

MIT OpenCourseWare
<http://ocw.mit.edu>

STS.003 The Rise of Modern Science
Spring 2008

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.

Tesla's Prescience

Today, ethics, implications, and the methodology of research are clearly defined. Scientific review boards approve research, However, Tesla lived at a unique time, where the broad foundations of science were still maturing, while the impact of science on popular culture was rapidly increasing. As a result, Tesla had a unique opportunity to reshape broad parts of scientific culture, as well as society as a whole, and took that opportunity in his work "The Problem of Increasing Human Energy."¹ Tesla's writing advocates strongly for mechanistic research, espouses a religious connection to science, and demonstrates Tesla's prescience regarding scientific advancement.

Tesla's writing — which comes some time after the scientific shift toward mechanistic studies in the mid-19th century — is a strong advocacy for a broad extension of mechanism into all of human life. Though Tesla starts off reiterating the ideas of previous mechanists, likening human life to movement and force, he takes the idea to an extreme. Unlike Justis von Liebig, who includes the idea that life is ascribed to vitalism and is something we can "never know in [its] essence,"² Tesla writes: "life-manifestation, then, even in its most intricate form ... is only a movement, to which the same general laws of movement ... must be applicable." (p. 2) This rigid interpretation of previous mechanistic theories allows Tesla to connect his research and inventions to the broader human existence. Tesla's work is a step above both Liebig and Theodor Schwann when he describes human life not merely as interrelated mechanisms, but as based entirely on forces that add both good and bad "human mass." Tesla expands his interpretation of mechanism and human mass, using it as a license to comment on society as a whole.

¹ Nikola Tesla, "The Problem of Increasing Human Energy," (Century Illustrated Magazine, June 1900), multiple excerpts.

² Justis von Liebig, "Organic Chemistry Applied to Physiology and Pathology," in *Animal Chemistry* (Cambridge, 1842; reprint, New York: Johnson Reprint Corp., 1964), 16.

Rigid Belief in Mechanism

Rather than merely extend the definition of mechanism, Tesla uses his position to analyze and criticize the human condition. Tesla categorizes human life as having two competing forces: one that increases the human mass, and another that decreases it. Forces that increase and accelerate the mass include “hygiene,” “food ... by moderation,” and “careful attention to health.” (p. 4) Detrimental forces include “gambling, business rush, and excitement.” (p. 5) This simplification from Tesla came at a unique time; the build up to 1900 came after an enormous flux of immigrants. In the 30 years preceding, millions of immigrants came to the U.S., prompting health concerns, religious intolerance, and discriminatory legislation such as the Chinese Exclusion Act. Tesla, an immigrant himself, was uniquely impacted by this influx; he was an immigrant from the Austrian Empire, brought over by Thomas Edison. Working under Edison, Tesla saw the condition of the migrant workers that powered the Industrial Revolution; Edison hired migrant workers to build his larger inventions, such as an iron ore separator in 1889.

Tesla’s work can thus be interpreted as a guide to improving society, largely as a response to societal pressures due to immigration. His “The Problem of Increasing Human Energy,” was published in a popular magazine (*Century Illustrated Magazine*) and reached a mostly non-scientific audience. Here, Tesla takes the opportunity to explain, to the general public, his ways of improving society. He suggests a few positive options, but focuses largely on “reducing the force retarding the human mass.” (p. 8) To Tesla, those forces are frictional (something with “unavoidable loss” like ignorance) and negative (forces like “visionariness [and] insanity” (p. 8) that can be turned positive, or at least predicted). These concerns reflected broader worries of the mental health of immigrants — especially the Chinese culture that included ancient rituals. Tesla continues with a blanket list of good and bad qualities, many of which likely arose from pressures due to immigration. Specifically, Tesla mentions issues of hygiene,

cleanliness, and stimulants, all of which were considered problems brought by migrant workers.

A Bridging Scientist

Following his characterization of human mass, Tesla elaborates on mass augmenting and reducing forces, as he criticizes broader parts of society and science. Somewhat surreally, Tesla accurately predicts scientific advancements years into the future. Throughout his work, Tesla makes offhand predictions, saying in the future we could “kindle fire on some distant star” (p. 1), develop robots and automatic systems to perform human tasks (p. 11), and may develop a form of artificial intelligence (what he terms “an automaton,” p. 12). He makes one prediction that is particularly interesting, given its ethical and scientific impacts: the evolution of warfare.

As Tesla starts describing mass-reducing forces, his views adapt from individualized and seemingly disconnected goals (preserving forests, eating vegetables, avoiding alcohol, etc.) to a more serious discussion of intractable conditions. Tesla highlights ignorance, stupidity, and imbecility as the “force[s] retarding the human mass,” (p. 8) and goes so far as to agree with Buddha’s interpretation: “Ignorance is the greatest evil in the world.” It is unclear what Tesla proposes to solve frictional forces, only arguing abstractly for the spread of knowledge and the “unification of the heterogeneous elements of humanity.” (p.8) These arguments seem eerily similar to those used later to advocate for eugenics programs, and elucidate the conflicting interests regarding eugenics programs. Tesla also connects the idea of ignorance and negative forces to a discussion of the human condition as a whole, launching into a stunningly accurate analysis of warfare.

Writing at the end of both the Spanish-American and Philippine-American wars (which were ‘conventional’ wars, in the modern sense), Tesla concisely predicts that future wars will be made more horrific due to science. “[W]ar has itself

become a science,” (p. 9) writes Tesla, describing the evolution of more powerful weapons and defense capabilities. He even has the amazing insight that “[t]he flying-machine is certainly coming” and that an “air-power” will be established, with which “men will fight on merrily.” (p. 9) These concerns, which Tesla weaves in with concerns about general health and society, seem misplaced. Historically, it appears as though the public — as well as the scientific community — was wholly unconcerned with the ethical evolution of warfare. Arguably, the public remained disconnected until the use of chemical agents in World War I, if not later. Tesla tries to convince his readers of the importance of avoiding warfare by drawing on his mechanistic theories, devising a solution to warfare that doesn’t decrease human mass. “[A] radical departure must be made,” he writes, “men must be dispersed with: machine must fight machine.” (p. 10)

Tesla’s argument, unfortunately, reaches the mechanistic extreme: that a machine can be made to emulate a human and have its “own mind.” (p. 12) For the common readers of his magazine piece, this concept is certainly foreign — if not entirely unbelievable — leading Tesla to include a discussion of the ethics of warfare. He adapts his own views over time, saying that “It has been argued that the perfection of guns ... will stop warfare. So I myself thought for a long time, but ... this [was] a profound mistake.” (p. 8) Tesla self-analysis seems to bring up the idea of scientific ethics for the first time, describing the ethical conflict of using science in warfare: “Our virtues and our failings are inseparable, like force and matter. When they separate, man is no more.” (p. 9)

Religious Undertones

Indeed, Tesla frames many of the ethical issues that modern science faces. From war, to energy, to environmentalism, Tesla’s broad analysis seems to form the basis for much of modern scientific ethics, far before its time. Tesla’s piece is most interesting, however, from a religious perspective. As Tesla struggles to convey his belief in mechanism, describing artificial intelligence and the rigidity of nature, he risks alienating his largely spiritual audience. Tesla’s views place him at a strange

nexus of religion and science. Much like the religious-themed early science, such as theories from Jean-Baptiste Lamarck, Tesla concretely mentions that the Christian religion is “profoundly wise and scientific” (p. 14), and likens a reverence for cleanliness to something “truly religious.” (p. 5) Tesla also alludes to Christianity throughout his piece, drawing on the symbolism of in saying that “darkness shall be dissipated by the light of science.” (p. 13)

What makes Tesla’s piece unique, however, is his attempt to blend science with religion. Tesla says that the survival of Christianity is due to “practical experiment and scientific observation,” (p. 14), though he adds that both science and Christianity are the source of mankind’s inspiration. It’s not evident from Tesla’s piece what he means by this interpretation of religion, though he likely intended to use religion to further his scientific and ethical views.

It appears, however, that Tesla’s true belief was a step removed from his peers. Rather than believe in a God that defines a life force, Tesla’s description of “all darkness ... dissipated by the light of science,” (p. 13) can also be construed as science defeating religion. Indeed, Tesla’s adds that, in the future, “patriotism shall be identical with religion, when there shall be ... one end, then the dream will become reality.” (p. 13). Though the analogy is dense, and may imply an atheistic undertone, Tesla’s quotes at the time show Christian beliefs: “The gift of mental power comes from God, Divine Being, and if we concentrate our minds on that truth, we become in tune with this great power. My Mother had taught me to seek all truth in the Bible.” Edison, too, seemed to share Tesla’s belief, though Edison abstracted God as a part of nature, saying:

“Nature is what we know. We do not know the gods of religions. And nature is not kind, or merciful, or loving. If God made me — the fabled God of the three qualities of which I spoke: mercy, kindness, love — he also made the fish I catch and eat. And where do His mercy, kindness, and love for that fish come in? No; nature made us — nature did it all — not the gods of the religions.”³

³ Paul Israel, “Edison: A Life of Invention,” (Wiley & Sons, Inc., Jan. 2001), excerpts.

Though Edison drew wide public criticism for the interview, he later elaborated that the public “misunderstood” his interview: “There is no such denial [of God], what you call God, I call Nature, the Supreme intelligence that rules matter.”⁴

Fundamentally, Tesla adopts a unique stance that joins ethics and religion to further his scientific views. By extending the mechanistic viewpoints of those that came before him, Tesla merges science with religion, and advocates effectively for societal improvements. Taking advantage of public concerns while preserving the scientific method, Tesla evolved an unprecedented ability to convince both scientists and lay people alike of his beliefs.

⁴ Israel, excerpts.