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Pure Science and the Posthuman Future

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Abstract

Since the industrial revolution, humans have tended to reduce science to the ancillary role of engine of technology. But the quest for knowledge started two and a half millennia ago with the aim of setting humans free from ignorance. The first scientists and philosophers saw knowledge as the goal, not as the means. The main goal was to understand matter, life, conscience, intelligence, our origin, and our destiny, not only to solve practical problems. Being sceptical to myths and religions, they gave themselves the goal to reach The Answer via rational and empirical inquiry. Transhumanism is a very specific philosophy of technology, because one of its goals is the creation of a posthuman intelligence. Several scientists share this hope: making of technology the ancilla of science, and not vice versa.

There are transhumanists of many different kinds, holding specific political, cultural or religious views. However, all transhumanists share a high degree of faith in science. Science is mainly seen as the *instrument* that can help humans to overcome their biological limitations – that is, to fight against aging, death, illnesses, and other mental and physical weaknesses. Even if this is already a respectable position from an ethical point of view, the program seems to be too reductive. It reduces science to a mere instrument and this implies a clear violation of the ethos of science. Indeed, according to sociologist Robert K. Merton (1973, 275), one of the main norms of the scientific ethos is disinterestedness:

> Science includes disinterestedness as a basic institutional element. Disinterestedness is not to be equated with altruism nor interested action with egoism. Such equivalencies confuse institutional and motivational levels of analysis… It is rather a distinctive pattern of control of a wide range of motives which characterizes the behavior of scientists.

This means that genuine scientists see scientific truth as a goal in itself, not as an instrument. Of course, this norm does not imply that scientists cannot have other interests besides the search for truth. They may *also* work to achieve personal goals like fame or money, or social goals such as the establishment of a political ideology, a religious creed, or technological applications. But truth should be always preferred in

the case of a conflict of interests. In short, the golden rule of the genuine scientist is "science for its own sake" (Campa 2001, 246-257).

This was certainly true before the industrial revolution. Now scientific knowledge is always systematically related with its practical use and, therefore, someone may think that the very idea of scientific ethos is outdated. However, journalist John Horgan demonstrated in his popular book *The End of Science* (1997) that most top scientists still see their work as a purely spiritual activity and not as an instrument to solve practical problems. Science is the way toward "The Answer" – the ultimate answer about the main existential question of humans: Why is there something rather than nothing? Wondering about the nature of matter, life, conscience, society, etc. – that is trying to answer the fundamental questions of physics, biology, psychology, sociology, etc. – can be seen as a way to approach The Answer.

Transhumanism puts so much emphasis on technology that it is worth asking if disinterested research still plays a role also in this philosophical view. Do transhumanists just want to live forever or do they also want to know the sense of their life? And do they believe that science can be the way to answer the existential question? Among those scientists interviewed by Horgan, a few can certainly be qualified as "transhumanists," even if they do not necessarily describe themselves as such. Indeed, they believe that the transition from humans to post-humans is possible and desirable. By analyzing their views, we may at least partially satisfy our curiosity. Of course, further empirical research is needed in order to establish the attitude of transhumanists to pure science, but this can be seen as a good point of departure.

The central idea of Horgan's book is that humans have already reached the final frontiers of knowledge. We already know what it was possible to discover. Now, there is still a place for the technical application of this knowledge, but not for new discoveries, not for a new paradigm shift. We may or may not agree with Horgan, but this is not the point here. The point is that our present scientific knowledge is not very satisfactory. Science seems *absurd*, that is to say very far from our everyday life and sometimes not consistent with our rational way of thinking. In the nineteenth century, any well-educated person could grasp contemporary physics. Today, physicists themselves operate with formulas and predict events without having a real "understanding" of the physical world. In short, science does not really answer our basic existential questions. Consequently, new questions arise. Is this frustrating situation due to the fact that the world is really absurd and alien to sentient beings? Or is it due to the fact that humans are not intelligent enough to understand the world?

Noam Chomsky reminds us that humans have cognitive limitations. Chomsky divides scientific questions into problems and mysteries. Problems are answerable, mysteries are not. Before the scientific revolution, almost all questions appeared to be mysteries. Then, Copernicus, Galileo, Newton, Descartes, and other thinkers solved some of them. However, other investigations have proved fruitless. For instance, scientists have made no remarkable progress investigating consciousness and free will. Horgan (1997, 152) summarizes Chomsky's view as follows:

> All animals… have cognitive abilities shaped by their evolutionary histories. A rat, for example, may learn to navigate a maze that requires it to turn left at every second fork but not one that requires it to turn left at every fork corresponding to a prime number. If one believes that humans are animals ─ and not "angels," Chomsky added sarcastically – then we, too, are subject to these biological constraints. Our language capacity allows us to formulate questions and resolve them in ways that rats cannot, but ultimately we, too, face mysteries as absolute as that faced by the rat in a prime-number maze. We are limited in our ability to ask questions as well. Chomsky thus rejected the possibility that physicists or other scientists could attain a theory of everything.

Accepting this picture, we still may ask if posthumans – if not humans – could fully understand the world. This is, at least, what Stephen Hawking believes. Hawking predicted that physics might soon achieve a complete, unified theory of nature. This prophecy was offered up by him on April 29, 1980, when he presented a paper entitled "Is the End of Theoretical Physics in Sight?" The speech was delivered on the occasion of his appointment as Lucasian Professor of Mathematics at the University of Cambridge, an important chair held by Newton 300 years earlier. According to Horgan (1997, 94) only a few observers noticed that Hawking, at the end of his speech, indicated posthumans and not humans as the protagonists of this conquest: "Hawking suggested that computers, given their accelerated evolution, might soon surpass their human creators in intelligence and achieve the final theory on their own."

Also philosopher Daniel Dennett seems to believe so. To be sure, Dennett (1991) thinks that we already have at least a partial answer to the mystery of consciousness. However, our explanations are never completely satisfactory to all humans: "One of the very trends that makes science proceed so rapidly these days is a trend that leads science away from human understanding" (quoted in Horgan 1997, 179). Our cognitive limitations could be understood and overcome only by posthuman beings having more powerful senses and minds. In other words, Dennett surmises that a human mind can hardly understand a human mind, that is itself. A theory of mind, although it might be highly effective and have great predictive power, is unlikely to be intelligible to mere humans. According to Dennett, the only hope humans have of comprehending their own complexity may be to cease being human: "Anybody who has the motivation or talent will be able in effect to merge with these big software systems". As Horgan (1997, 180) explains, "Dennett was referring to the possibility… that one day we humans will be able to abandon our mortal, fleshy selves and become machines." Then, a new problem would of course arise: will the superintelligent machines be able to understand themselves? Trying to understand themselves, the machines would have to become still more complex. And this spiral would last for all eternity.

Marvin Minsky shares a similar view, although with an important difference. According to him, humans can understand themselves. However, this does not preclude the possibility (or the necessity) to go further. Even if we manage to solve the problem of consciousness we do not *ipso facto* reach the end of science. We may be approaching our limits as scientists, but we will create robots and computers smarter than us, which can continue doing science. Intelligent machines will then try to understand themselves, opening a new frontier to pure science. To Horgan's objection that such knowledge would be machine science and not human science, Minsky answers as follows: "You're a racist, in other words. I think the important thing for us is to grow, not to remain in our present stupid state. [We are just] dressed up chimpanzees" (quoted in Horgan 1997, 187).

Also Hans Moravec sees the future world as dominated by artificial machines. A well known robotic engineer, Moravec has presented his futuristic view in *Mind Children* (1988) and *Robot: Mere Machine to Transcendent Mind* (1998). According to him, there will be a moment when all humans will be replaced by robots in the workplace. Instead of working, humans will be paid to consume. Subsequently, in order to avoid death, humans will merge with artificial machines by uploading their consciousness. Robots will keep competing and evolving and, finally, they will colonize the universe. But what will these machines do with their incredibly powerful artificial brains? According to Moravec they will certainly be interested in pursuing science for its own sake: "That's the core of my fantasy: that our nonbiological descendants, without most of our limitations, who could redesign themselves, could pursue basic knowledge of things." He added that science will be the only motive worthy of intelligent machines, because "things like art, which people sometimes mention, don't seem very profound, in that they are primarily ways of autostimulation" (quoted in Horgan 1997, 250).

Moravec has also expressed doubts as regards his own fantasy. First of all, it is hard to predict what a machine trillions of times more intelligent than us could desire or do. Secondly, he has also shown some skepticism about the possibility that sentient beings could stop competing and start cooperating in order to

discover the truth about the universe. More than a goal in itself, science, for Moravec, is the by-product of an eternal competition among intelligent, evolving machines. Thus, no competition, no scientific progress.

Freeman Dyson's view presents many similarities. He just does not think that the end of "flesh" is near. Intelligent biological organisms will still play an important role in the future, even if they could look very different from present ones. Dyson is a polymath. He has written extensively on physics, space, nuclear engineering, weapons control, climate change, philosophy, and futurology. He started speculating about the future of sentient beings in 1979, by publishing an article entitled "Time without End: Physics and Biology in an Open Universe." The paper was intended to respond to Steven Weinberg, who noted that the more the universe seems comprehensible the more it seems pointless. The possibility that humans are just a product of chance and that the universe is uninterested in our sort is disturbing and frustrating. But, according to Dyson, no universe with intelligence is pointless. "In an open, eternally expanding universe, intelligence could persist forever – perhaps in the form of a cloud of charged particles, as Bernal had suggested – through shrewd conservation energy" (Horgan 1997, 253).

Dyson has since elaborated his futuristic view in other popular books, such as *Disturbing the Universe* (1979), *Infinite in All Directions* (1988), and *Imagined Worlds* (1997). The basic idea of this scientist is that the universe "works" according to "the principle of maximum diversity," which operates at both the physical and the mental level. Life is possible but not too easy. In principle, a universe homogeneous in all directions could also be possible. That is to say, boring. But this is not what happens. The universe is diverse and interesting in all directions. Sometimes, strange or paradoxical. According to Dyson, this happens because the laws of nature and the initial conditions are such that the world has to be as interesting as possible. Intelligent life does not exist by chance, but it is obviously always in danger in any specific region of the universe. That is why Dyson decided to write the agenda of genetic engineers: their goal should be the creation of non-human or post-human intelligence. Since we are a part of cosmic consciousness, our duty is to contribute to its diffusion in the universe. Therefore, Dyson dreams about the creation of mobile intelligent beings, able to absorb directly from the sun the energy they need. This would solve the problem of space travel and favor the colonization of the universe.

In *Imagined Worlds*, Dyson warns that his futuristic speculations notably surpass the possibilities of present science: "Science is my territory, but science fiction is the landscape of my dreams", he admits. However, it is important to note that he recognizes the importance of pure scientific investigation. If humans have limitations, if they are tied to Mother Earth, posthumans will explore and colonize the universe. By doing this, they will give sense to it. This is because the universe makes sense only when it is aware of its own existence.

In short, Minsky Moravec and Dyson think in evolutionary terms and believe in our posthuman future. Horgan (1997, 255) caustically judges them as follows:

> Dyson, Minsky, Moravec – they are all theological Darwinians, capitalists, Republicans at heart. Like Francis Fukuyama, they see competition, strife, division as essential to existence – even for posthuman intelligence.

However, they also recognize the value of pure science and this is what matters in our research. Besides, not all scientists believe that competition is the eternal rule of the universe. For instance, Edward Fredkin, pioneer of digital physics and artificial intelligence presents a more liberal view and stresses the connection between intelligence and cooperation. Fredkin predicts that competition will prove to be only a temporary phase, one that intelligent machines will quickly transcend. It is interesting to note that this scientist has never shown any anticapitalistic idiosyncrasy. Before becoming a professor of physics at Boston University, he had been a fighter pilot in the US Air Force and a successful entrepreneur. In

synthesis, Fredkin believes that the future will belong to machines "many millions of times smarter than us" and exactly because they are more intelligent they will recognize that struggle and competition are atavistic and counterproductive. Cooperation yields a win-win situation because what one learns, all can learn. And evolution depends on learning. Once the machines will be supremely intelligent, they will overcome the Darwinian race and start cooperating in order to solve the secret of the universe, or The Answer. Fredkin says: "Of course computers will develop their own science. It seems obvious to me" (quoted in Horgan 1997, 255).

Another scientist who assumes that machines will cooperate and eventually merge is Frank Tipler. Central to his vision is the concept of "Omega Point", inspired by Jesuit thinker Teilhard De Chardin. Tipler mainly developed his theory in two books: *The Anthropic Cosmological Principle*, written in collaboration with British physicist John Barrow (1986), and *The Physics of Immortality* (1994). Tipler asks what will happen when all the matter of the universe is converted into an enormous conscious device processing information. He believes that this entity will resurrect all the people who existed in the past, at least in form of information. In other words, the end of science is a divine machine very similar to what monotheistic religions call God. But, if the future of humanity is to become the omnipotent, omniscient and eternal being of monotheistic religions, it makes no sense to ask if this being will look for knowledge. It will not look for The Answer, because *it will be* The Answer.

We are now approaching the conclusions. It is well known that every scientist has the duty to *update,* that is to read new articles and books, to improve his/her knowledge, to acquire the new available information concerning the topic (s)he is going to study. This is a propaedeutic activity to the production of the best possible science. If humanism underlines the necessity of updating, transhumanism goes much further. It presents a new duty for future scientists. In order to produce new and better knowledge, they will not only have to update, they will have to *upgrade*. Updating implies the modification of the "software" of scientists – whether humans or machines. Upgrading will imply the modification of the "hardware" of scientists. Thus, upgrading can be seen as a new ethical rule for the individual scientist and scientific communities – respectively a complement and an extension of the deontological norms of disinterestedness and updating.

One basic problem of science is that when researchers are young and their brain works at their best, they have no erudition and experience; when they get older and acquire erudition and experience, their brains start deteriorating. If all scientists could have both a rich amount of information and knowledge in their brain and together a good "processor" and a powerful memory for a longer time than just a few decades, would not science advance much more quickly? But how can scientists upgrade? Many transhumanist books deal with the problem of intelligence growth and we cannot mention all of them. We'll just refer to one of them: *Citizen Cyborg* by sociologist James Hughes. In chapter 4 ("Getting smarter") Hughes writes that more than 40 "smart drugs" have been clinically tested to improve memory consolidation, neural plasticity and synaptic transmission speed. But memory pills are just the beginning. Research proves that neurotrophic chemicals could govern the growth of neural stem cells in the brain. In other words, the perspective is to develop drugs that encourage brain self-repair. "Even better than a neurotrophic pill would be a neurotrophic gene therapy that helped the brain to repair itself, or that enhanced intelligence in other ways" (Hughes 2004: 38). Cognition-enhancing drugs and gene therapies can be surpassed probably only by cyborgization. To directly connect the brain to computer is, according to Hughes, the most powerful human intelligence enhancer.

> Researchers have been experimenting with two-way neural-computer communication by growing neurons on and around computer chips, or by placing electrodes in brains that are connected to computers, leading to computing prostheses for the brain (Hughes 2004, 39).

Dyson criticizes Thomas Kuhn because, in his masterpiece *The Structure of Scientific Revolutions* (1962), he narrates the story of six scientific revolutions that could be explained almost as religious conversions, while disregarding at least twenty revolutionary paradigm shifts that were due to the invention of new devices – such as telescope, microscope, particle accelerators, etc. Enhancing senses by using instruments of investigation plays a fundamental role in science. Often, scientists tend to see themselves as angels or pure minds and forget that their body is the first instrument of investigation, the interface between their mind and the world – an interface that can and, perhaps, *should* be enhanced. The above-mentioned devices, and many other not mentioned here, can be seen as artificial prostheses improving the cognitive capabilities of scientists. In the near future these prostheses could be implemented into the human body, concretizing the transition from scientists to postscientists (or superscientists).

We are not surmising that this small sample of scientists is representative of all the transhumanist movement, but this research shows at least that also the quest for pure knowledge *is* and *can be* part of the transhumanism agenda. It is not by chance that one of the main "enemies" of transhumanism, Francis Fukuyama, is also reluctant to accept the idea of science for its on sake. His attacks on transhumanism are well known. In his book *Our Posthuman Future: Consequences of the Biotechnology Revolution* (2002) he uses no periphrases when presenting the dangers of biotech. And in an article in *Foreign Policy* (September 2004) he accused transhumanism of being the world's most dangerous idea. It is worth noting that Fukuyama confesses that he would never have become a social scientist if he were not interested in democracy and capitalism. Science for its own sake has never really interested him. After the publication of *The End of History* – the book that made him famous all over the world – he was interviewed by Horgan about the future of humanity. Obviously, the *Scientific American* journalist did not forget to ask if, with the end of politico-economical conflicts, the search for truth could become the new goal of humanity. Fukuyama's answer was emblematic: "Hunh" (Horgan 1997, 244). The disdainful rejection of a program which represents not only the dream of *Star Trek* fans, but also that of an array of respectful philosophers and scientists, is indicative of the worldview of this thinker.

In conclusion, the biophysical enhancement of humans aimed at improving scientific research is a strategic moral imperative, because it synthesizes two only apparently incompatible metascientific views: the Baconian formula of scientia ancilla technologiae and the rationalist plea for disinterested science. Francis Bacon and his followers have discovered that "knowledge is power." The rationalists *à la* Descartes have instead insisted that "knowledge is duty". Now, thanks to transhumanism, we have the chance to synthesize these two views at a higher level. To succeed we just have to recognize a new basic truth: "power is knowledge."

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