

Founding Editor's Viewpoint

Prometheus and the Heaven Scenario: Progress and Challenges in 21st Century Science

There is an unfortunate and inevitable disconnect between our scientific achievements and an effective scrutiny of the ethical, moral, and legal considerations that should accompany them. Ray Kurzweil, one of the most distinguished futurists of our time, points out that our technology is accelerating in an exponential fashion.¹ The genomic era, only a decade old, and J. Craig Venter's announcement last year that his team had supplanted a natural chromosome with one made in the laboratory that then controlled the cell phenotype² ushered in the new discipline of synthetic biology. The combination has presented us with an array of possibilities we could never have imagined a decade ago. In only 10 years, we achieved the techniques not only to transform existing life forms but also to create entirely new species. Although our techniques in these new disciplines are still in their infancy, we will soon progress to the point at which we must decide how to view what we are doing in the setting of our responsibility to our own society and to the general ecology of the planet.

The synthesis of biological and technological research produces a wide variety of sensitive and even problematic issues. One of the most important is that of the human-animal chimera. The combination of humans with pig heart valves and rodents with human skin are examples of what Degrazia calls "mildly chimeric creatures."³ We have tolerated these for years without much thought about the moral and legal aspects of creating such entities. But as our skills increase, genuine issues will, or should, arise. As Degrazia points out, for example, the Great Apes are of special interest for studying the development and nature of human neural cells. Rodents are another likely subject for such investigations—perhaps because their resemblance to ourselves (Degrazia calls this their "moral status") is less obvious than that of the Great Ape. There are several considerations when the question of implanting human cells, whether undifferentiated or partially specialized, arises. An authoritative British report predicts that we will soon be able to produce a monkey with a brain composed entirely of human neurons.⁴ The report comments on the fact that the public was particularly uneasy about work that involved producing human traits in animals' brains and opined that work on combining a nonhuman primate with enough human brain cells to produce "human-like behavior" should be off limits for the time being. A similar warning was issued about combining human-derived sperm or ova with animal germ cells that could generate a true human-animal hybrid. Bobrow, chair of the working group that produced the report, pointed out that as this kind of work progressed, it was conceivable that scientists could generate an animal with features that might be uniquely human—including facial shape, skin texture, or speech.⁵ What, then, defines human? Will a chimera with the ability for self-awareness and reasoning be defined as human with a human's attendant rights?

Robert urges scientists to stop ignoring issues like these and to come out of their laboratories to talk about their work to the rest of society: "Judging from the negative public response to proposals to create part-human animals, stem cell researchers will have a difficult task in disabusing the image of mad scientists run amok . . . scientists are partially responsible for generating this image, especially when they turn away from public justification of their research and demand to be left alone, unburdened by non-scientific rules and regulations. The problem with this response is that it fails to recognize the social context in which scientific research is deeply embedded . . . Research . . . is undertaken in a civic content, bound by rules, regulations and political mores."⁶

The same kinds of issues arise with the ethics and legality of producing more and more sophisticated robots. President Obama, for example, maintains he did not need congressional approval to declare war on Libya, since he deployed only drones for combat. Another interesting point concerned his contention that

drones, if attacked, should be entitled (and equipped) to wage a defensive response—and, as Singer has pointed out, this may have been the first (“if unintentional”) step in defining robots’ rights.⁷ Singer is particularly concerned that 60% of the experts working on the synthesis of humans and machines did not believe their work might produce any social, ethical, or moral problems.

As the conjoining of mechanical and human entities progresses, it is evident that we will be transferring at least some of our cognitive processes and decisions to robots/machines. W. Daniel Hillis comments: “We have embodied our rationality within our machines and delegated to them many of our choices. In this process . . . we have linked our destinies not only among ourselves across the globe, but with our technology.”⁸ This phenomenon, known as the brain-machine interface, means that robots will have biological components and humans will have internal technological components. This raises not only the issue of which humans will have access to technology that will augment their cognitive skills (among others) but of whether a robot could have so much intellectual capacity that it will eventually qualify as a living thing.⁸

The transition from biological investigation to this new technology, which enables us to impact the course of natural evolution, brings an end, in the minds of some pundits, to Darwinism. Venter comments: “Once we can read the genetic code, we’ve started the phase where we can write it. And that is going to be the end of Darwinism.”⁹

The issues and questions that arise whenever a scientific advancement changes the competence and power of humans are eerily the same: some warn of potentially disastrous consequences and others urge us to push forward to reap the benefits of what we have achieved. The myth of Prometheus, who challenged the gods by stealing fire and giving it to man, was only the first conceptualization of the dilemma. Garreau says it beautifully: “The essence of the Heaven Scenario is stealing fire from the gods, breathing life into inert matter and gaining immortality. Our efforts to become something more than human have a long and distinguished genealogy. Tracing the history of those efforts illuminates human nature. In every civilization, in every era, we have given the gods no peace.”¹⁰

It is time to recruit society’s most thoughtful minds to talk about how to define the ethical, moral, and legal issues that our science, hurtling forward at exponentially increasing speed, inevitably engenders. Such deliberations should be mandated to accompany every new scientific advancement, very much the way we insisted on formal review boards to consider the morality and legitimacy of proposals for clinical studies. To ignore the importance of what will very soon become reality, with earth-shaking implications for our own planet (and some believe for the entire universe), is indefensible.

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