

## **Beyond the Machine Technology and Posthuman Freedom Max More**

"Living and unliving things are exchanging properties ..."  
Phillip K. Dick, *A Scanner Darkly*.

According to the introductory statement for this conference discussion, man and machine are diametric opposites. I will seek to contribute to the discussion by constructively disagreeing with this statement. I will contend, first, that although humans are not machines they are composed of mechanical parts. Second, by appreciating this we can see how machines and technology can enable to become "more human than human", i.e., less mechanical than we remain today.

If it were true that humans and machines are diametric opposites then it would have to be true that humans are not in the least machinelike and that machines cannot have humanlike properties. Yet biochemistry shows us that we are comprised of billions of machines. Each of our organs and tissues is a machine with a particular function. Each organ is made up of cells which themselves are made up of smaller, simpler biochemical machines. We call these "ribosomes", "mitochondria", "RNA" and the like. Even the seat of our consciousness and personality, the brain itself, is made up of many billions of machines — neurons, synapses, hormonal systems, neurotransmitters. Ultimately body and brain are composed of the simplest mechanical parts — subatomic particles. Ultimately we are all quarks in motion.

The alternative view — that humans are the very opposite of machines — can only be true if we accept vitalism. Vitalism holds that life results not from biochemical reactions but from a vital force unique to living things. Whereas modern science sees life as resulting from the complex interactions of mechanistic parts forming an organic whole, vitalism sees life as suffused with a substance not found in non-living nature.

To say that humans are composed of machines is not to say that we are merely machines. Humans are dignified machines. We are [so far] the most extropic, most complex product of billions of years of evolution. All machines are not created equal. Living organisms display properties not shared by simpler machines. These emergent properties [homeostasis, reproduction, learning, intelligence] result not from the addition of a mysterious vital force but from the complexity of functional interrelationships. If we define "machine" and "mechanical" to imply rigid, unvarying, stupid, inflexible function, then humans are not machines, despite being entirely composed of machines. When enough machines work together in complex ways, new properties emerge, properties we refer to with terms like "organic", "living", "feeling", and "thinking".

The idea that humans and machines are opposites also fails to recognize that machines continue to evolve more organic, living qualities. Already we are developing robots that display some qualities of animals; we have artificial life software that mutates, reproduces, and evolves, as do computer viruses and worms; we have computers that learn using fuzzy logic, genetic algorithms, and other computational techniques. Whether a creature or an organ is made of carbon-based organic material, or of silicon or other inorganic materials does not matter. What is important is the complexity of the result: is the structure able to learn, to self-modify, to respond dynamically to changing input?

We can say that humans are especially subtle, complex, and dignified machines. Or we can say that humans are not machines though composed of them. The facts matter more than the words we use, though words bring connotations that have power over attitudes. The crucial point is that humans and machines are not opposites. As machines continue their rapid evolution and as we increasingly tinker with our bodies and brains to repair and improve them, this fact will become ever more obvious. This realization will open the way to improving ourselves by upgrading the machine components of humans.

A human brain reasons, creates, feels, plans, calculates, appreciates. These properties of living, conscious beings result from the immensely complicated connections among our 100 billion neurons. Any individual neuron displays no consciousness, no reasoning, no creativity. Even more clearly, the molecular and atomic parts making up the neurons do not display these properties. The neuron is a biochemical machine. We should therefore be able to replace or supplement biological neurons with synthetic neurons while retaining the same functions. We should be able to repair damaged neural tissue with implants. We should be able to add memory, processing power, and new abilities by supplementing natural neurons with synthetic neurons. In principle, we could replace all our neurons until we had an entirely synthetic or prosthetic brain. If the new neurons worked similarly to the old, and were connected up the same, we would never notice a difference. [Except that we might be able to process information faster and would not slow down with age.]

Since misunderstanding is easy I want to stress here that I claim only that humans are composed of mechanical parts, not that we ARE machines. In some sense we can reasonably say that humans are machines, since we are entirely composed of mechanical parts, and we have no sound reason to believe we have non-material parts. If we were to describe ourselves as machines we would be giving wide latitude to the meaning of the term. "Machine" usually connotes something rigid, unvarying, planned, and programmable. Since we think of ourselves as free, responsible, moral, rational beings, we may reasonably restrict the term "machine" and refuse to apply it to ourselves. This is the option I favor. However, we must then accept that our computers and robots and electronic ecosystems can also then cease to be machines in this sense. Whether something is a machine depends on the complexity and subtlety of its function, not on what substance it is made of. Simple biological organisms such as enzymes and viruses certainly count as machines, while an advanced artificial intelligence would not count as a machine.

Although I see no decisive metaphysical objection to describing humans as machines, the connotations of the word convince me that we would be wise not to apply the term to ourselves [nor to our mind-children — the artificial persons we will eventually create]. Since connotations of terms affect our attitudes we should avoid labeling persons with terms that may encourage us to regard them as tools, as objects, or purely as means to our ends. Machines are usually understood as arrangements of parts to perform useful work, modifying mechanical energy into more useful forms. Machines come in various forms from simple levers and screws to engines [machines that transform heat and other forms of energy into mechanical energy] and computers [machines that process information]. Obviously a vast gulf exists between a crude lever and supercomputer running millions of lines of code. If both can be called machines, we might stretch the term to include humans. But because "machine" implies a tool to be used for external purposes, I prefer to refrain from attaching this term to persons.

To further locate my position among the alternatives, I suggest we can distinguish at least four views on the relation of humans and machines:

1 Humans are machines. This appears to be the position of Daniel Dennett, according to the June 1997 FleshFactor interview and, more originally that of Lucretius and La Mettrie. According to this view, not only do humans contain machines, they are machines.

2 Humans have a dual nature, having a mechanical physical body and a spiritual body or soul that is entirely non-mechanical. I take this view to be scientifically and philosophically indefensible although extremely popular among most people.

3 Humans are mysteriously non-mechanical. They [or at least their brains] have essential properties that are not mechanical at any level of understanding and which cannot be recreated in any devices we might construct [i.e., artificial intelligence]. These "New Mysterians" [or modern day vitalists] as they have been called include Roger Penrose and John Searle.

4 Humans are composed of mechanistic parts but the arrangement of these parts produces emergent, non-mechanistic properties. The non-mechanistic properties would not exist but for the mechanistic parts comprising them, but we cannot fully understand the emergent properties solely by examining the mechanistic level. This is my view.

The humans-as-machines metaphor, though superficially scientific [in stressing the absence of supernatural elements], strikes me as outdated. In the human science of economics realization of the inappropriateness of machine language has been spreading. For decades economics talked of the "engine" of the economy, of "priming the pump", of "fine-tuning" and so on. The Austrian school of economists first challenged this approach by emphasizing the market as a discovery procedure [especially the work of Friedrich Hayek]. Recently a bionomics model has taken hold in which the economy is understood in terms of an ecosystem that is best carefully nurtured and fertilized but not centrally controlled like a machine.

While William Paley in his Design Argument for the Existence of a God portrayed the world as a gigantic mechanism designed for a purpose, evolutionary theory has revealed a world ordered by distributed processes over millions of years. Though each organism in the world can be broken down into mechanistic components [bones, ligaments, cells, organelles] the principles embodied in the ecosystem as a whole, like those embodied in the economy, have little in common with the working principles of paradigmatic machines.

The statement "humans are machines" cannot decisively be declared true or false. We can draw no sharp line between machines and complex systems that are not machines, just as we cannot draw a sharp line between life and non-life or between night and day. I stand on the side of those who prefer to say humans are not machines because I see us moving ever further from rigidity, inflexibility, and mindlessness. If the term "machine" ever loses these connotations, I will then see no reason to object to describing humans as elegant organic machines.

I started by claiming that technology can allow us to become "more human than human". Now I can clarify that claim, showing how the understanding that we are made of mechanical parts is a cause for optimism and humanism [or transhumanism] and the fostering of freedom, not fear and nihilism nor a policy of social control. Although humans have evolved more complex brains than any other animal, still we have not fully escaped our biological-machine heritage. Too easily humans are manipulated. We have little control over our emotions, our moods, our personality. We respond to external influences and to internal chemical, hormonal, and neural events often without much consciousness or choice. While more self-

determining and self-aware than other creatures, humans still show clear signs of being mechanical and other-determined. The whole appeal of seeing that we are a complex functionally interrelated collection of mechanical parts is that it opens up an appealing prospect: that technology will allow us to modify our nature, to alter ourselves, to augment and shape ourselves according to our values.

Advanced technologies such as genetic engineering, smart drugs, prostheses, and soon brain implants [neuroprostheses] represent the next step in the long march of evolution. Evolutionary processes have brought order out of chaos, extropy out of entropy. Extropy is the extent of a system's intelligence, information, order, vitality, diversity, and capacity for improvement. Extropy has [so far] reached its peak on this planet in human beings. The original physical processes that led to stellar and planetary formation gave way to biological evolution. Biological evolution has yielded its primary place to memetic and technological evolution. As the extropic processes of evolution have proceeded, the complexity of nervous systems has grown. The purely chemical responses of single-celled creatures led to tropistic behavior. Tropism became supplemented in animals by instinctual behavior stimulated by integrated perception and recognition. With the advent of our species new possibilities for flexible behaviors arose thanks to our capacity for conceptual thought, for rationality, creativity, self-restraint, and self-transformation.

Properly used, technology will not mechanize us but expand our freedom as we move from human to posthuman, continuing the extropic evolutionary process. The scientifically untenable ideas of dualism and vitalism have led us into the false idea that freedom is all or none. In Descartes' version of dualism, all animals are merely machines, unable to make choices. Only humans, imbued with a spiritual substance or soul, have freedom and responsibility. In addition to pushing animals outside the realm of moral standing, this view was doubly unfortunate. Those who believe in a soul will be unable to see how alterations to the physical constitution of persons could increase freedom. On their view, our uniquely human freedom and rationality resides outside the material realm. If we lose our belief in a supernatural realm, the dualist legacy may lead us to abandon any conception of genuine choice, freedom, and responsibility. [Philosophers refer to the view that physical causation and freedom cannot coexist as incompatibilism.]

Similarly, vitalists [whether the nineteenth century variety or today's New Mysterians], by locating human freedom in a mysterious vital force will not understand how alterations to our physical structure could increase our freedom. If our freedom depends on this vital force, we can only lose it by technologizing ourselves such as by implanting synthetic neurons or using prosthetics.

We may do best not to claim that humans ARE machines. Yet understanding and accepting that we are composed of an arrangement of mechanistic parts provides a key to our further demechanization. Being aware of our origin in mindless nature, we can see that we have not completed our evolutionary journey from unconsciousness and rigidity to maximum freedom and self-definition. With this awareness and by applying our burgeoning scientific knowledge and technological prowess, we can hasten our development. We can bring about the triumph of consciousness over mindlessness.

Anyone, who declares that humans are today totally free beings, should consider why the compulsive eater does not stop, why the addicted smoker does not quit, why the depressive does not snap out of it, why the procrastinator does not change his behavior, and why all of us find it so hard to rewrite our behavioral programs. While we all may have more range of

choice than we are usually aware of, still we cannot choose to be who we wish to be. Our emotions resist us. Anger, hostility, envy, lust, unhappiness, anxiety, fear, excitement, lethargy, all dominate us to varying degrees. Cognitive techniques give us a measure of influence, yet cannot easily shift ingrained habits of thought or powerful moods. Our childhood experiences and our genes largely shape our personality. Our hormones and the structure of our brains set limits to our choices of how to feel, how to behave, how to think, and who to be.

A specific example of how an advanced neurotechnology could allow us more choice over our emotions: Our brains evolved in such a way that emotional centers like the amygdala strongly influence the cortex. Because of the plentiful pathways going from the amygdala to the cortex, our feelings dictate much of our attention and shape our thoughts, whether we like it or not. We have few connections going the other way, from cortex to amygdala. This makes it hard to shut off emotions once activated. If we could add new pathways from emotional to cognitive centers [accelerating an evolutionary process that has already given us more such connections than have other mammals] we could acquire deep awareness of our emotions and the ability to modify them. We would then free ourselves from an unchosen emotional domination, achieving a better integration of reason and passion.

Rewiring the brain is not in our immediate future [though it will come much sooner than most scientists expect]. Other technologies are already starting to expand the range of our choice over the self we want. The first to benefit from these technologies are the emotionally and cognitively impaired. Drug therapies, beginning with crude anti-depressants and anti-anxiety drugs and now more refined, targeted drugs that selectively affect neurotransmitter sites, have allowed millions to have more say in how they feel and act. Nootropics or "smart drugs", though still in their early stages, can improve cognition in the elderly and others with cognitive deficits, and sometimes even in young, healthy persons. Gene therapy is rapidly becoming a practical tool for altering somatic and neurological functions. Retinal and cochlear implants have begun to restore perceptual abilities. Neuroprostheses, though further in the future, have enormous potential to take back control from the shaping forces of evolution and upbringing.

With all these technologies, whether chemical or genetic modification or implants, our concern should be using them to expand our range of choice. Genetic engineering and mood drugs could be used to narrow our abilities, to create happy slaves, or to pacify us. These dangers are real but must not deter us from developing technological means of freeing ourselves from our still half-mechanistic nature. In developing means of modifying ourselves, we should seek to give ourselves more choice over how to feel and who to be, not to use these means to push ourselves and others into specific functions or ways of being.

The increased freedom of self-creation, the augmented capacity for self-definition, will mean an expanded arena of personal responsibility. We will have less and less room to blame our troubles on our genes, our parents, our hormones, our society. Many will feel uncomfortable with this level of choice to self-define.

I look forward to it as the next phase of our development away from unconscious nature towards a posthuman condition of self-creation or automorphing.

Finally I note that the idea of man-as-machine has sometimes been used to promote social engineering — the pushing of individuals into centrally-determined positions and roles. B.F. Skinner's behavioristic views and his horrendous portrayal of what he took to be a utopia

warn us to beware the machine metaphor. I have granted that we could describe ourselves as especially elegant, sophisticated machines. Adding to the reasons I gave for refraining from this usage we can add the danger that the metaphor will give impetus to today's social engineers. By recognizing that we have mechanistic components but that our goal is to carry ourselves further from our machine heritage, we can resist those who would make us tools to their ends. And we can affirm our own determination to treat other humans as ends in themselves. We are composed of mechanistic parts but possess emergent properties of free choice, self-ownership, and personal responsibility.

My message, then, is that we should grant the obvious truth in the assertion that humans are machines. We cannot reasonably regard humans and machines as utterly opposed. By understanding our origins and underlying nature we can accelerate our development from rigidity, mindlessness, and external determination to flexibility, mindfulness, and self-determination and self-definition. We can increasingly choose a self, become artists of the self. The automorphic age is arriving.