

Daedalus and Icarus Revisited

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Doubts about the goodness of scientific and technological progress are hardly new, and fears about the dangers of human knowledge existed long before it became plausible to worry that the fate of the entire world might be in peril. The physicist Freeman Dyson offers one common—and very modern—way of describing our predicament: “Progress of science is destined to bring enormous confusion and misery to mankind unless it is accompanied by progress in ethics.” In other words, we need some novel ethic to match our technological ingenuity. But progress in ethics might also mean what Abraham Lincoln had in mind when describing the principles of the Declaration of Independence as “a standard maxim for free society ... constantly looked to, constantly labored for, and even though never perfectly attained, constantly approximated.” Dyson’s idea suggests new ideals replacing old ones as history moves technologically forward; Lincoln’s idea suggests more permanent human aspirations that serve as the measure of different ages. Either meaning poses very serious challenges. Genuinely novel ethics are not always genuine improvements, while many anciently articulated ethical goals remain elusive.

The ambiguity in the meaning of moral progress is at the heart of a 1923 debate between biochemist J.B.S. Haldane and logician Bertrand Russell, two of the greatest and most argumentative public intellectuals of twentieth-century Britain. Haldane, who would go on to an extremely distinguished career as a biochemist and geneticist, spoke under the auspices of the Cambridge Heretics discussion club. Russell, already a famous philosopher, answered him as part of a speakers series sponsored by the Fabian Society under the general title, “Is Civilization Decaying?” The published version of Haldane’s remarks created no little controversy; even Albert Einstein had a copy in his library. There is also little question that Haldane’s work influenced two of the greatest British critics of scientific and technological progress: Julian Huxley and C.S. Lewis.

The titles of the essays, Haldane using *Daedalus* and Russell *Icarus*, support the common idea that Haldane writes as an advocate of progress and Russell as a skeptic. While this view is understandable, it is hardly exhaustive. Haldane freely highlights horrible possibilities for the future, and he is quite blunt about the socially problematic character of scientific research

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SPRING 2005 ~ 73

and scientists. Russell, on the other hand, can imagine circumstances (albeit unlikely ones) where the power of science could be ethically or socially constrained. The real argument is about the meaning of and prospects for moral progress, a debate as relevant today as it was then. Haldane believed that morality must (and will) adapt to novel material conditions of life by developing novel ideals. Russell feared for the future because he doubted the ability of human beings to generate sufficient “kindliness” to employ the great powers unleashed by modern science to socially good ends.

Both authors explore the problem of relating moral and technological progress with sufficient depth that we would benefit by reexamining this debate with a view to our own time. But the manner in which they frame the problem stands in the way of articulating a clear moral goal that might serve as progress’s purpose and judge. With serious ethical discussion thus sidelined, technological change itself becomes the fundamental imperative, despite the reasonable doubts both Haldane and Russell have concerning its ultimate consequences. And while Haldane is more loath to acknowledge it than Russell, the net result of their debate is a tragic view of mankind’s future, marked by an irreconcilable and destructive mismatch between our aspiration to understand nature and the power we gain from that knowledge.

In the Image of Science

Haldane begins *Daedalus* with a directness that does not characterize most of the essay that follows. Drawing on scenes of destruction from World War I and from casual discussion of the possible reasons for exploding stars, he asks whether the progress of science will culminate in the complete destruction of humanity or in the reduction of human life to an appendage of machines. “Perhaps a survey of the present trend of science may throw some light on these questions.” It is already revealing that Haldane gives this kind of scientific projection such a privileged place, for it suggests that in his mind the primary question behind the destruction of mankind is simply whether science will gain the power to accomplish it. If the central issue of our future is the power to destroy ourselves, then the most obvious way of avoiding that risk is preventing mankind from gaining that power in the first place. Yet Haldane sees no realistic chance of stopping the progress of science. He argues that believing in the future might strangely require a willingness to see all that we know destroyed and replaced. Even if we can avert apocalyptic disaster, we will remake ourselves in unrecognizable ways.

Haldane believes that biology is likely to become “the center of scientific interest” in the future, and this is where the bulk of his essay is focused. But he digresses to discuss the situation in physics, which is in a “state of profound suspense ... primarily due to Einstein, the greatest Jew since Jesus.” Avoiding an “inevitably technical” discussion of physical theory, he decides instead to speculate on the “practical consequences of Einstein’s discovery.” In so doing, he provides a preview of the logic that will inform his entire essay. Einstein heralds the end of the era of Newtonian physics, whose concomitant working metaphysic was materialism. This scientific revolution means the coming of a new metaphysical and moral order, and Haldane predicts that Einstein’s work will bring with it a triumph of Kantian idealism (although he admits that he does not know exactly what this change will mean in practice). He projects further that “some centuries” hence “physiology will invade and destroy mathematical physics.” Overall, “we are working towards a condition when any two persons on earth will be able to be completely present to one another in not more than $1/24$ of a second.... Developments in this direction are tending to bring mankind more and more together, to render life more and more complex, artificial and rich in possibilities—to increase indefinitely man’s powers for good and evil.”

This statement is an answer of sorts to the original question: Will man survive, and what will he be like? Haldane’s answer hardly seems like much of an advance over where the essay began: Self-destruction, he suggests, is a genuine possibility as we “increase indefinitely man’s powers for good and evil.” But in fact, Haldane has laid out two crucial elements of his larger argument. First, there is the implicit definition of progress: bringing mankind closer together, increased complexity, artificiality, and open-endedness. We will see how this view culminates in his picture of a united humanity working to transcend itself, and in his turn to evolution as a form of salvation. Second, as Haldane understands the world, scientific discovery brings with it a horizon of belief that sets the parameters of daily life. While Haldane will speak of “labor and capital” as “our masters,” his essay attempts to show how it is really the scientists, the Daedaluses of the world, who discover new ways of seeing and doing, and at a far deeper level are in control. This point is reiterated in yet another digression on “the decay of certain arts,” which Haldane describes as a consequence of artists not understanding the scientific and industrial order in which they live. This view of science’s role in setting the agenda for human life has crucial consequences for the ethical question that is

supposed to be the motive force behind the essay. If science shapes the parameters of human aspiration and human virtue, then morality is simply an effort to respond to man's ever-increasing and ever-changing power over nature. We judge ourselves in the image of science, not science in the image of some transcendent idea of the human good.

The Malleability of Morals

When the main topic of the essay—advances in biology—is taken up, the subject is again introduced with a digression. To foretell the impact of future development in biology, Haldane looks at four “biological inventions of the past” to see the nature of their consequences. Three inventions are stated directly: domestication of animals, domestication of plants, and production of alcohol. A fourth is only hinted at, involving an unspecified invention that focused male sexual attention on the female face and breasts rather than buttocks. Haldane also mentions the invention of bactericide and birth control.

These biological inventions have two common characteristics. First, they have had a “profound emotional and ethical effect” on human life. Second, the biological invention “tends to begin as a perversion and end as a ritual supported by unquestioned beliefs and prejudices.” Haldane asks us to consider the “radical indecency” that milk drinking introduces into our relationship to the cow, or the “process of corruption which yields our wine and beer.” Any innovator who would suggest such disgusting things would clearly at first be considered outside the bounds of civilization. But civilization adjusts. In a typical bit of satire, Haldane wonders what “strange god will have the hardihood to adopt Charles Bradlaugh and Annie Besant,” tireless workers for birth control and other secular causes of the nineteenth century.

Haldane takes the figure of Daedalus as instructive about the changing status of beliefs. Daedalus had no care for the gods, and the gods failed to punish him even for so monstrous an act as breeding a woman with a bull. “He was the first to demonstrate that the scientific worker is not concerned with gods,” and thus he exposed himself to the “universal and agelong reprobation of humanity”—with the exception of Socrates, who was “proud to claim him as an ancestor.” The point here is ambiguous. If there is ongoing disapproval of Daedalus, then Haldane's case that mankind adjusts its ideals to its technologies seems questionable. Yet insofar as the West is heir to Socratic rationalism, it is somehow also heir to Daedalus.

Haldane tries to clarify his argument that yesterday's perversions become today's "unquestioned beliefs" by presenting the bulk of his projections about biology in the form of an essay from "150 years hence," written by "a rather stupid undergraduate" reviewing the progress made in this period. The student presents the most remarkable achievements—a global food glut, the transformation of the color of the ocean to purple due to the same microorganism that created the food glut, the elimination of deserts, ectogenic children, and genetic engineering—in a deeply matter of fact and unreflective way. This is his world, and while intellectually he understands it has not always been so, he is reasonably content with the way things are. Haldane follows this mock essay with his own speculations on birth control, eugenics, behavior control, the abolition of disease and old age, and the transformation of death into "a physiological event like sleep," shorn of its emotional terrors.

In arguing that we adjust our ethics to our inventions, Haldane exploits two truths about human life: over time, many ideas of right and wrong do change in response to changed circumstances, and most people do have a fairly thoughtless understanding of the sources of the ideas of right and wrong that inform their moral horizons. But Haldane draws too much from these observations, because he fails to connect them in any way. He neglects to think about the possibility that greater reflection on moral principles might lead to less malleability. Socrates, after all, proceeded in his investigations by holding open the possibility that opinion could be distinguished from truth, even in moral matters.

For his most ancient examples, the truth of the ethical transformation Haldane describes is so shrouded in myth and mystery that we cannot say anything with certainty. Haldane does not even attempt to produce evidence of a period of revulsion concerning milk, alcohol, or the female face. He is on more solid ground with the cases of sanitation and birth control. But the growing acceptance of both, in the face of what Haldane would see as mere traditionally minded opposition, tells us nothing in and of itself. We would need to examine, for example, whether opposition to cleanliness was any more or less defensible in its moral claims than opposition to birth control. Since Haldane does not find it necessary to reflect on this point, he leaves himself open to the charge of holding an unreflective and dogmatic belief in ethical relativism, which from the start transforms all moral claims into cultural prejudices. Indeed, when Haldane speaks in his own voice about what the future holds, he notes that "I am Victorian enough in my sympathies to hope that after all family life,

for example, may be spared,” even as it becomes unnecessary for women to bear children. His only imaginable response to the abolition of the family is rooted in emotions trained by the mores of a particular time and place.

At this point in the essay, it appears that Haldane can provide no assurances that scientific progress will not lead to our demise. In fact, that demise might be brought on by the way changes wrought by science create new moral desiderata—new norms that adjust our expectations to things that we once saw as evil, blinding us to a self-destructive course. And even if science does not lead to our demise, a man of the past looking into the future is unlikely to see what he would call “progress” strictly speaking; he is likely instead to see horrifying change and a generation that complacently accepts indecency.

This part of Haldane’s essay culminates with the observation that the “conservative has but little to fear from the man whose reason is the servant of his passion, but let him beware of him in whom reason has become the greatest and most terrible of the passions. These are the wreckers of outworn empires and civilizations, doubters, disintegrators, deicides.” This free-spirited view of human affairs might be tolerable if one were confident that something better would be built on the wreckage of the old. But on Haldane’s own understanding, as presented so far, no such claim can withstand the fierce gaze of the reasonable man. So it may come as no surprise that Haldane tries to shift somewhat the ground of his argument.

Might Makes Right

This shift begins with Haldane’s argument that science should be seen from three points of view: First, it is “the free activity of man’s divine faculties of reason and imagination.” Second, it is “the answer of the few to the demands of the many for wealth, comfort and victory.” Haldane legitimately reminds us of the bargain on which modern natural science rests, which allows the “free activity” of science for the sake of the benefits it produces. (Of course, if those benefits are inherently double-edged, one might reconsider the terms of the original bargain.) Third, science is “man’s gradual conquest, first of space and time, then of matter as such, then of his own body and those of other living beings, and finally the subjugation of the dark and evil elements of his own soul.” These conquests, Haldane acknowledges, will never be complete but they will be “progressive.” And the “question of what he [mankind] will do with these powers is essentially a question for religion and aesthetic.”

This last point is breathtaking, as Haldane seems to understand. For what are the “dark and evil” aspects of the soul that require conquest? Not, apparently, the passion of unadulterated reason; not the urge to destroy civilizations or commit deicide; not the urge to murder a rival or satisfy a monstrous lust. Not, alas, if Daedalus is to remain a model to be admired. And how do “religion and aesthetic” suddenly rise to such a prominent place in shaping man’s fate, or is their impotence in the face of scientific advance precisely the point? For Haldane acknowledges that the scientific powers now being given to mankind are like giving a baby a box of matches; we seem to possess the power of gods and the wisdom of infants. How can we expect this all to turn out well? In what sense can we call the “conquest” of nature and of the human soul “progressive”?

Haldane’s hope is that “the tendency of applied science is to magnify injustices until they become too intolerable to be borne, and the average man whom all the prophets and poets could not move, turns at last and extinguishes the evil at its source.” But with the impotence of “religion and aesthetic” already confirmed, we are left to wonder what Haldane means by injustice, or by what standard “evil” will be recognized and judged. To clarify what he means, Haldane offers the example of war. By making mankind more powerful, science has created the “*reductio ad absurdum*” of modern warfare, and thus created the circumstances that make world government more possible, since it is the only vehicle that might stop apocalyptic self-destruction. (He wrote this essay, remember, in the wake of what was then history’s bloodiest war and at a time when the League of Nations still seemed to hold promise.) As Haldane puts it: “Moral progress is so difficult that I think any developments are to be welcomed which present it as the naked alternative to destruction, no matter how horrible may be the stimulus which is necessary before man will take the moral step in question.” Our moral future thus depends on flirting with the technological brink, which we seem destined to do whether we like it or not.

Haldane seems to believe that science first pushes society to become more just according to the local standard of justice (“the scientific worker is brought up with the moral values of his neighbors”). But then science, by increasing our power and changing our circumstances, helps to destroy that standard (“an alteration of the scale of human power will render actions bad which were formerly good”). So at the very moment that society is forced to become more just, it is on the way to becoming more “outworn.” When Haldane concludes that the prospect for humanity is

“hopeful if mankind can adjust its morality to its powers,” he means that progress can only in the most limited sense be seen as the achievement of what was ineffectively advocated by prophets and poets. His effort to soften his teaching on science’s power of moral destruction fails; progress is not the realization of old ideals but the necessary birth of new ones. “It is just because even the least dogmatic of religions tends to associate itself with some kind of unalterable moral tradition, that there can be no truce between science and religion.”

Haldane eventually returns to what is central in his essay: the influence of the man for whom reason has become “the greatest and most terrible of the passions.” The essay concludes with a poetic evocation of “the lonely figure of Daedalus,” conscious and proud of his “ghastly” mission, “Singing my song of deicides.” From this point of view, moral progress would mean adopting the view that “mythology and morals are provisional” or situational—with Daedalus creating the situations. In effect, Haldane transforms “might makes right” into the hallmark of moral progress—an odd but deeply telling conclusion for an essay that has come to be seen as an “optimistic” assessment of the future of science.

Why does Haldane fail to appreciate this result? One reason is clearly his romantic image of the scientist as a crusader for truth without regard to consequences, and another reason is the need to free the scientist to work unmolested despite all the acknowledged problematic consequences of doing so. But more deeply, this moral concession to scientific might is perhaps obscured for Haldane by his understanding of the evolving character of scientific power—that is, by his idea of the “gradual conquest, first of space and time, then of matter as such, then of his own body and other living beings, and finally the subjugation of the dark and evil elements of his own soul.” Part of what Haldane has in mind by this growing, but always incomplete, process of conquest is evident both in his look backward at past discoveries and his look forward at future possibilities. By looking to both past and future, he is attempting to overcome our prosaic acceptance of current abilities, to highlight how remarkable they would look from the perspective of the past, and how we might be similarly impressed (or naïvely horrified) by what the future will make possible. He wants us to be awed by what human beings can achieve through our “divine faculties of reason and imagination,” and so to believe in the self-transcending possibility of self-directed evolution. By realizing the temporary character and utter foreignness of the human past, we might put our faith in a post-human future.

Inventing the Future

This post-human project comes out even more clearly in Haldane's story, "The Last Judgment," where he attempts to look forty million years into the future of mankind. In this vision of the future, man's use of tidal power changes the orbit of the moon, drawing it close enough to be destroyed and to destroy all life on Earth. In the meantime, mankind makes multiple efforts to reach, colonize, and terraform Venus, taking half a million years to achieve the first successful landing. Realizing the hostile conditions for life on Venus, a group of men set out to restart evolution; for by then, natural selection had been stopped and mankind had reached a state of happy equilibrium indistinguishable from utter stagnation. "Confronted once more with an ideal as high as that of religion but more rational, a task as concrete as but infinitely greater than that of the patriot, man became once more capable of self-transcendence." After only ten thousand years, a genetically engineered offshoot of humanity is created, at odds with its environment, hence driven and unhappy, hence a being that can survive on Venus. These early settlers develop into a "superorganism" of individuals mentally linked to one another, and they prepare a race capable of colonizing the outer planets. Read in conjunction with *Daedalus*, the story illustrates Haldane's view of the consequences of our increased scientific and technological powers: on the one hand, destroying Earth and all human life, and on the other hand, self-consciously directing human evolution into a form that can thrive elsewhere. The noble goal of self-transcendence does not produce happiness, but happiness means stagnation.

Haldane was familiar enough with the work of H.G. Wells to anticipate the likely reaction to such a story. In its own time, it fires the imagination, and hence serves the author's purpose: to inspire people to look to the future for guidance rather than the past. Seen in retrospect, its very quaintness fuels pride in actual accomplishments. But this way of understanding progress has a troubling side as well, which is well illustrated in British author Olaf Stapledon's work *Last and First Men*, written very much under the influence of Haldane. The book is a future history covering some two billion years, being dictated to the author by one of the "last men." During this period, eighteen species of "men"—all of them human descendants but few recognizably human—rise and fall, first on Earth, then on Venus, then finally on Neptune.

The Stapledon story, whose early millennia clearly elaborate on "The Last Judgment," is rich in satire and imagination. Stapledon creates dis-

tinctive races of men with their own abilities, physical characteristics, and cultures: men that can fly, men with telepathic powers, men that are nothing more than huge brains. Civilizations rise and fall due to violence or stagnation; religions and social movements form on the basis of misunderstandings; the past is forgotten and rediscovered. But at a certain point all the races face the necessity or desire for self-transcendence, the inner drive or external push to be more than themselves. And it is just at this moment that most races destroy themselves—either deliberately via successful evolution of their successors, or unintentionally by unwise use of their scientific powers. Despite the cyclical character of the story, marked by the rise and fall of different races, there is also a broad progressive tendency in the races' increased power over their physical worlds, over their own bodies and minds, and finally over their own pasts.

Some races are happier than others; some periods of time are more blessed. But overall, the last men look back at the story and see it as a tragedy. "If actual grief has not preponderated over joy, it is because, mercifully, the fulfillment that is wholly missed cannot be conceived." The last men discover that their own end is coming due to the disintegration of the Sun, and they cannot conceive of a way to save themselves. Instead, they engage in two god-like efforts. The first is an attempt to redeem the tragic past by "participation" in it, exemplified by sending this history back to their ancestors. (Stapledon does not here trouble himself much with the paradoxes of time travel.) The last men hope that what they see as signs of providence—signs for which they are not responsible—are evidence of a future intelligence yet greater than their own. The second god-like effort is an attempt to seed the cosmos with life, in the hope of beginning somewhere else the long evolution towards intelligence.

What drives them, even knowing that there is a limit to their days, is that same impulse for self-transcendence, which becomes their effort to redeem the whole tragic history of intelligent life. With the end looming, they seek to make the finite eternal:

If ever the cosmic ideal could be realized, even though for a moment only, then in that time the awakened Soul of All will embrace within itself all spirits whatever throughout the whole of time's wide circuit. And so to each one of them, even to the least, it will seem that he has awakened and discovered himself to be the Soul of All, knowing all things and rejoicing in all things. And though afterwards, through the inevitable decay of the stars, this most glorious vision must be lost, suddenly or in the long-drawn-out defeat of life, yet would the awakened

Soul of All have eternal being, and in it each martyred spirit would have beatitude eternally, though unknown to itself in its own temporal mode.

Is this passage simply like others in the story, where Stapledon is more obviously satirizing self-deceptive mystical beliefs? And are we to believe that the real future of intelligence rests with the last men's effort to seed the galaxy with life? If so, then the tragic element of the story becomes the final moral lesson: If intelligence arises again, why should not the whole bloody mess simply repeat itself in some new way? Yet it seems more likely that this passage is not satire at all, and through his own future history Stapledon comes to an important insight: perhaps the human desire for self-transcendence is really a world-transcending aspiration, an "attraction to infinity." Properly understood, that attraction might open the door to genuine religious faith.

Haldane approaches a similar conclusion at the end of "The Last Judgment," where he acknowledges that religion and science teach some of the same lessons, although for different reasons. Religion says that it is a mistake to think that one's own "ideals should be realized," because "God's ways are not our ways." Science says instead that "human ideals are the products of natural processes that do not conform to them." Religion teaches an "emotional attitude to the universe as a whole," a sense of human limitation that is only confirmed when science illuminates the awesome immensities and complexities of the universe. Both teach us to "conjecture what purposes may be developed" and to think grandly about human plans and our unselfish "cooperation" in them.

Both religion and science, in other words, teach that "events are taking place for other 'great and glorious ends' which we can only dimly conjecture.... Without necessarily accepting such a view, one can express some of its implications in a myth." If there is even this degree of convergence between religion and science, why prefer myths of the future over existing stories of God's presence in history? Why look to the future instead of the past? The answer, for Haldane, is because such future-oriented stories are obviously provisional, because they glorify human power and achievement and carry the authority of science, and because they can be constructed to propose no moral absolutes.

Daedalus is a delightful essay, literate and witty. As a scientist, Haldane deserves credit for refusing to provide a guarantee for the human future, and he is right to suggest that our uncertainty stems from "the old paradox of human freedom re-enacted with mankind for actor and the earth for stage." But for all the charm of *Daedalus*, Haldane does not recognize

that this great paradox is being reenacted without a moral compass, and thus without any serious basis to call what may happen in the future, even if we do not destroy ourselves, genuine “progress.” The substitution of science fiction for religious tradition is not obviously an advance when it comes to making serious judgments about “great and glorious ends,” particularly if those ends finally derive from Daedalus’ willful quest for power. In the end, scientific progress parallels moral progress only if might does indeed make right. And while Socrates might honor the curiosity of Daedalus, even he could not accept such a blind definition of the human good.

Servant of the Ruling Class

Bertrand Russell’s reply to Haldane does not start in an especially promising way. He characterizes *Daedalus* as “an attractive picture of the future as it may become through the use of scientific discoveries to promote human happiness,” which hardly seems an adequate description of Haldane’s intention or his belief that the future happiness of our descendants will probably not look attractive to us. In contrast, Russell thinks that science will continue in the future to do what it does in the present: not serve human happiness in general but serve the power of “dominant groups.” This is a proposition that Haldane would not necessarily deny, although he has a deeper view of exactly who is whose master. Russell then says that he will focus on “some of the dangers inherent in the progress of science while we retain our present political and economic institutions”—yet again, a premise with which Haldane would almost surely agree. So far, at least, there would seem to be no real debate between the two men.

Like Haldane, Russell divides his discussion into various fields of science (physical, biological, anthropological), and he freely combines projection into the future with satiric commentary on the present. In laying out his broad purpose, Russell eventually adumbrates his first real differences from Haldane. Acknowledging the huge effect science has made in shaping the world “since Queen Anne’s time,” Russell observes that the impact of science can take two basic forms: first, “without altering men’s passions or their general outlook, it may increase their power of gratifying their desires,” and second, it may change their outlook on the world, “the theology or philosophy which is accepted by energetic men.” Russell will focus, he says, on the first kind of effect: how science serves existing desires rather than how it creates new worldviews.

This restriction appears curious at first sight, for it gives the appearance of circularity to Russell's understanding of the results of scientific progress. If he thinks science is problematic under present circumstances, it may be because he is not interested in thinking (*à la* Haldane) about the manner in which science may form and change those circumstances. Perhaps he sees science serving the interests of today's dominant groups because he is not considering how it might create new dominant groups. Russell thus excludes from the start the possibility that science will be anything but "conservative," and he appears at first critical of modern science precisely for this conservatism.

The divide between the two men turns out to revolve precisely around this difference of emphasis. The key to Russell's response to Haldane is understanding why Russell thinks that, on balance, science is more likely to serve existing power structures than to challenge them. Russell announces his answer in brief early on: "Science has increased man's control over nature, and might therefore be supposed likely to increase his happiness and well being. This would be the case if men were rational, but in fact they are bundles of passions and instincts."

The Cynical Utopian

Russell's focus in *Icarus* is on the physical and anthropological sciences, which he sees as having had a fourfold effect: increase of population, increase of comfort, increased energy for war, and increased need for large-scale organization. The fact that "modern industrialism is a struggle between nations for two things, markets and raw materials, as well as for the sheer pleasure of domination," means that war and large-scale organizations are particularly important. The place of science in this struggle is ambiguous. While on one page he says that the national character of organizational rivalry is something "with which science has nothing to do," just a couple of pages later he concludes that "the harm that is being done by science and industrialism is almost wholly due to the fact that, while they have proved strong enough to produce a *national* organization of economic forces, they have not proved strong enough to produce an international organization."

What stands in the way of international organization, he argues, is that the pleasure produced by rivalry is the driving motivation among the few rich men who control big business. To think that their goal is wealth is to misunderstand them, like thinking that scoring goals is the point of soccer. Were that true, teams would cooperate, for then many more goals

could be scored. So too with business: more cooperation would mean more wealth. But in both instances, the really important thing, the team rivalry, would be missing.

The power vested in these large organizations is already so great that “the ideals of liberalism are wholly inapplicable” to the modern world; there is no liberty except for those who control the sources of economic power, no free competition except “between States by means of armaments.” The only hope for freedom or democracy in a “scientific civilization” would be if economic and nationalistic competition were to produce one big winner, establishing a “cruel and despotic” global tyranny. But in time, Russell hopes, the energy of the tyrants at the top might flag, leaving behind a “stable world-organization,” a “diminishment of the evils which now threaten civilization,” and “a more thorough democracy than that which now exists.” Where Haldane looks to the possibility of self-destruction as the potential impetus to moral progress, Russell looks to tyranny as the potential pathway to peace.

Both Russell and Haldane believe that scientific progress will be best assured under world government. But why this should be so requires some elucidation. Clearly, the key problem for Russell is rivalry combined with the power of modern science, which is one powerful example of how our passions and instincts lead to irrational results as circumstances change. It is clear how tyrannical centralized control could use the power of science to limit rivalry, but less clear how rivalry would not arise even with world organization, once that control loosened and the organization became a “more thorough democracy.”

A telling example of how Russell sees world government and its relationship to science comes when he discusses the need to implement birth control measures—particularly, he seems to expect, among non-white races, so that no nation will grow much faster than others. He expects white races, already showing signs of population decline, to use “more prolific races as mercenaries,” threatening a revolt that ends in the extermination of the white races. The casual racialism behind such thinking, however common at the time among progressive intellectuals, confirms the extent to which world government, tyrannical or not, is unlikely to be premised on human political equality.

When it comes to eugenics and the goal of producing a “better race,” however, Russell is not a naïve inegalitarian, and it is here that we reach the crux of his disagreement with Haldane. Like Haldane, Russell expects that eugenic efforts will be attempted and may even work, but on the whole

he is skeptical about the moral prospects of positive eugenics. Where Haldane imagines democratic campaigning for this or that eugenic ideal (“Vote for Smith and more musicians”), Russell thinks that such decisions “would of course be in the hands of State officials, presumably elderly medical men. Whether they would be preferable to Nature I do not feel sure. I suspect they would breed a subservient population, convenient to rulers but incapable of initiative. However, it may be I am too skeptical of the wisdom of officials.”

Russell is also skeptical when it comes to the biochemical control of behavior. This novel capacity would give those in charge “power beyond the dreams of the Jesuits, but there is no reason to suppose they will have more sense than the men who control education today. Technical scientific knowledge does not make men sensible in their aims, and administrators in the future, will be presumably no less stupid and no less prejudiced than they are at present.” In this, at least, his utopianism about world government is moderated by his realism about human folly and perversion.

Russell raises this skepticism to the level of principle: Science increases the power of those in power. If their ends are good, they can achieve more good; if their ends are evil, more evil. “In the present age, the purposes of the holders of power are in the main evil,” so science does harm. “Science is no substitute for virtue; the heart is as necessary for a good life as the head.” By heart, Russell means the “sum-total of kindly impulses” which make people “indifferent to their own interest” but in fact serve that interest, once it is properly distinguished from a rationalized “impulse to injure others.” Intelligence plus such deliberate desire “would be enough to make the world almost a paradise.”

Russell is reasonably certain that science could increase the kindly impulses, but also reasonably certain it will never happen. Those who would make the discovery and administer the treatment (he imagines a “secret society of physiologists” kidnapping and treating world leaders) would already have to be governed by natural kindness, otherwise “they would prefer to win titles and fortunes by injecting military ferocity in recruits.” “And so we come back to the old dilemma: only kindness can save the world, and even if we knew how to produce kindness we should not do so unless we were already kindly.” The remaining alternatives, Russell believes, are self-extermination or “world-wide domination by one group, say the United States,” leading eventually to an orderly world government. Yet the “sterility” of the Roman empire leads Russell to conclude by wondering whether “the collapse of our civilization” is perhaps the best answer after all.

Such glib and world-weary statements are part of what made Bertrand Russell the man we remember as Bertrand Russell. But there remains a serious claim being put forward. To Haldane's core assertion that science will produce progress by giving human beings the choice of reform or oblivion, Russell responds that we will likely, and perhaps even should, choose oblivion. Haldane looking forward sees future evolution as our best hope; Russell looking backward sees our evolutionary heritage as a fatal flaw. The full force of an analogy used by Russell at the beginning of his essay only becomes clear at the end: Dogs, he noted, overeat because they are descendants of wolves, who needed to be driven by "insistent hunger." Under domestic circumstances, this retained drive hurts dogs. Likewise, human beings have "instincts of power and rivalry" that are inconsistent with our well-being, and hence self-destructive under present circumstances. And these instincts, it seems, are more likely to be gratified by means of science than altered. We are creatures of our nature, creatures of our passions. Coming closer to the technological brink is not likely to change this fact.

This outlook helps explain why Russell does not meet Haldane head on by looking at the way science changes the outlook of "energetic men." Whatever the guiding theology or philosophy of the day, however influenced it may be by modern science, natural instinct will win out. "Science is no substitute for virtue," Russell notes, but he puts little weight on the ability of virtue to counter the raw human instinct for power, injury, and rivalry.

Russell's skepticism about the strength of virtue creates a moral vacuum, which leads him to dark and dire conclusions. One does not have to believe in man's overwhelming goodness to wonder whether Russell's outlook is grounded more in fashionable cynicism than moral realism. If injury, power, and rivalry were as powerful as Russell suggests, then it is hard to see how life is not a great deal more terrible than it already is. Moreover, it is not obvious why the generous and kindly "impulses" must take a back seat to the darker passions. Russell assumes, at best by analogy, that the rivalrous impulses would be those more conducive to survival. But by his own admission, virtue is not simply unnatural and may act to our benefit. As an example, he cites the Quakers, who controlled a natural greedy impulse in the name of a moral principle (don't misrepresent prices) and had success as a result. If once useful impulses can become self-defeating, why can't "kindly" impulses take their places?

In reality, we discover that virtue is of far less interest to Russell than it ought to be. His cynicism about morality's sway over the human soul is

really born of dissatisfied utopianism: “If men were rational in their conduct . . . intelligence would be enough to make the world almost a paradise.” But as civilization is not made up mostly of Bertrand Russells, there is little hope for anything other than collapse. From this point of view, Russell looks like a disappointed Haldane, the Haldane who looks with apparent equanimity on the possibility that humanity may finally prove itself unworthy of survival by not surviving. As Haldane put it, “At worst our earth is only a very small septic area in the universe, which could be sterilized without very great trouble, and conceivably is not even worth sterilizing.” By different roads and for different reasons, both authors come to the same anti-human conclusion. The core difference is that Haldane believes we might become something better by shattering what we are now.

The Real Meaning of Progress

So where does this debate leave us? It is telling that Haldane refers to G. K. Chesterton towards both the beginning and ending of his essay. The second time he quotes lines of poetry by Chesterton, without attribution, to acknowledge yet again the potentially destructive power of the human intellect. The first time he criticizes *The Napoleon of Notting Hill*, which “prophesied that hansom-cabs would still be in existence a hundred years hence owing to a cessation of invention. Within six years there was a hansom-cab in a museum.” In commenting on this apparent failure of prediction, Haldane gives some indication that he might understand that Chesterton was not really predicting at all, but satirizing predictors just like himself, who (in Chesterton’s words) project small things of the present into big things of the future, “just as when we see a pig in a litter that is larger than the other pigs, we know by an unalterable law of the Inscrutable it will someday be larger than an elephant.” But it is also possible that Haldane missed the more serious point of Chesterton’s book: even if the future were to look like the present with respect to hansom-cabs, it would not mean that we are failures in the ways that matter most. There would still be ample room for the whole range of human abilities and aspirations to play themselves out both for good and for ill.

This truth is likely to be lost if we understand the human story in terms of the aspirations outlined in *Daedalus*. Haldane believes in the possibility, although not the necessity, that science will lead to the progressive improvement of the world, because he thinks that human beliefs can accommodate themselves to the changing conditions created by the vast increases in human power. We are driven down that path by a

hitherto inchoate, and potentially self-destructive, desire for self-transcendence, a desire that comes into its own when we have the power to make it real. Progress cannot be measured by human happiness, because happiness would produce stagnation. But Haldane's notion of progress is by necessity discontinuous, since the goodness of one stage of the human story will not be recognizable as such by those at a different stage. Only some imagined being of the far future, heir to the whole human narrative, might be able to look back and see (or construct) the thread that binds it all together, redeeming a chaotic and otherwise tragic past.

Russell rejects Haldane's picture of progress, because he thinks that there is a fixity to those aspects of human nature that will lead us to use the increased powers granted by science to destructive ends. The powers of science could potentially be used to alter our nature, Russell believes, but our nature provides significant disincentives to doing so in any manner that will serve good ends. Generosity is in short supply, so we should not expect to be engineered or biochemically manipulated to be nicer to each other. To do so we would need to be nice already. Unlike Haldane, Russell in this essay does not explicitly make the realm of virtue and kindly impulses situational, but he does believe that morality is very weak in comparison with other drives. Absent some utopian re-ordering of the world, science really is giving matches to babies.

For Russell, science places us on the edge of a cliff, and our nature is likely to push us over the edge. For Haldane, science places us on the edge of a cliff, and we cannot simply step back, while holding steady has its own risks. So we must take the leap, accept what looks to us now like a bad option, with the hope that it will look like the right choice to our descendants, who will find ways to normalize and moralize the consequences of our choice. Russell disarms virtue, Haldane relativizes it.

The net result is that a debate about science's ability to improve human life excludes serious consideration of what a good human life is, along with how it might be achieved, and therefore what the hallmarks of an improved ability to achieve it would look like. Shorn of serious moral content, the measures of "progress"—if it can be said to exist at all—become our amazement at or dissatisfaction with all our discoveries and inventions, our awed anticipation of what might yet be achieved, our terror about what might go wrong along the way. The result of framing the question of scientific progress in this way is evident in the very structure of most popular discussions of science, both in books and on television. Start with a little history to produce an attitude of pride that we know so

much more than we once did. Look at what we know now, and stress the dangers of our remaining ignorance. Anticipate the future, and how humbled we are that those who follow us will know far more than we do if only we stick with it.

Above all, the very thinness of any notion of progress that survives the Haldane-Russell debate—little more than the fact of accumulation of knowledge and a vague hope that things might turn out well in light of unspecified yet grand civilizational projects—helps to explain the widespread belief that *any* effort to restrain science on the basis of ethics represents a threat to “scientific progress.” To see this as simply a result of the self-interest of scientists is to do them an injustice. Like Haldane, most scientists are probably unaware of how the belief that morality must adjust to scientific and technological change amounts to saying that might makes right. The sense of threat is partly due to the poverty of thought on the subject, and perhaps the narrow education that is required for making measurable scientific achievements. For restraint doubtless *would* slow accumulation, and (from this point of view) can only represent the triumph of fear over hope. But what is to be said for accumulation when Russell and Haldane have done with it? It serves either the power of the conventionally powerful or the power of the scientists.

A clear-eyed defense of science needs to take seriously the original “bargain” that Haldane himself describes: that free research produces increased well-being. To investigate the meaning of well being, or doing well, means neither the dogmatic acceptance nor the dogmatic rejection of the moral values of one’s neighbors. It requires avoiding cynicism and utopianism about human motives and possibilities. It requires a willingness to look at the question of the human good with care and seriousness. And even if such an investigation yields a complex and mixed picture of what a good life is and how science contributes to it, the defense of science still requires the willingness to encourage what is valued and discourage what is troublesome, knowing that we will face many grave uncertainties and honest disagreements along the way.

The Greek tale of Daedalus and Icarus illustrates that doubts over the results of human knowledge and ingenuity are hardly new. The debate enshrined in *Daedalus* and *Icarus* suggests that today the great increase in our powers co-exists with a diminished capacity to think about them with any kind of moral realism. By slighting ethics, Haldane and Russell did not serve the cause of science well, since science only matters in human terms if it truly serves our humanity. And that is by no means guaranteed.