even man belongs among the children of nature. ...The question is only whether we wish to use our new scientific and technical knowledge in this direction, and this question cannot be decided by scientific means; it is a political question of the first order and therefore can hardly be left to the decision of professional scientists or professional politicians.¹⁶

Arendt argues that it is within this web of life—as one among many “children of nature”—that human experience of the world has developed, and that we have come to comprehend, not only the natural environment, but also ourselves. To understand nature and life on the one hand, and meaning and humanity, on the other, are not conflicting projects but are inextricably bound together. Yet, the human power to create the unnatural has reached a truly radical stage, not only because it may bring about the loss of life, biodiversity, whole species on a massive scale, but also because it will fundamentally transform the human way of being in the world. How is that conceivable? It is because “humanity” is not an essence, for Arendt, but a

particular condition of body and thought rooted in our connection to the earth, in what she terms our “natality.”

Arendt associates “science” with this radical, and radically dangerous, transformative power. Science unlocks the inner workings of nature so that nature can be “forced,” in Francis Bacon’s memorable metaphor, to serve human needs and desires. But again it is the step beyond Baconian science that most concerns Arendt, the step that will not merely use or manipulate nature, but replace it, particularly in the biological sphere.¹⁷ Science as power has no value dimension; it is amoral. As such it must be directed and governed by a value-laden vision of the human good and by internal professional self-restraint and external political regulation.

V

I turn now from the question of how various forms of cultural meaning shape (the regulation of) biotechnology and synthetic biology to the question of how biotechnology may shape cultural and ethical meaning. Here the starting point for consideration is drawn from sources far removed from the liberal humanism or the religiosity familiar in American political culture, which tend to see the state as a contract of mutual self-interest and cooperation among free and equal natural persons. The theoretical perspective focusing on the idea of biopolitics views the state as a structure of power designed to protect the life and survival of natural bodies. The bodies (labor) and minds (creativity) of its subjects are the raw material and natural resource of the power of the state, and the primary function of state power is to manipulate and exploit (while safeguarding and investing) that resource. In the modern period, this function of making life within a political community “immunized” from perils that threaten it from outside became deliberate, strategic, and increasingly efficient, rational, and scientific.¹⁸ The perspective of biopolitics has been described in the following way:

That politics has always in some way been preoccupied with defending life doesn't detract from the fact that beginning from a certain moment that coincides exactly with the origins of modernity, such a self-defensive requirement was identified not only and simply as a given, but as both a problem and a strategic option. By this it is understood that all civilizations past and present faced (and in some way solved) the needs of their own immunization, but that it is only in the modern ones that immunization constitutes its most intimate essence. One might come to affirm that it wasn't modernity that raised the question of the self-preservation of life, but that self-preservation is itself raised in modernity's being [*essere*], which is to say it invents modernity as a historical and categorical apparatus able to cope with it.¹⁹

The early twentieth century anti-liberal political theorist Carl Schmidt articulated the implications of this view when he argued that the state is constituted by what he called the sovereign exception, that is the power to exclude “mere life” from the political community for the benefit of life that served some purpose or had some communally beneficial function.²⁰ For the theorists of biopolitics, this logic finds its ultimate expression in the Holocaust, Nazi eugenics, and the notion of life unworthy of life (*lebensunwertes Leben*). The flip side of this, from the perspective of those sensitive to the social control of biopolitics, is the seemingly benign and unexceptionable notion of life better than life.

Biotechnology emerges as an edifice of state/corporate power that is prone to further this state formation of control over the conditions of life and living bodies. (This is not necessarily the deliberate intention of scientists; quite the contrary.) From this point of view, philosophical accounts of value and ontology are beside the point, there are no demarcations to be made between human and nonhuman life as both will be caught up in this discipline, this cultural

formation of manipulation and control. The liberal humanistic tradition extolling individual dignity, freedom, and rights is a weak bulwark also, because biopower has already insinuated itself into those categories, colonized the life world informed by them.

I know of no richer exploration of this facet of biopower and its effect on the very possibility of meaning than Kazuo Ishiguro's stunning novel, *Never Let Me Go*, which depicts an imagined future regime of extensive organ procurement and organ transplantation, rationalized and made effective through the biotechnology of human cloning.²¹ The novel follows children from the class (actually caste) of human clones as they grow up and gradually understand that they must fulfill the function for which they were created, namely, to serve as organ "donors" and "carers." Carers are clones who, before they become donors themselves, are assigned to care for those in the donor phase of their lives as they are gradually killed ("completed") by repeated organ retrievals. Ishiguro is able to explore a question that has been central to the bioethics debate concerning the (as yet speculative) future of human cloning. What would it feel like to be a clone? What would it do to one's sense of personhood, moral worth, and self-esteem to know that you were made, not begotten; created strategically for an overtly instrumental purpose?

The answers are not straightforward. The clone children in their minds rationalize the situation and generally neutralize the implications of the small bits and pieces of the truth that they are told by the "guardians" (teachers) or come to know by inference or rumor. As young adults, they struggle more as they move toward clarity and confrontation with the meaning of their situation, but they are not necessarily inclined to rebel.

Near the end of the book, a small group of clone children who went to school together and have been life-long friends (their lives are not actually going to be that long) encounter the

former head of their school. She reveals to them the scope and logic of the biopower that has come to dominate their society:

...when the great breakthroughs in science followed one after the other so rapidly, there wasn't time to take stock, to ask the sensible questions. Suddenly there were all these new possibilities laid before us, all these ways to cure so many previously incurable conditions. This is what the world noticed the most, wanted the most. And for a long time, people preferred to believe these organs appeared from nowhere...by the time they came to consider just how you were reared, whether you should have been brought into existence at all, well by then it is was too late. There was no way to reverse the process. How can you ask a world that has come to regard cancer as curable, how can you ask such a world to put away that cure, to go back to the dark days? ...So for a long time you were kept in the shadows, and people did their best not to think about you. And if they did, they tried to convince themselves you weren't really like us. That you were less than human, so it didn't matter. ²²

The biopower inherent in biotechnology is all the more pernicious, not because of its harms or risks of untoward results, but precisely because of the successful achievement of its promises of enhancing human security, safety, health and function. Ishiguro reminds us of the terrible cost of dehumanization and oppression paid by all of us, and not only by those (the clones) who are oppressed. He shows that when meanings disappear from our languages of self-understanding and social construction, then our capacity to think, to act, and even to feel in ways linked to those meanings disappears likewise. Ishiguro gives us a world that stands in his moral gaze, not so much condemned, as deeply wounded and impaired. Concepts like student, guardian, giving, caring, service, possibility, completion, holding on, and letting go are all turned

inside out, twisted slightly out of shape, and rendered corrupt by euphemism and double entendre. The recipients of body parts from the stock-room of the donor caste in this society gain enhanced health at the price of emaciated meaning. They may live longer thanks to their biopower, but they will not humanly prosper.

Will this be the ironic, redoubtable gift of synthetic biology as well? When someone looks back at our age of biotechnology, will it be unambiguous to describe it using the idea of progress?

VI

I conclude with some reflections on the regulation of synthetic biology. Policy and regulation in the area of synthetic biology—as in most areas of technology and science policy and governance—will most likely focus primarily on public safety and harm issues. Secondarily, it will likely focus on discrimination and equity issues if it seems to put some group at risk of social harm, or if it seems to benefit one sector of society unduly and yet be developed at public expense.

These issues are fundamental and important, to be sure. But here I want to reflect on a different set of issues that may not be so evident, but that I nonetheless think are crucial and merit careful attention and analysis by policy makers.

In this chapter my concern has been with the worldview associated with and exemplified in synthetic biology—or, more precisely, in the elite representation and the social reception of synthetic biology. (Of course, that public representation and social reception is not always an accurate or complete account of what the science/technology actually is or does, as experts see it, but this public face of synthetic biology has enormous influence in its own right.) My tack has been to explore the source and shape of social concerns about biotechnology, especially from the

vantage point of how this science and technology teaches us to think about natural systems, the relationship between humans and nature, and ourselves and our communities. Does it make us see ourselves as (in Aldo Leopold's words) "plain citizens of the biotic community"? Or as appropriators of meaningless raw biotic material? Does it teach us to see ourselves as civic trustees and stewards of a fragile and increasingly fragmented web of life? Or does it teach us to see ourselves as fabricators, improvers, exploiters, and engineers of a world that is imperfect precisely because it is very complex, fragile, and prone to eluding our deliberate control?

My general thesis is that biotechnology and synthetic biology do indeed convey civic and moral lessons—they have to, the notion of value neutrality in technology is a myth—and that the lessons they teach are the wrong ones. Not wrong necessarily in terms of the direct effects of the science within its still limited biological and operational range—I have nothing against growing microorganisms that can serve as clean fuel, or that can mitigate the environmental damage of oil spills—but wrong in terms of the indirect influence they have, in the ways in which the civic education offered by this science undermines the task of developing an alternative to the human appropriation, manipulation, and "engineering" of nature and of life. For it is an alternative vision and set of values—this change of worldview, this cultural evolution—that we must seek if we are to take seriously our goals of sustainability, resilience, and social justice. Green engineering fixes for specific problems will not get us there. (And besides, who can assure us that the technological outcomes of synthetic biology will all be green?)

Another way to put this is that synthetic biology is a technology that may temporarily solve some problems in our lives, but it is also a cultural formation that will contribute, almost certainly, to the further distortion of the patterns of our lives. The sensibility that synthetic biology reflects will further impede our achievement of a crucial recognition for our future: I

refer to the recognition that human beings are embodied, embedded, “natured” creatures, necessarily and fundamentally. We are not the engineers of life.

At this point, an important question should be asked: Are considerations such as this relevant and appropriate to policy-making in a pluralistic democracy? I would say yes, and all the more so because we are a democracy, or at least aspire to be such. Policy to govern science and technology that focuses exclusively on how the technology may harm us and that totally ignores considerations about how the meaning and culture of that technology may shape us is inadequate, one-eyed policy. Arguably, the civic and moral shaping of cultural meaning and worldviews are more important in a democracy than in other modes of governance. The frame used in the report of a presidential commission on bioethics in the early 1980s, *Splicing Life*, discounted and dismissed cultural concerns of the kind I am raising by saying that they really amount to a version of a religious objection to biotechnology.²³ This religious objection holds that synthetic biology is morally inappropriate because it is a form of “playing God.” That is to say, it is a kind of human trespass into the sacred and a kind of sinful human arrogance. This criticism, defenders to biotechnology point out, is based on special metaphysical or theological beliefs that are out of place in the discourse of public policy analysis.

But this frame of response, which defenders of biotechnology have been using against critics for many years now, is totally inadequate for capturing the significance of the concerns I am trying to articulate here. Religious notions of the right relationship between humans and the creation certainly are one basis for concerns about biotic or ecological citizenship, trusteeship, and stewardship; but they are not the only basis, and it does not follow that these concerns are “religious” or metaphysical arguments. To think so is to overlook the ways in which these concerns are in fact grounded in the best science we have today as regards such fields as ecology,

conservation biology, and geophysical fluid dynamics. To be a synthetic biologist is not to usurp the place of God (theologically a very bizarre notion, when you think about it), but it may well be to manipulate life in ways that are of dubious wisdom from a social and a scientific point of view.

To this one might respond: “Synthetic biology works, doesn’t it?” Is the fact that something “works” the final determinant of its scientific legitimacy? I don’t think so, any more than it is the final determinant of ethical legitimacy. Synthetic biologists have hit upon a level of genomic and biological functioning (at very elemental and small levels) that they can seemingly control rather impressively. So synthetic biology does “work” in a sense and therefore represents scientific discovery of a new truth in the biological sciences. Any yet, despite this, I have a feeling that synthetic biology’s manipulations are profoundly out of step with the current best thinking in biology in that they seek to dispense with, rather than to understand, the complexity and holistic properties of biological systems at all levels.²⁴

I acknowledge that these reflections do not entail a set of specific and particular regulations concerning the future conduct of synthetic biology. But perhaps it is only one part of the task of policy analysis and ethics to suggest concrete regulations. Another part of that task, to which I have tried to contribute, may be to warn against misplaced technological promise and subtle misdirection.

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Notes

¹ Nicholas Rose, *The Politics of Life Itself: Biomedicine, Power, and Subjectivity in the Twenty-first Century*. (Princeton: Princeton University Press, 2006)

² J. H. Evans, *Playing God? Human Genetic Engineering and the Rationalization of Public Bioethics Debate*. Chicago: University of Chicago Press, 2002.

³ Marshall Sahlins, "Infrastructuralism," *Critical Inquiry* 36.3 (Spring 2010), 371-385

⁴ HM Collins and Robert Evans, "The Third Wave of Science Studies: studies of expertise and experience," *Social Studies of Science* 32/2 (April 2002), 235-296

⁵ Anthony Giddens, *New Rules of Sociological Method* (New York: Basic Books, 1976).

⁶ John F. Kennedy, "Remarks to Members of the White House Conference on National Economic Issues," May 21, 1962. assessable at:
http://www.jfklink.com/speeches/jfk/publicpapers/1962/jfk203_62.html

⁷ John Stuart Mill, "Nature," in *The Collected Works of John Stuart Mill, Volume X - Essays on Ethics, Religion, and Society*, ed. John M. Robson, Introduction by F.E.L. Priestley (Toronto: University of Toronto Press, London: Routledge and Kegan Paul, 1985), pp. 373-402. Accessed from <http://oll.libertyfund.org/title/241> on 2011-06-14

⁸ Max Weber, *The Protestant Ethic and the Spirit of Capitalism*. (New York: Charles Scribner's Sons, [1905] 1958). Weber was concerned with linking the rise of capitalism with cultural and psychological reactions to the doctrine of predestination and the desire to influence conditions of personal salvation; my focus here is on a different aspect of this cultural tradition.

⁹ Zygmunt Bauman, *Liquid Modernity*, (Cambridge: Polity Press, 2000).

¹⁰ Christopher Lasch, *The Culture of Narcissism*. New York: Norton, 1976) and Daniel Bell, *The Cultural Contradictions of Capitalism* (New York: Basic Books, 1976).

¹¹ Cf. Francis Fukuyama, *Trust: The Social Virtues and the Creation of Prosperity*, (New York: the Free Press, 1995).

¹² Paul Ricoeur, *Freud and Philosophy: An Essay on Interpretation*, tr. by Denis Savage, (New Haven: Yale University Press, 1970), pp. 20-37.

¹³ Cf. Carolyn Raffensperger and Joel Tickner, eds. *Protecting Public Health and the Environment: Implementing The Precautionary Principle*, (Washington, DC: Island Press, 1999).

¹⁴ Leon R. Kass, *Life, Liberty and the Defense of Dignity: the Challenge for Bioethics*, (San Francisco: Encounter Books, 2002); Jürgen Habermas, *The Future of Human Nature*, (Cambridge: Polity Press, 2003); President's Council on Bioethics, *Human Cloning and Human Dignity*, (New York: Public Affairs, 2002); Michael Sandel, *The Case Against Perfection: Ethics in the Age of Genetic Engineering*, (Cambridge, MA: Harvard University Press, 2007); Francis Fukuyama, *Our Posthuman Future: Consequences of the Biotechnology Revolution*, (New York: Farrar, Straus, and Giroux, 2002); Leon R. Kass and James Q. Wilson, *The Ethics of Human Cloning*, (Washington, DC: AEI Press, 1998); C. S. Lewis, *The Abolition of Man*, (New York: Macmillan, 1955 [1947]); C. G. Mitchell, E. D. Pellegrino, J. B. Elshtain, F. F. Kilner, and S. B. Rae, *Biotechnology and the Human Good*, (Washington, DC: Georgetown University Press, 2007); Martha C. Nussbaum and Cass Sunstein, eds., *Clones and Clones: Facts and Fantasies about Human Cloning*, (New York: W.W. Norton, 1998).

¹⁵ R. Dworkin, "Playing God: Genes, Clones, and Luck," in *Sovereign Virtue: The Theory and Practice of Equality*, (Cambridge, MA: Harvard University Press, 2000), p. 452.

¹⁶ Hannah Arendt, *The Human Condition* (Chicago: University of Chicago Press, 1958), pp. 2-3; A more elaborate discussion of this have been developed by Arendt's colleague Hans Jonas in his book *The Imperative of Responsibility*. [get cite]

¹⁷ K. Lee, *Philosophy and Revolutions in Genetics: Deep Science and Deep Technology*. London: Palgrave Macmillan, 2005.

¹⁸ Michel Foucault, *History of Madness*, (New York: Routledge, 2009) and *The Birth of Biopolitics: Lectures at the Collège de France 1978-1979*, (New York: Palgrave MacMillan, 2008); Nicholas Rose, *The Politics of Life Itself: Biomedicine, Power, and Subjectivity in the Twenty-first Century*. (Princeton: Princeton University Press, 2006); and Giorgio Agamben, *Homo Sacer: Sovereign Power and Bare Life*, (Stanford: Stanford University Press, 1998). Roberto Esposito, *Bios: Biopolitics and Philosophy*, (Minneapolis: University of Minnesota Press, 2008).

¹⁹ Roberto Esposito, *Bios: Biopolitics and Philosophy*, pp. 54-55

²⁰ Carl Schmidt, *Political Theology: Four Chapters on the Concept of Sovereignty*. (Cambridge, MA: MIT Press, 1985.) Cf also Agamben, *Homo Sacer*, pp. 15-29. For a discussion of how liberalism might respond to the problem of biopower, see Bruce Jennings, "The Liberalism of Life: Bioethics in the Face of Biopower," *Raritan Review* 22:4 (Spring, 2003), 130-144.

²¹ This next few paragraphs draw upon my previously published essay, "Biopower and the Romance of Liberation," *Hastings Center Report*, (July/August 2010), 1-4.

²² Kazuo Ishiguro, *Never Let Me Go*, (New York: Vintage Books, 2005), pp.; 262-3.

²³ President's Commission for the Study of Ethical Problems in Medicine and in Biomedical and Behavioral Research, *Splicing Life* (Washington, DC: U.S. Government Printing Office, 1983). A similar framework of argument informs the recent work of the Presidential Commission for the Study of Bioethical Issues, *New Directions: The Ethics of Synthetic Biology and Emerging Technologies* (Washington, DC: Presidential Commission for the Study of Bioethical Issues, 2010.) A contrasting perspective can be found in The European Group on Ethics in Science and New Technologies to the European Commission, *Ethics of Synthetic Biology* (Luxembourg: Publications Office of the European Union, 2010).

²⁴ D. Noble, *The Music of Life: Biology beyond Genes*, (New York: Oxford University Press, 2006).