Why the Technological System Will Destroy Itself

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I.

Our discussion deals with self-propagating systems. By a self-propagating system ('self-prop system' for short) we mean a system that tends to promote its own survival and propagation. A system may propagate itself in either or both of two ways: The system may indefinitely increase its own size and/or power, or it may give rise to new systems that possess some of its own traits.

The most obvious examples of self-propagating systems are biological organisms. *Groups* of biological organisms can also constitute self-prop systems; e.g., wolf packs and hives of honeybees. Particularly important for our purposes are self-prop systems that consist of groups of human beings. For example, nations, corporations, labor unions, and political parties; also some groups that are not clearly delimited and lack formal organization, such as schools of thought, social networks, and subcultures. Just as wolf packs and beehives are self-propagating without any conscious intention on the part of wolves or bees to propagate their packs or their hives, there is no reason why a human group cannot be self-propagating independently of any intention on the part of the individuals who comprise the group.

If A and B are systems of any kind (self-propagating or not), and if A is a functioning component of B, then we will call A a *subsystem* of B, and we will call B a *supersystem* of A. For example, in human hunting-and-gathering societies, individuals are members of bands, and bands often are organized into tribes. Individuals, bands, and tribes are all self-prop systems. The individual is a subsystem of the band, the band is a subsystem of the tribe, the tribe is a supersystem of each band that belongs to it, and each band is a supersystem of every individual who belongs to that band. It is also true that each individual is a subsystem of the tribe and that the tribe is a supersystem of every individual who belongs to a band that belongs to the tribe.

The principle of natural selection is operative not only in biology, but in any environment in which self-propagating systems are present. The principle can be stated roughly as follows:

> *Those self-propagating systems having the traits that best suit them to survive and propagate themselves tend to survive and propagate themselves better than other self-propagating systems.*

This of course is an obvious tautology, so it tells us nothing new. But it can serve to call our attention to factors that we might otherwise overlook.

We are about to advance several propositions. We can't prove these propositions, but they are intuitively plausible and they seem consistent with the observable behavior of self-propagating systems as represented by biological organisms and human (formal and informal) organizations. In short, we believe these propositions to be true, or as close to the truth as they need to be for present purposes.

> **Proposition 1**. In any environment that is sufficiently rich, self-propagating systems will arise, and natural selection will lead to the evolution of self-propagating systems having increasingly complex, subtle, and sophisticated means of surviving and propagating themselves.

Natural selection operates relative to particular periods of time. Let's start at some given point in time that we can call Time Zero. Those self-prop systems that are most likely to survive (or have surviving progeny) five-years from Time Zero are those that are best suited to survive and propagate themselves (in competition[1] with other self-prop systems) during the five-year period following Time Zero. These will not necessarily be the same as those self-prop systems that, in the absence of competition during the five-year period, would be best suited to survive and propagate themselves during the thirty years following Time Zero. Similarly, the systems best suited to survive competition during the first thirty years following Time Zero are not necessarily those that, in the absence of competition during the thirty-year period, would be best suited to survive and propagate themselves for two hundred years. And so forth.

For example, suppose a forested region is occupied by a number of small, rival kingdoms. Those kingdoms that clear the most land for agricultural use can plant more crops and therefore can support a larger population than other kingdoms. This gives them a military advantage over their rivals. If any kingdom restrains itself from excessive forest7clearance out of concern for the long-term consequences, then that kingdom places itself at a military disadvantage and is eliminated by the more powerful kingdoms. Thus the region comes to be dominated by kingdoms that cut down their forests recklessly. The resulting deforestation leads eventually to ecological disaster and therefore to the collapse of all the kingdoms. Here a trait that is advantageous or even indispensable for a kingdoms short-term survival—recklessness in cutting trees—leads in the long term to the demise of the same kingdom.[2]

This example illustrates the fact that, where a self-prop system exercises foresight, in the sense that concern for its own long-term survival and propagation leads it to place limitations on its efforts for short-term survival and propagation, the system puts itself at a competitive disadvantage relative to those self-prop systems that pursue short-term survival and propagation without restraint. This leads us to

[1]When we refer to "competition" we don't necessarily mean intentional or willful competition. Competition, as we use the term, is just something that happens. For example, plants certainly have no intention to compete with one another. It is simply a fact that the plants that most effectively survive and propagate thesmelves tend to replace those plants that less effectively survive and propagate themselves. "Competition" in this sense of the word is just an inevitable process that goes on with or without any intention on the part of the competitors.

[2]Something along these lines, but more complicated; probably happened among the ancient Maya. See Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed*, Penguin, New York, 2011, pp. 157-177. Probably many good examples could be drawn from the realm of economics. I don't know enough about economics to cite any specific examples, but something like the following might well occur:

Two savings-and-loan associations, X and Y, compete for the same depositors. During a real estate boom X makes money hand over fist by investing massively in real estate and therefore is able to offer its depositors a higher rate of interest than does,Y, which follows a more cautiousinvestment policy. As a result, Y loses most of its depositors to X. Perhaps Y will go out of business; if not, it will certainly be greatly weakened. A few years later the. real estate bubble bursts and X goes broke. Thus, a trait (willingness to take risks) that is conducive, and perhaps necessary, to the survival of X in the short term, leads to the demise of X in the long term. I rather suspect that this example represents in grossly simplified form a phenomenon that occurs fairly often in the world of finance.

Proposition 2. In the short term, natural selection favors self-propagating systems that pursue[3] their own short-term advantage with little or no regard for long-term consequences.

A corollary to Proposition 2 is

Proposition 3. Self-propagating subsystems of a given supersystem tend to become dependent on the supersystem and on the specific conditions that prevail within the supersystem.

This means that between the supersystem and its self-prop subsystems, there tends to develop a relationship of such a nature that, in the event of the destruction of the supersystem or of any drastic acceleration of changes in the conditions prevailing within the supersystem, the subsystems can neither survive nor propagate themselves. A self-prop system with sufficient foresight would make provision for its own or its descendants' survival in the event of the collapse or destabilization of the supersystem. But as long as the supersystem exists and. remains more or less stable, natural selection favors those subsystems that take fullest advantage of the opportunities available within the supersystem, and disfavors those subsystems that "waste" some of their resources in preparing themselves to survive the eventual destabilization of the supersystem. Under these conditions, self-prop systems will tend very strongly to become incapable of surviving the destabilization of any supersystem to which they belong.

Like the other propositions put forward in this essay, Proposition 3 has to be applied with a dose of common sense. If the supersystem in question is weak and loosely organized, or if it has no more than a modest effect on the conditions in which its subsystems exist, the subsystems may not become strongly dependent on the supersystem. Among hunter-gatherers in some (not all) environments, a nuclear family would be able to survive and propagate itself independently of the band to which it belongs. Because tribes of hunter-gatherers are loosely organized, it seems certain that in almost all cases a hunting-and-gathering band would be able to survive independently of the tribe to which it belongs. Many labor unions might be able to survive the demise of a confederation of labor unions such as the AFL-CIO, because such an event might not fundamentally affect the conditions under which labor unions have to function. But labor unions could not survive the demise of the modem industrial society, or even the demise merely of the legal and constitutional framework that makes it possible for labor unions as we know them to operate.

Clearly a system cannot be effectively organized for its own survival and propagation unless the different parts of the system can promptly communicate with one another and lend aid-to one another. Moreover, in order to operate effectively throughout a given geographical region, a self-prop system

[3]When we refer to the exercise of "foresight" or to the "pursuit" of advantage, our reference is not limited to the conscious, intelligent foresight or to the intentional pursuit of advantage. We include any behavior (interpreting that word in the broadest possible sense) that has the same effect as the exercise of foresight, or the same effect as the pursuit of advantages, regardless of whether the behavior is guided by any mechanism that could be described as "intelligence". (Compare Note 1.) For example, any vertebrates that, inthe process of evolving into land animals, had the "foresight" to "attempt" to retain their gills (an advantage if they ever had to return to water) were at a disadvantage due to the biological cost of maintaining organs that were useless on land. Hence, they lost out in "competition" with those incipient land animals that "pursued" their short-term advantage by getting rid of their gills. By losing their gills, reptiles, birds, and mammals have become dependent on access to the atmosphere, and that's why whales today will drown if forced to remain submerged too long.

must be able to receive prompt information from, and act promptly upon, every part of the region. Consequently,

> **Proposition 4**. Problems of transportation and communication impose a limit on the size of the geographical region over which a self-prop system can extend its operations.

Human experience suggests:

> **Proposition 5**. The most important and the only consistent limit on the size of the geographical regions over which self-propagating human groups extend their operations, is the limit imposed by the available means of transportation and communication. In other words, while not all self-propagating human groups tend to extend their operations over a region of maximum size, natural selection tends to produce *some* self-propagating human groups that operate over regions approaching the maximum size allowed by the available means of transportation and communication.

Today there is quick transportation and almost instant communication between any two parts of the world. Hence,

> **Proposition 6**. In modern times, natural selection tends to produce some self-propagating human groups whose operations span the entire globe. Moreover, even if humans are someday replaced by machines or other entities, natural selection will still tend to produce some self-propagating systems whose operations span the entire globe.

Current experience strongly confirms this proposition: We see global "superpowers", global corporations, global political movements, global religions, global criminal networks, etc. Proposition 6, we argue, is not dependent on any particular traits of human beings but only on the general properties of self-prop systems, so there is no reason to doubt that the proposition will remain true if and when humans are replaced by other entities: Natural selection will continue to produce or maintain self-prop systems whose operations span the entire globe.

Let's refer to such systems as *global* self-prop systems. Instant worldwide communications are still a relatively new phenomenon and their full consequences have yet to be developed; in the future we can expect global self-prop systems to play an even more important role than they do today.

> **Proposition 7**. Where (as today) problems of transportation and communication do not constitute effective limitations on the size of the geographical regions over which self-propagating systems operate, natural selection tends to create a world in which power is mostly concentrated in the possession of a relatively small number of global self-propagating systems.

This proposition too is suggested by human experience. But it's easy to see why the proposition is true independently of anything specifically human: Among global self-prop systems, natural selection will favor those that have the greatest power; global or large-scale self-prop systems that are weaker will tend to be eliminated or subjugated. Small-scale self-prop systems that are too numerous or too subtle to be noticed individually by the dominant global self-prop systems may retain some degree of autonomy, but each of them will have only local influence. It may be answered that a coalition

of small-scale self-prop systems could challenge the global self-prop systems, but if small-scale self-prop systems organize themselves into a coalition having worldwide influence, the coalition will itself become a global self-prop system.

We can speak of the "world-system", meaning all things that exist on Earth, together with the functional relations among them. The world-system probably should not be regarded as a self-prop system, but whether it is or not is irrelevant for present purposes.

To summarize, then, the world-system is approaching a condition in which it will be dominated by a relatively small number of extremely powerful global self-prop systems. These global systems will compete for power—as they must do in order to have any chance of survival—and they will compete for power *in the short term*, with little or no regard for long-term consequences (Proposition 2). Under these conditions, intuition tells us that desperate competition among the global self-prop systems will tear the world-system apart.

Let's try to formulate this intuition more clearly. For some hundreds of millions of years the terrestrial environment has had some degree of stability, in the sense that conditions on Earth, though variable, have remained within certain limits that have allowed the evolution of complex life-forms such as fishes, amphibians, reptiles, birds, and mammals. In the immediate future, all self-prop systems on this planet, including self-propagating human groups and any purely machine-based systems derived from them, will have evolved while conditions have remained within these same limits, or at most within somewhat wider ones. By Proposition 3, the Earth's self-prop systems will have become dependent for their survival on the fact that conditions have remained within these limits. Large-scale self-prop human groups, as well as any purely machine-based self-prop systems, will be dependent also on conditions of more recent origin relating to the way the world-system is organized; for example, conditions pertaining to economic relationships. The rapidity with which these conditions change must remain within certain limits, else the self-prop systems will not survive.

This doesn't mean that all of the world's self-prop systems will die if future conditions, or the rapidity with which they change, slightly exceed some of these limits, but it does mean that if conditions go far enough beyond some of the limits many self-prop systems are likely to die, and if conditions ever vary wildly enough outside of the limits, then, with near certainty, all of the world's more complex self-prop systems will die without progeny.

With several self-prop systems of global reach, armed with the colossal powers of modem technology and competing for immediate power while exercising no self-restraint from concern for long-term consequences, it is extremely difficult to imagine that conditions on this planet will not be pushed far outside of all earlier limits and battered around erratically, with the result that all of the Earth's more complex self-prop systems will die without progeny.

Notice that the crucial factor here is the availability of rapid, worldwide transportation and communication, as a consequence of which there exist global self-prop systems. There is another way of seeing that this situation will lead to radical disruption of the world-system. Students of industrial accidents know that a system is most likely to suffer a catastrophic breakdown when (i) the system is highly complex (meaning that small disruptions can produce unpredictable consequences), and (ii) tightly linked (meaning that a breakdown in one part of the system spreads quickly to other parts).[4] The world-system has been highly complex for a long time. The new factor is that of rapid, worldwide transportation and communication, as a result of which the world-system and all global self-prop systems are now tightly linked. Until relatively recently, self-prop systems were local phenomena, hence

[4]See "Of toxic bonds and crippled nuke plants", *The Week*, January 28, 2011, p. 42.

the destructive effects of their competition also were usually local. Today, because global self-prop systems compete worldwide, because they are tightly linked, because the world-system as a whole is tightly linked, and because technology provides global self-prop systems with colossal power, global disaster sooner or later is a near certainty.

An obvious answer to the foregoing arguments will be to assert that destructive competition among global self-prop systems isn't inevitable: A single global self-prop system might succeed in eliminating all of its competitors and thereafter dominate the world alone; or, because global self-prop systems would be relatively few in number, they might come to an agreement among themselves whereby they would refrain from all dangerous or destructive forms of competition. However, while it is easy to talk about such an agreement, it is vastly more difficult to actually conclude one and enforce it. Just look: The world's leading powers today have not been able to agree on the elimination of war or of nuclear weapons, or on the limitation of emissions' of carbon dioxide.

But let's be optimistic and assume that the world has come under the domination of a single, unified system, which may consist of a single global self-prop system victorious over all its rivals, or may be a composite of several global self-prop systems that have bound themselves together through an agreement that eliminates all destructive competition among them. The resulting "world peace" will be unstable for three separate reasons.

First, the world-system will still be highly complex and tightly linked.

Second, prior to the arrival of "world peace" and for the sake of their own survival and propagation, the self-prop subsystems of a given global self-prop system (their supersystem) will have put aside, or at least moderated, their mutual conflicts in order to present a united front against any immediate external threats or challenges to the supersystem (which are also threats or challenges to themselves). In fact, the supersystem would never have been successful enough to become a global self-prop system if competition between its most powerful self-prop subsystems had not been moderated.

But once a global self-prop system has eliminated its competitors, or has entered into an agreement that frees it from dangerous competition from other global self-prop systems, there will no longer be an *immediate* external threat to induce unity or a moderation of conflict among the self-prop system. In view of Proposition 2—which tells us that self-prop systems will compete with little regard for long-term consequences—unrestrained and therefore destructive competition will break out among the most powerful self-prop subsystems of the global self-prop system in question. This argument of course assumes that the most powerful self-prop subsystems will be "intelligent" enough to distinguish between a situation in which their supersystem is subject to an immediate external threat, and a situation in which their supersystem is not subject to an immediate external threat. The assumption, however, seems highly probable.

Benjamin Franklin pointed out that "the great Affairs of the World, the Wars Revolutions, &c. are carried on and effected by Parties." Each of the "Parties", according to Franklin, is pursuing its own collective advantage, but "as soon as a Party has gain'd its general Point"—and therefore, presumably, no longer faces immediate conflict with an external adversary—"each Member becomes Intent upon his particular Interest, which thwarting others, breaks that Party into Divisions, and occasions…Confusion."[5]

Franklin's statement doubtless represents somewhat of an oversimplification, but history does generally confirm that when large human groups are not held together by any immediate external challenge, they tend strongly to break up into factions that compete with one another regardless of long-

[5]Kenneth Silverman (editor), *Benjamin Franklin: The Autobiography and Other Writings*, Penguin, New York, 1986, p. 103.

term consequences. What we are arguing here is that this does not apply only to human groups, but expresses a tendency of self-propagating systems in. general as they develop under the influence of natural selection. Thus, the tendency is independent of any flaws of character peculiar to human beings and the tendency will persist even if humans are "cured" of their purported defects or are replaced by intelligent machines.

Let's nevertheless assume that the most powerful self-prop subsystems of global self-prop systems will not begin to compete destructively when the external challenges to their supersystems have been removed. There is still a third reason why the kind of "world peace" described above will be unstable.

By Proposition 1, within the new "peaceful" world-system new self-prop systems will arise that, under the influence of natural selection, will evolve increasingly subtle and sophisticated ways of evading recognition—or, once they are recognized, evading suppression—by the dominant global self-prop systems. By the same process that led to the evolution of self-prop systems in the first place, new self-prop systems of greater and greater power will develop until some are powerful enough to challenge the existing global self-prop systems, whereupon destructive competition on a global scale will resume.

For the sake of clarity we have described the process in simplified form, as if a world-system relatively free of dangerous competition would *first* be established and afterward would be undone by new self-prop systems that would arise. But it's more likely that new self-prop systems will be arising all along to challenge the existing global self-prop systems, and will prevent the hypothesized "world peace" from ever being the in the first place. In fact, we can see this happening before our eyes. The most crudely obvious of the (relatively) new self-prop systems are those that challenge law and order head on, such as terrorist networks, drug cartels, and hackers groups (e.g., Anonymous, or the now-defunct LulzSec[6]). Such self-prop systems not only can disrupt the normal course of political life, as drug cartels have done in Mexico and terrorists have done in the United States; they even have the potential to take control of important nations, as drug cartels arguably have come close to doing in Kenya.[7] A subordinate system that a government creates for its own protection—its military establishment—can turn into a self-prop system in its own right and become dominant over the government, either replacing it through a military coup, or exercising effective power behind the scenes while allowing the government to retain the appearance of full sovereignty.[8]

Probably more significant at the present time are emerging self-prop systems that use entirely legal methods (new corporations are continually being formed; some grow powerful enough to challenge older corporations and gain covert political power) and those that try to keep their use of illegal methods to a minimum (as in the case of the movement that recently overthrew Hosni Mubarak in Egypt). Legal self-prop systems are especially important in those parts of the world where democracy is firmly established, because democracy gives new groups the opportunity-to compete for (and possibly win) power by legal means. Two competing, entirely legal self-prop systems that have arisen in the U.S. during the last several decades are the politically correct left and the dogmatic right (not to be confused with the liberals and conservatives of earlier times in America). This essay is not the place to speculate about the outcome of the struggle between these two forces; suffice it to say that in the

[6] "An anonymous foe", *The Economist*, June 18, 2011, pp. 67-68. Bill Saporito, "Hack Attack", *Time*, July 4, 2011, pp. 50-52, 55. Byron Acohido, "Hacktivist group seeks 'satisfaction'" and "LulzSec's gone, but its effect lives on", *USA Today*, June 20, 2011, p. 1B, and June 28, 2011, p. 1B.

[7] "A state in the thrall of drug lords", *The Week*, January 14, 2011, p. 18.

[8] As in Pakistan, for example. See *Time*, May 23, 2011, p. 41; *The Week*, November 26, 2010, p. 15; *The Economist*, February 12, 2011, p. 48, and February 26, 2011, p. 65 ("General Ashfaq Kayani…[is] widely seen as the most powerful in [Pakistan].").

long run their bitter conflict may do more to prevent the establishment of a lastingly peaceful world order than all the bombs of AI Qaeda and all the murders of the Mexican drug gangs.

Some people may imagine that it would be possible to design and construct a world-system in such a way that the foregoing processes leading to destructive competition would not occur. But there are several reasons why such a project could never be carried out in practice. Here we mention only one of the reasons: the extreme complexity that the world-system would necessarily have, and the impossibility of predicting (especially at long term) the behavior of complex systems.[9]

It will be objected that a mammal, (or other complex biological organism) is a self-prop system that is a composite of millions of other self-prop systems, namely, the cells of its own body. Yet (unless and until the animal cancer) no destructive competition arises among cells or groups of cells within the animal's body. Instead, all the cells loyally serve the interests of the animal as a whole. Moreover, no external threat to the animal is necessary to keep the cell faithful to their duty. There is (it will be argued) no reason why the world-system could not be as well organized as the body of a mammal, so that no destructive competition would arise among its self-prop systems.

But the body of a mammal is, a product of hundreds of millions of years of evolution through natural selection. This means that it has been-created through a trial-and-error process involving many millions of successive trials. If we suppose the duration of a generation to be a period of time Δ, those members of the first generation that contributed to the second generation by producing offspring were only those that passed the test of selection over time Δ. Those lineages[10] that survived to the third generation were only those that passed the test of selection over time 2Δ. Those lineages that survived to the fourth generation were only those that passed the test of selection over time 3Δ. And so forth. Those lineages that survived to the nth generation were only those that passed the test of selection over the time-interval $(n-1)\Delta$ as well as the test of selection over every shorter time-interval. Though the foregoing explanation is grossly simplified, it shows that in order to have survived up to the present, a lineage of organisms has to have passed the test of selection many millions of times and over all time-intervals, short, medium, and long. To put it another way, the lineage of organisms has had to pass through a series of many millions of filters, each of which has allowed the passage only of those lineages that were "fittest" (in the Darwinian sense) to survive over time-intervals of widely varying length. It is only through this process that the body of a mammal has evolved, with its incredibly complex and subtle mechanisms that promote the survival of the animal's lineage at short, medium, and long term. These mechanisms include those that prevent destructive competition between cells or groups of cells within the animal's body.

But once self-prop systems have attained global scale, certain crucial differences emerge that make the selection process highly inefficient.

First, at each trial in the process of trial and error that is evolution through natural selection, there are too few individuals from among which to select the "fittest". In a biological species there ordinarily are, at the least, several million individuals from among which the "fittest" in each generation are

[9] See *The New Encyclopcedia Britannica*, 15th ed., 2003, Vol. 25, article "Physical Science, Principles of", pp. 826-827.

[10] For the sake of simplicity we define a lineage to be any sequence of organisms O_1, O_2, O_3,...,O_n such that O_2 is an offspring of O_1, O_3 is an offspring of O_2, O_4 is an offspring of O_3, and so on down to O_n. We say that such a lineage has survived to the n" generation. But if O_n produces no offspring, then the lineage does not survive to generation n+1.

For example, if John is the son of Mary and George is the son of John and Laura is the daughter of George, the Mary-John-George-Laura is a lineage that survives to the fourth generation. But if Laura produces no offspring, then the lineage does not survive to the fifth generation.

selected by their ability to survive and reproduce.[11] Self-prop systems sufficiently big and powerful to be plausible contenders for global dominance will probably number in the dozens or possibly in the hundreds; they certainly will not number in the millions.

Second, in the absence of rapid, worldwide transportation and communication, the breakdown or the destructive action of a small-scale self-prop system has only local repercussions. But, where rapid, worldwide transportation and communication have led to the emergence of global self-prop systems, the breakdown or the destructive action of anyone such system shakes the entire world-system. Consequently, in the process of trial and error that is evolution through natural selection, it is highly probable that after only a relatively small number of "trials" resulting in "errors", the world-system will break down or be so severely disrupted that none of the world's larger or more complex self-prop systems will be able to survive (see Proposition 3). Thus, for such self-prop systems, the trial-and-error process comes to an end; evolution through natural selection cannot continue long enough to create global self-prop systems possessing the subtle and sophisticated mechanisms that prevent destructive internal competition within complex biological organisms.

Meanwhile, fierce competition among global self-prop systems will have led to such drastic and rapid alterations in the Earth's climate, the composition of its atmosphere, the chemistry of its oceans, and so forth, that among biological species none will be left alive except, maybe, some of the simplest organisms—certain bacteria, algae and the like that are capable of surviving under extreme conditions.[12]

The theory we've outline here provides a plausible explanation for the so-called "Fermi Paradox". It is believed that there should be numerous planets on which technologically advanced civilizations have evolved, and which are not so remote from us that we could not by this time have detected the radio transmissions of those civilizations. The Fermi Paradox consists in the fact that our astronomers have never been able to detect any radio signals that seem to have originated form an intelligent extraterrestrial source.[13]

According to Ray Kurzweil, one common explanation of the Fermi Paradox is "that a civilization may obliterate itself once it reaches radio capability. This explanation might be acceptable if we were

[11] Among very large animals the number of individuals in each generation may be in the thousands rather than in the millions. But biological species that consist of a relatively—small number of large individuals—such as mammoths, giant sloths, and the "megafauna" generally—have proven to be far more vulnerable to extinction than species that consist of a large number of small individuals.

[12] As explained here, we think competition between global self-propagating systems will almost certainly lead to devastation of the world if modern technology is allowed to continue its progress. But the remarkable powers that technology makes available might result in worldwide devastation independently of the existence of global self-prop systems. For example, as Bill Joy has pointed out ("Why the Future Doesn't Need Us", *Wired*, April 2000), it may in the future be possible to create tiny self-propagating systems (biological or not) that could reproduce themselves uncontrollably and spread over the world with devastating effect. Because the equipment needed to create such self-prop systems would be simple and inexpensive as compared with, for example, the equipment needed to produce nuclear weapons, some small group of amateurs could accidentally or intentionally create deadly self-prop systems without anyone's being aware of what they were doing until it was too late. Small groups of amateurs are already dabbling in genetic engineering. See Elizabeth Weise, "DIY 'biopunks' want science in hands of people", *USA Today*, June 1, 2011, p. 7A. These amateurs wouldn't necessarily have to create synthetic life or do anything highly sophisticated in order to bring on a disaster; merely changing a few genes in an existing organism could have catastrophic consequences. The chances of disaster in any one instance may be remote, but there are potentially thousands or millions of amateurs who could begin monkeying with the genes of microorganisms, and thousands or millions of minute risks can add up to a very substantial risk.

[13] Ray Kurzweil, *The Singularity is Near*, Penguin, New York, 2005, pp. 344-349.

talking about only a few such civilizations, but [if such civilizations have been numerous], it is not credible to believe that every one of them destroyed itself."[14]

Kurzweil would be right if the self-destruction of a civilization were merely a matter of chance. But there is nothing implausible about the foregoing explanation of the Fermi Paradox if there is a process common to all technologically advanced civilizations that consistently leads them to self-destruction. In this essay we have argued that there is such a process.

[14]Ibid., p. 348. Kurzweil refers to an estimate that there should be "billions" of technologically advanced civilizations within the range of our observation, but he plausibly argues that the assumptions on which this estimate is based are highly uncertain and probably overoptimistic (this writer would say wildly overoptimistic). Ibid., pp. 346-47. Still, an explanation is needed for the fact that our astronomers have detected no indication of *any* extraterrestrial civilizations at *all*. See ibid., p. 357. See also Michael D. Lemonick, "Is Anybody Out There? The universe may be more hospitable to life than we thought", *Time*, June 6, 2011, p. 18; "A planet in the 'Goldilocks zone'", *The Week*, June 3, 2011, p. 21. On the basis of no evidence or reasoning whatever, Kurzweil writes that "sudden [self-]destruction is likely to be only a modest factor in reducing the number of radio-capable civilizations." Ibid., p. 346. As we've argued, he's dead wrong.

II.

Our discussion of self-propagating systems merely describes in general and abstract terms what we see going on all around us in concrete form: Organizations, movements, ideologies are locked in an unremitting struggle for power. Those that fail to compete successfully are eliminated or subjugated.[15] The struggle is almost exclusively for power in the short term; the competitors pay scant attention even to their own long-term survival,[16] let alone to the welfare of the human race or of the biosphere. That's why nuclear weapons have not been banned, emissions of carbon dioxide have not been reduced to a safe level, the Earth's resources are being exploited at an utterly reckless rate, and no limitation has been placed on development of powerful but dangerous technologies.

The purpose of describing the process in general and abstract terms, as we've done here, is to show that what is happening to our world is not accidental; it is not the result of some chance conjunction of historical circumstances or of some flaw of character peculiar to human beings. Given the nature of self-propagating systems in general, the destructive process that we see today is made inevitable by a combination of two factors: the colossal power of modern technology and the availability of rapid transportation and communication between any two parts of the world.

Recognition of this may help us to avoid wasting time on naïve efforts to solve our current problems. For example, on efforts to teach people to conserve energy and resources. Such efforts accomplish nothing whatever.

It seems amazing that those who advocate energy conservation haven't noticed what happens: As soon as some energy is freed up by conservation, the technological world-system gobbles it up and demands more. No matter how much energy is provided, the system always expands rapidly until it is using all available energy, and then it demands still more. The same is true of other resources. The technological world-system infallibly expands until it reaches a limit imposed by an insufficiency of resources, and then it tries to push beyond that limit regardless of consequences.

This is explained by the theory of self-propagating systems: Those organizations (or other self-prop systems) that least allow respect for the environment to interfere with their pursuit of power here and now, tend to acquire more power than those that limit their pursuit of power from concern about what will happen to our environment fifty years from now, or even ten years (Proposition 2). Thus, through a process of natural selection, the world comes to be dominated by organizations that make

[15] It is not our intention to exalt competition or to portray it as desirable. We are not making value judgments here. Our purpose is only to set forth the relevant facts, however painful those facts may be.

[16] E.g.: "As [Barbara] Tuchman put it…, 'Chief among the forces affecting political folly is lust for power… .'" Diamond, op. cit., p. 431. "Governments… regularly operate on a short-term focus: they… pay attention only to problems that are on the verge of explosion. For example, a friend of mine who is closely connected to the current [George W. Bush] federal administration in Washington, D.C., told me that, when he visited Washington for the first time after the 2000 national elections he found that our government's new leaders had what he termed a '90-day focus': they talked only about those problems with the potential to cause a disaster within the next 90 days." Ibid., p. 434. Diamond is wasting his time in preaching against these tendencies because these tendencies are inevitable products of natural selection operating upon self-prop systems under present-day conditions.

maximum possible use of all available resources to augment their own power without regard to long-term consequences.

Environmental do-gooders may answer that if the public has been persuaded to take environmental concerns seriously it will be disadvantageous in terms of natural selection for an organization to abuse the environment, because citizens can offer resistance to environmentally reckless organizations. For example, people might refuse to buy products manufactured by companies that are environmentally destructive. However, human behavior and human attitudes can be manipulated. Environmental damage can be shielded, up to a point, from public scrutiny; with the help of public-relations firms, a corporation can persuade people that it is environmentally responsible; advertising and marketing techniques can give people such an itch to possess a corporation's products that few individuals will refuse to buy them from concern for the environment; computer games, electronic social networking, and other mechanisms of escape keep people absorbed in hedonistic pursuits so that they don't have time for environmental worries. More importantly, people are made to see themselves as utterly dependent on the products and services provided by the corporations. Because people have to earn money to buy the products and services on which they are dependent, they need jobs. Economic growth is necessary for the creation of jobs, therefore people accept environmental damage when it is portrayed as a price that must be paid for economic growth. Nationalism too is brought into play both by corporations and by governments. Citizens are made to feel that outside forces are threatening: "The Chinese will get ahead of us if we don't increase our rate of economic growth. Al Qaeda will blow us up if we don't improve our technology and our weaponry fast enough."

These are some of the tools that organizations use to counter environmentalists' efforts to arouse public concern; similar tools can help to blunt other forms of resistance to the organizations' pursuit of power. The organizations that are most successful in blunting public resistance to their pursuit of power tend to increase their power more rapidly than organizations that are less successful in blunting public resistance to their power-seeking activities, whatever the degree of environmental damage involved. Because such organizations have great wealth at their disposal, environmentalists do not have the resources to compete with them in the propaganda war.

This is the reason, or an important part of the reason, why attempts to teach people to be environmentally responsible have done so little to slow the destruction of our environment. And again—note well—the process we've described is not contingent on any accidental set of circumstances or on any defect in human character. Given the availability of advanced technology, the process of inevitability accompanies the action of natural selection upon self-propagating systems.

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Why the Technological System Will Destroy Itself
21 July 2011

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