

## How Should Humanity Steer the Future? – Sideways!

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### Introduction

If the question were merely scientific, we should all be living in a Marxist workers' paradise by now. Yet scientific socialism, as Marx's economic theory is formally known, fails at the fundamental level of human biology. This is quite dramatically demonstrated in the Lysenkoism that once pervaded Soviet science and held back progress in evolutionary biology there, for decades.<sup>1</sup>

We should be clear that we aren't indicting Marxist economics; the idea that humanity is entitled to share resources "... from each according to his ability, to each according to his needs ..." popularized by Marx and also attributed to many earlier sources, is as liberating as early Christianity and twice as idealistic as the 18<sup>th</sup> century Western Enlightenment. On American shores, we fought our own peasant revolution against taxation without representation. The preamble to the U.S. Constitution speaks to the ideals of social justice, common welfare and "... the blessings of liberty ..." for the individual, against the potential tyranny of nobility, unrestrained capitalism, church and state. There has always been a palpable irony in balancing the needs of the least element of society with the defense of a controlling hierarchy. Lip service paid to democracy versus federalism, falls to a most delicate balance of democratic principles and processes against imposed authority, a system of checks and balances enshrined in the U.S. Constitution, a document yet unrivalled for its theoretical maintenance of political balance.

We know that democracy is today losing the battle for that balance in the U.S., and throughout the world.

Not everyone thinks that's a bad thing; theocratic and authoritarian governments, monarchies and tribal-type unions don't fret over individual welfare to any greater extent than they have to, in order to keep an uneasy peace with the population. If a local revolution comes, it tends to replace one master with another of the same stripe.

A quote often attributed to Einstein, among others, is a practical definition of 'insanity': "...doing the same thing over and over again and expecting different results." That was the trouble with Lysenkoism, in fact – it is a quasi-religious belief that characteristics of populations are acquired through shared repetition; that giraffes grow long necks because generations of them inherited from their ancestors the tendency to stretch for the highest leaves on the tree, that future generations of peasant farmers can increase their yields through multiplying their efforts in collectivizing resources in the present generation. There is no room for the creative individual, or for creative nature, to evolve with a will of its own.

We don't intend to debate the liberal ideal here – we believe in it. We think it's the only sane ideal among all choices, because it doesn't expect the individual or the society to do the same things over and over again only to get the same undesirable results; it expects the individual to grow on her own terms. What we intend, is to frame a scientific perspective that allows both believers in democracy, and the opposition, to coexist and prosper in the inevitable transition to a democratic world. For if this transition is not inevitable, extinction of the species is all we can look forward to. Like yeasts making alcohol for Vonnegut's alcoholic protagonist to ingest, we may just be consuming our resources and defecating in them until we drown ourselves in our own waste, blissfully

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unaware of creating some delightful beverage for an unknown and unimagined consumer.<sup>2</sup>

#### Five fundamental entitlements

In the first place, what do humans need to survive and grow and be happy? The fundamental economic foundations of any government, regardless of political philosophy or form, rests on delivering adequate food, clothing and shelter – at least, for those enfranchised citizens whose dissatisfaction could threaten the status quo. Bread and circuses were good news for Roman citizens; bad for the nations that Rome subjugated and exploited.

For most of human history, even up until the history of the last century or so, this list of entitlements could be said to be complete. Freedom from hunger and want, though, are negative freedoms; the liberated individual is hardly happy with the least that even a Roman Noble or a plantation slave owner provided his captives or that a Russian tsar allowed his peasant subjects.

Such meeting of needs does not entail “liberty and justice for all...”

What more does a fully enfranchised citizen of the world require to be free? She requires what the rulers and the elite of every society have always enjoyed as entitlements, and most often protected and passed on to their progeny: besides a sumptuous provision of food, clothing and shelter, the benefits of education and mobility—free lifetime access to information and learning resources, medical care and recreation.

Democracy is clearly losing the battle for freedom of education; higher education in the U.S. is not only growing further out of reach because of the exorbitant cost, it is out of reach of those ill prepared by virtually nonexistent free preparatory education, as public schools in many places struggle to even keep their doors open, much less provide a secure, abundant, and nourishing learning environment. A university education for prepared foreign students is within

closer reach than for unprepared students within our borders.

Democracy is making painful progress toward freedom of mobility. The U.S., virtually the last developed country in the world to adopt the idea of universal health care, barely managed to enact a plan that benefitted insurance underwriters and investors at least as much, if not more than, individuals. And even that brave effort has been threatened with repeal by minority party conservatives scores of times.

Modern capitalism has learned how to use political cover to protect itself against Marx’s prediction of over-production and under-consumption, by hedging losses and collecting rewards on economic downturns as well as on gains.

Surely, though, the founders of the United States republic, as well as other nations built on or reformed by the Enlightenment, would ask: how did it come to this? How did it happen that **85 individuals out of seven billion people own and control as much wealth as fully half of the total world population?**<sup>3</sup> It sounds like the stuff of science fiction; it is an unfortunate fact.

We are trying not to write a political tractate – facts are as they are, and we offer to explore a fact-based scientific, not political, solution. Politics, nevertheless, can as easily pave the way for science as for special interests that pay for their privileges with expensive lobbying of legislators.

#### Plowshares into swords?

First, it’s doubtful that a prosperous world can exist without effectively limiting violence, whether we end up with a democratic, fully enfranchised society or not. We are barely into the second decade of the 21<sup>st</sup> century, with armed conflict and genocide so common as to hardly make the daily news anymore. If the next big war does come, though, there will be no winner, because we can’t even tell what “victory” means. A world conflagration in this technological age

is a positive feedback loop of self-annihilation, which can be ably described as a factor in Frank Drake's celebrated equation for the probability of intelligent extraterrestrial life, against the growth of potentially destructive technology.<sup>4</sup> If a self-destructive loop in a technologically advanced society is inevitable, the probability of intelligent life here, let alone in the rest of the universe, is effectively zero. We are steering ourselves toward extinction.

Before the end of the U.S.—Soviet cold war, diplomatic solutions focused on mutually assured destruction (MAD). If we were to speak instead of mutually assured prosperity (MAP), such that entails full enfranchisement of the world's population, we would supplement or replace the diplomats with soldiers—not just trigger pullers, also virtual soldiers, in the form of network linked assets. Why? Military science, which has contributed so much to the destruction of the world, has ironically done so much to improve it. Roads and bridges, life-saving technology and personal mobility, food preservation, space exploration and more were motivated by military needs. The motivation for improved technological warfare today lies in command, control, communications and computers. The U.S. and its allies possess the most sophisticated network-centric hardware and software available, and capabilities are still growing.

Net-centric warfare has transformed the battlefield as dramatically as network technologies have transformed business and society.<sup>5</sup> How do we arrange to use these powers for good, to enable a just and prosperous society as opposed to our fearful and penurious one?

#### Of mice and Malthus

Even in this day and age, most theories of human population pressure on natural resources do not differ a great deal from theories of other animal populations. Thomas Hobbes' picture of "... nature, red in tooth and claw ..." figures very much in the economics of capitalist competition today, and Thomas Malthus' calculation of

human geometrical population growth versus arithmetical resource growth seems nearly fulfilled.

There are more complicated dynamics at work in the human society. Peasant and tribal societies that form the bulk of the world's population tend to think of a brighter future rather than dwell on the miserable present in which they eke out subsistence earnings. The peasant's idea of a bright future, however, is at odds with the capitalist economy's idea of a prosperous present. The peasant will aim to have more sons and daughters to do more work and produce more goods that bring in more money for the future—while the capitalist economy will suppress growth in production in the present (in order to avoid the Marxist catastrophe of over-production and under-consumption) to the limit of a balanced supply and demand. The problem is that sons and daughters still need to be fed, clothed, sheltered, educated, when demand is low and supply is high; plans for future prosperity in the peasant family are smashed, because the excess supply is hoarded rather than re-invested in the population's well being. The system thrives on an excess labor pool, as if labor were spent hens destined only for retirement into the stew pot. Even Charles Dickens might be shocked at the inequity.

Supply side ("trickle down") economics is long dead.<sup>6</sup> There is no incentive to return excess capital to the market in the present rather than hoard it against future growth in value. One requires no more evidence than that 85 people can collectively buy half of the world. The capitalist is fully hedged against economic downturns in the aggregate marketplace and fully vested in present returns for investors against long term prosperity for all.

There is also no incentive for peasant populations to stem the production of children along with the production of goods, because there is no difference between the two modes of production. Prosperous middle class societies, on the other hand, demonstrably do not overpopulate, pollute and unreasonably strain

resources—they are stakeholders in the real commonwealth. Quality of life sustainability is an obvious function of population growth<sup>7</sup>.

#### Is there a scientific answer?

If there is a scientific answer, the time is ideal. The steady rise of third world nations and growing economic parity among global powers (notably, the U.S. and China) may already have been seen to contribute to a subtle shift toward strategic policy initiatives that suggest a desire for mutually assured prosperity. Evidence of increased cooperation (by both government and non-government entities) in nation building and modernization enterprises, along with disaster relief and humanitarian aid, trade, treaties, arms reduction – even given daily reports of wars and rumors of wars, famine and calamity from every corner of the Earth – suggests that on balance, individuals of the world’s exponentially growing population do expect to share the benefits of fully enfranchised citizenship, and leave their outdated ways behind.

We suggest that the science promising to help correct the path is not scientific socialism; it is complex system science, and based on a dramatically counterintuitive finding.

In a 2007 *Science* article<sup>8</sup> May Lim, Richard Metzler and Yaneer Bar-Yam reached the conclusion:

*“Peaceful coexistence need not require complete integration.”*

It is counterintuitive because the assumption of integration of societies—in the context that requires assimilation of cultural values, beliefs and laws into a common well of political doctrine—has been the mainstay of liberal thought for generations.

Lim, *et al*, make a case that preserves the liberal ideal while invoking the importance of multiple scales of interaction that maximize cooperation and minimize the potential for violent conflict:

*“Violence arises due to the structure of boundaries between groups rather than as a result of inherent conflicts between the groups themselves.”*

We may see a particular structural model, then, as a mode of communication by which individuals, and cultural/political organizations of individuals, can freely contribute to the common well and drink from it, without being drowned in some doctrine of forced behavior.<sup>9</sup>

The motivation for Lim, *et al*, derives from Bar-Yam’s extensive research in complex systems, culminating in the theory of multi-scale variety. This theory generalizes the principle that lateral, rather than hierarchical, distribution of activity and information drives system effectiveness: *“In considering the requirements of multi-scale variety more generally, we can state that for a system to be effective, it must be able to coordinate the right number of components to serve each task, while allowing the independence of other sets of components to perform their respective tasks without binding the actions of one such set to another.”*<sup>10</sup>

Underlying is a hidden assumption we wish to make obvious: human free will transcends cultural and political boundaries; if the means to cooperate is available, the will follows.

The means to guarantee entitlements – food, clothing, shelter, education and mobility – is a logistics problem.

#### Sharing resources without redistribution

The idea of redistributing wealth is actually paradoxical. Unless wealth is distributed—i.e., unless one can exchange what one values for what one values more—it isn’t wealth. Wealth distributes from an initial condition analogous to heat dissipation toward equilibrium. This is lateral and local, not hierarchical.

Collectivization fails in the long run, because it only generates potential wealth; it does not represent the true idea of wealth as trade. The

collectivists forced to consume seed corn, to again invoke the Marxist prediction of over-production and under-consumption, endanger the whole economic momentum toward equilibrium that trade engenders, because it creates a self-destructive positive feedback loop.

Why would a wealthy capitalist want to practice the same ethic as a poor farmer—what’s in it for him? Actually, everything:

The near world economic collapse of the early 21<sup>st</sup> century was an effect of eating the seed corn. The capitalist collective ate up their capital in the form of reduced value, and so degraded the value of what seeds were left to plant. The money farm almost went broke because the farmers valued capital more than wealth. Seeds spoil when they aren’t planted.

Because most free market modern economic theories are built on the principle of a random walk around an equilibrium point, most economists recognize the danger of an out of equilibrium loop of wealth-destroying positive feedback. It isn’t as if we haven’t seen it before, in images of a wheelbarrow of Deutschemarks to buy a loaf of bread, or a sea of worthless stocks being swept from the New York Stock Exchange trading room floor.

Yet we continue to do the same things over and over again, expecting different results.

What would preserve a *continuous* trajectory toward equilibrium and guarantee avoidance of the destabilizing positive feedback loop, or even an economic extinction event? What would persuade a money farm collective of 85 megabillionaires to turn over all their capital to the rest of the world – voluntarily, because it would serve their own best interests and make them richer? What guarantees to them that they will stay wealthy in perpetuity and protected from any kind of apocalypse, whether of the zombie kind or some other?

The author is old enough to remember when Soviet Premier Nikita Khrushchev taunted the

West with “We will bury you” in Soviet collective wealth against capitalist individualism.<sup>11</sup> We ask the 85: whom do you plan to bury? When you own a shovel big enough to bury half the world – then what? Dig two graves.

An inevitable reaction to the hoarding and manipulation of capital by collective money farms is the rise of peer to peer lending groups,<sup>12</sup> a nice illustration of the gentle Robert Frost warning, “Something there is that doesn’t love a wall.” Good neighbors have fences with unlocked gates.

#### The science of keeping the gates open

We want to explore how high-tech logistics management of many small and redundant systems, linked in a robust global network, makes it possible to guarantee equal global sharing of resources without depriving individuals of personal access and use of as much property as they can acquire, in unequal measure. The idea of ownership in this model shifts from control of people to control of real property in a distributed system:

Perhaps not everyone knows that the iconic “... life, liberty and the pursuit of happiness ...” Thomas Jefferson wrote into the U.S. Declaration of Independence, was adapted from Enlightenment philosopher John Locke’s “... life, liberty and *property*.”<sup>13</sup> It would have been unseemly as well as contradictory in an age of institutionalized slavery, when some people were considered the property of other people, to proclaim, “... all men are created equal ...” and then tacitly endorse slavery. Though it took the bloodiest of wars, and postwar amendments to the U.S. Constitution, to eventually settle the question for good, the democratic federalist ideal that forbids local governments from unjustly exploiting people subject to their local laws, remains intact to this day. States’ rights ensure the right of people to self-determination, not a state’s right to suppress individual freedom.

There’s a highly effective didactic tool by which

many children learn to share equally: one is given the choice to either cut the cake, or to pick which piece to eat. We aren't children, though the principle is sound for all cooperative endeavors: equal vestment means compelling interdependence, not necessarily equal ownership. (What fascinates, is that the decision of whether or not to cooperate is unilateral.) The point of the exercise is to prevent withholding of cooperation:

The withholding of capital to protect the value of personal property is identical to withholding cooperation in the social contract that the capitalist enterprise represents. We speak of a system in which groups, down to the least element – the individual – can be effective without sacrificing self-determination to a hierarchical order. Even though the fact remains that cultural/political groups often impose severe restrictions on the individual mobility of their members, a global system that maximizes cooperation suggests to rational societies that local liberalization is an asset to maintaining their independence among the global community of nations. This is non-contradictory only if such cooperation is voluntary and non-coercive, not "... binding the actions of one ... to another."

Bar-Yam<sup>14</sup> identifies the paradox in current socioeconomic policy that attempts to help equalize ownership by giving aid: "*How can one help when help creates dependency?*" This question also frames Zambian economist Dambisa Moyo's<sup>15</sup> indictment of aid to African countries as ineffective and haphazard. Bar-Yam uses the metaphor: "*Development agencies should ... act as the scaffolding that helps workers build a house, which can stand on its own when the scaffolding is removed.*" He acknowledges, "... *it doesn't always happen.*" While Dr. Moyo's thesis is far from universally accepted (indeed, one is challenged to find any economic philosophy that is), it has ignited a worldwide dialogue over the value of investment versus aid. Whether public or private, however, we agree in principle that cyclical investment fuels sustained economic well-being while aid

quickly burns out.

#### Multiscale variety vs hierarchy

Bar-Yam introduced multi-scale variety, the idea that independent subsystems allowed to organize around task coordination at different times on different scales, makes the larger system effective. One can summarize: locally efficient use of resources assures global effectiveness in the creative growth of resource availability – with the caveat that local subsystems remain independent, because otherwise the drain on local resources will reduce subsystem effectiveness and cause an undesirable positive feedback loop by lack of sufficiently varied resources to sustain required tasks.

The problem of bounded rationality—the limitation of individual elements of a linked system, be they human, network node or subsystem, to acquire sufficient information for central control decisions—had long been cast in systems thinking as a problem of hierarchy, vertical or nested. Bar-Yam's network, of multi-scale variety with distributed control, allows communications technology to be integrated laterally into the system to solve or mitigate the problem of bounded rationality.<sup>16</sup> In so doing, the system is open to self-correction; some problem might be time-limited in a particular part of the system, yet is not unresolvable in the whole, as the hub of activity shifts to a different subsystem, allowing the time-limited system the freedom to recover.

A remarkable 2006 result of Dan Braha and Yaneer Bar-Yam<sup>17</sup> demonstrated that in a self-organized communication network, a continuously shifting hub of distributed activity causes the map to sometimes vary quickly and radically on local scales over short time intervals, even while the map itself shows little global change aggregated over long time intervals.

This abstract model would mirror complex military movements and communications, if we considered the map as a theater of operations the

size of the globe. That is, each communicator in the network has at their workstation all the necessary resources to deliver a message and coordinate events, sometimes acting as the hub of activity, sometimes as the beneficiary of information and sometimes as provider of information. Point is, the metastability of the system over time suggests that a continually shifting range of activity represented by changing hub configurations is self limiting; as a result, the global domain is largely protected from the danger of positive feedback – i.e., a loss of system control and potential widespread self-reinforcing destruction. In the history of the world wars, one can identify such unchecked feedback of escalating hostilities. Even in the present world, one can make a good argument that the specter of damaging positive feedback, festering in individual areas of the world – among failed governments, local armed resistance to despotic regimes, piracy, organized crime and racketeering, human trafficking – is tinder for a future conflagration.

The efforts of stable nations to contain crime and hostilities are largely based on applying force in a hierarchical top-down manner. If we look at world events in the context of a self-organized system of interdependent subsystems, however, we see that such tactics are destined to be self-perpetuating; suppression of activity even if demanded to temporarily contain a situation, is anti-creative, and if Per Bak<sup>18</sup> is right, futile in the long run. Bak's self-organized critical, non-linear model of change isn't just mathematics—applied to biology, it supports the Gould-Eldredge punctuated equilibrium model of evolution.<sup>19</sup> Most recently, mathematician Gregory Chaitin has proposed “mathematical biology,”<sup>20</sup> further reinforcing the power to understand our physical world through abstract modeling. These ideas suggest the existence of natural ways—paths of least resistance—to aid the containment of destructive violence while promoting the creative growth of both societies and individuals.

What all these models require in common, and

which extends into the evolution of all systems and subsystems whether physical or purely abstract—is an assured variety of inputs that sacrifices some efficiency in order to maximize creativity and effectiveness. Many redundant and strategically located self-sustaining regions of production may ensure both consumption at the source and sustainable, randomly shifting hubs of network activity. The capital drain on any one region is limited, because the network's resources are not; i.e., risk is effectively absorbed and there is no single point of failure.

Bar-Yam recognized<sup>21</sup> that cybernetics pioneer W. Ross Ashby's “law of requisite variety”<sup>22</sup> is a theorem in a world where excess resources and system redundancy are assets to the creative process. In other words, while it is counterintuitive to an individual to think of efficiency as a liability, the self-limiting process of a self-organized system can only be as efficient as the availability of resources in a particular hub-connected subsystem, to meet its needs.

Duncan J. Watts and Steven Strogatz<sup>23</sup> of “Watts-Strogatz graph” fame, showed a “small world effect” for fixed numbers of network nodes, laying groundwork for realistic models of self organization that allow spontaneous and orderly growth system wide.

#### National security is a global enterprise

The dedication of the United States to minimally managed, if not quite unfettered, capitalism has almost reached its logical conclusion:

With its eroded (and still declining) industrial base and growing status as a net importer, the United States is positioned globally as a service provider economy.

In our opinion, the strength of the U.S. can no longer be measured in stockpiles of weapons that hopefully won't be used, or in trying to restore a lost industrial base against the relentless campaign of U.S. firms to export American jobs to cheaper labor markets. This trend is unlikely

to stop, barring an unexpectedly radical change in American politics, until the world's labor market is equalized.

What the U.S. has readily available now, is an expertise in data and resource management, communications and other high tech services that foreshadows an unrivalled leadership role in managing the world's resources, so long as the position of leader is shared with equal deference to the positions of the world's resource owners and managers. In a transformation of the idea of ownership from commodities to knowledge management, control of the knife is equal to owning the cake.

Net-centric logistics has the ability to transform U.S. foreign aid from a giveaway program to an investment program. Scandals ranging from piracy to corrupt political leadership and inept management of resources are common; we believe that reciprocal agreements that de-incentivize local political control in favor of local ownership and a management contract that includes security services, have a fair chance of working—now that widespread citizen revolts, primarily in the Mideast and Africa, have to a varying degree successfully forced broader sharing of political power.

The bottom line:

In a world threatened by its own head-on clashes of self-destructive tendencies, lateral distribution of communications technology and resources – a globally linked supply chain controlled by high tech information systems in a robust network – helps dampen inequality and maximally enfranchise individuals for an exponential growth in creativity and wealth generation. Sideways is the only rational trajectory.

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**Acknowledgment:** A significant amount of material was adapted from Ray, T. “Net-Centric logistics,” to appear in *Applying Complex Adaptive Systems Research to Countering Terrorism, Insurgency, Regional and Ethnic Violence*; Ali Minai, Yaneer Bar-Yam and Philip Fellman, editors; Springer Verlag (Berlin & New York) Forthcoming 2014.



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