

The Epistemological Revolution: Competitive strategies and tactics in a time of ignorant conspiracies¹

A work in progress

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e-pis-te-mol-o-gy (*î-pîs'te-mòl'e-jê*) *noun*

The branch of philosophy that studies the nature of knowledge, its presuppositions and foundations, its extent and validity.

Uncertainty

The single most pervasive and persistent problem facing all humans through all time, it is the element of **uncertainty**? the gap between what we humans know and experience as certain and that which we do not—and in many cases cannot—know with any degree of surety.

And yet, given the magnitude of the problem of uncertainty and its impact on our daily lives, the issue of uncertainty is one we seldom address directly.

It simply is much easier, and seen as far more direct and practical, to ignore the larger issue of uncertainty per se and “go to the heart of the matters” that vex us. The result tends to produce “authorities,” who often function to displace the creation of contextual knowledge, which can reduce uncertainty. From authority, particularly in times of change, we tend to get “truth proxies” guiding action most often involving symptoms, which are in turn the focus of our more immediate interests and framing differing points of view as “right” or “wrong.”

Thus we reduce our uncertainties to practical immediacies, mainly shorn of the cloak of diverting considerations that emerge from a “larger view.”

The main fact of such ways of seeing the world and building a corresponding intelligence is that for practically all of human history, such intellectual behavior worked. We saw a problem—in building roads, or cities, or empires—and we solved such problems with grand confidence. Human behavior, backed up by the abundance of resources and intelligence in their use, was mainly rewarded for doing things.

During all the time of human history up to present times, it was far less rewarding—and often highly penalized—to ask whether we should do some thing or other.

Today, however, as they say, “The times they is a’changing.” Uncertainty, throughout all levels of human society is perhaps greater than ever before in history. Our daily experiences increasingly make a case for the possibility that it is not ability to do things that are failing us now, as much as the levels of uncertainty increasingly

drawing us into questions of what we should be doing, why, and of most importance, how we can know in time, that which will work best to advance our continuing interests.

Nor are these new concerns.

Forces, Laws, and Transitions

Towards the end of his epic novel, **War and Peace**, published as the United States was embroiled in its Civil War, Count Leo Tolstoy spoke of power, the forces of human will, of necessity, nature, and the repeating patterns of our world. In the last three pages of his novel, Tolstoy has little problem with these greater ideas as he steps to a higher level of human perception. He tells us that as Copernicus and Galileo destroyed the cosmology of the ancients who placed earth at the center of the universe, we must once again shift our conceptual universe. Tolstoy tells us that "...by admitting our free will we arrive at an absurdity, while admitting our dependence on the external world, on time, on cause, we arrive at laws."

Common sense suggests that we should always be active in addressing our absurdities—and now is a particularly prudent time to do so. Good intellectual practice, some of it science, but most of it common sense, gives us far more than the means to avoid absurdity. It can let us build an effective world view for addressing the full diversity of conditions before us.

Four factors are currently at work shaping the ways we confront the realities and the absurdities of our future. They are:

☞ Energy, as it is found in:

?? the free work nature does in ecosystems;

?? the parts of the free, non-market and thus non-monetized, work nature does in ecosystems that contributes to the support, economic and otherwise, of human populations;

?? the works of nature that produces products (oil, natural gas, coal, lumber, etc.) that are commodities traded in human markets and valued with money.

☞ The environment, and the laws of nature which guide its behavior, which can be recognized and used as examples to further advance our interests.

☞ Markets and money, the abstract and symbol products used to set, trade, and increasingly confuse the value processes in human culture.

☞ Population, relative to ecosystems, resources, markets, and money

☞ The characteristics of the way we view our world.

Epistemology

In simple terms, Epistemology is the study of **how we know what we know**. However, while it is a critical element in our intellectual foundations, epistemology is not a common concept. In his book The Structure of Scientific Revolutions, Thomas Kuhn said human societies are caught up in what he called "paradigms," or shared "world views" of what people think about themselves and their circumstances.² We humans create such paradigms when our accumulations of social norms and reward processes resist addressing the adequacy of same as times change. We fail to exercise one of the most fundamental opportunities of our being human, the ability to assess our epistemological roots—in other words, to constantly question the basis for our

individual and shared ideas, motivations, and most fundamental attributes of thought and behavior.

We can find abundant proof of this resistance to questioning the shared values of a time or place. For example, bring the subject up in meetings with any university faculty you come in contact with. Far too often, their answer is direct, highly predictable, and drenched in ambiguity. The answer is surely found within the highly focused specialty of the person asked, we are told, and if today's answer is not enough, then all it takes is a bit more time and money.

We must recognize that those we support and depend upon to question and find more effective alternatives to our conventional wisdoms are both the product and perpetuator of that same wisdom. This is, of course consistent with the essence of a paradigm. Within any certain paradigm, there are almost never immediately positive rewards for questions—and answers—that transcend the circumstances of the conventional world views in which those of a certain paradigm see themselves living.

On the other hand, continued high quality (e.g., secure and satisfying) survival from one paradigm to the next, is always the result of appropriately questioning the status quo and its common world view.

Thus, the primary issue here is not about the validity of this or that world view, but how what we know has been developed and tested as a means of providing a clear and accurate picture of our condition, resources, tendencies and options for a secure and satisfying future—however it makes itself known.

And when you do find those rare folks who are willing and able to question the conventional wisdom, without merely substituting one set of idiosyncratic ideas with another, hold on to them. Do so not simply for a new set of possibly more fascinating beliefs, but for the more powerful and potentially accurate view they can help you obtain of what may, and may not, work.

Further, our resistance to questioning fundamental intellectual processes is never more entrenched than when a society is undergoing great fundamental change—such as we are now experiencing.

Regardless, epistemological revolutions occur with surprising frequency. They just take a lot of work—and courage—because of the way individual and social thought processes are developed, maintained, and change.

Nor should we allow ourselves to be confused by our attempts to deny and avoid the great problems of our times. They are right in line with the denial phase Elizabeth Kubler-Ross describes in her book On Death and Dying.³

Consider, for example, how much of our denial behavior is reflected in our great fanaticism with the very distant (cosmology,) the very small (particle physics,) very complex (chaos and fractals,) the very improbable (mysticism in all its forms) and grandly abstract combinations of all four of these and other interests. All the preceding, such as the complex musings of Stephen Hawking, in his book, A Brief History in Time, are unquestionably fascinating. Yet where is the intellectual counterpart to these cosmic ruminations that deal with the changing realities of human social conditions anywhere in the world?

A strong case can be made that these more real and pertinent subjects exist in great abundance and importance to our lives. For example, consider the repeating patterns of behavior found in all systems. Here, patterns in the formation of crystals and river

meanders, evolving physical processes (and not mathematical resemblances such as in fractals) result in ecosystems behaviors and cultures reflecting the processes that shape and form all that everything from primal matter to what thinking creatures like ourselves are and do. From the Serengeti plains of Africa to Wall Street's corporate board rooms, all can have behavior patterns with an ability to fascinate equal to the grandest cosmological construct, and all are far more pertinent to our immediate and future lives.

Where is the discussion of such processes? Where are we building more objective and effective ways for knowing who we are, where we are tending, what our real choices are, and how we can make our choices support out true, sustainable, and satisfying interests?

Regardless of how we play it, our changing world has caught us in an unprecedented epistemological revolution. This is a great transformation each of us can choose to enjoy and participate in, or get trampled by its passing. One clear lesson from our behavior so far: We need to be far more objective, sensitives and accurate in our ways of looking at the way we see ourselves, our problems and our opportunities than we have been to date.

The following will summarize some of the interrelated aspects of an epistemological revolution.

The Context/Action Spectrum

Albert Einstein, greatly concerned about a future he knew would be affected by his ideas, is to have said:

The world that we have made as a result of the level of thinking we have done thus far creates problems which cannot be solved by the same level of thinking in which they were created.

The basic difference between the two levels of thought alluded to by Einstein are simple and straightforward.

They involve the perceptual positions of **context** and **point-of-view**.

Context and point-of-view are necessary (and go a long way toward being sufficient) perceptual complements. Specifically:

- ☞ Context is the necessary perspective required to discover and understand action possibilities related to diverse points of views and options and to ensure actions are appropriate to further one's interests.
- ☞ Context sees the forest as a place that has not only trees, but is a part of the larger place and forces of ecosystems, economies, and the other circumstances in which a tree may grow.
- ☞ Contextual observations are required to ensure one cuts down the right tree and that it is the right thing to do from among all available choices (which can include not using trees at all.)
- ☞ A point of view is the necessary perspective required to take action.
- ☞ A point of view sees the trees in a forest and, based on objectives, provides, for example, a basis for making a decision to cut it down or camp next to it. (A component of action is obtaining information regarding the consequences of recent actions and feeding them back to both Point of view and Context as a continuously iterative process.

- ✍️ In other words, action is the end state of a point of view. A contextual perspective is required to ensure that the point of view/action is appropriate to one's interest.
- ✍️ Further, and critical to understanding context and points-of-view, the only action that can be taken from a contextual perspective is to move to a higher contextual perspective. Any movement toward action abrogates the contextual perspective and shifts the contextual perspective into being a point of view.

In the end, context and point-of-view/action are inescapably linked. The quality of our actions will be dependent upon a broad range of circumstances including both the effectiveness of our contextual perspectives and our ability to learn, test, and improve all aspects of our working information system.

The following will be expanded upon

There are numerous ways to elaborate on all this.

In other words, Education in contexts leads to the ability to assess the relative merit of actions. Appropriate points-of-view plus adequate training leads to effective action. etc.

Energy, Ecology, Economics, and our Lives⁴

The following introduces some critical distinctions required to make sense of our world, what it is, and what it is not. As a result, the words "economics," "energy," and "ecology," have specific meanings we should be aware of.

Energy:

Energy relates to human society in four distinct ways:

- ✍️ Energy is a source of power, characterized by the physical flows and storages, both in nature (see Table 1.) and as a consequence of human activity, which make up the design, construction, operation, wastes, maintenance, and recycling of all the systems. In other words, Table 1. describes many of the ways the ecosystem provides its free subsidies to human needs and activities.
- ✍️ Energy has a critical role when used as an indicator of the distinction between physical, ecological, and cultural (symbolic and abstract) processes. Specifically, those things which can be measured by energy consistent with the First and Second Laws of Thermodynamics belong to the physical/ecological domain. Those things and processes which cannot be measured with thermodynamic measures, again specifically, are abstractions and symbols—the aggregate of which we know as culture.
- ✍️ When used as a measure of physical change and change potential, backed up by the Laws of Thermodynamics, energy provides an **objective** means of measuring systems capability and behavior in physical energy terms. With energy measures, all aspects of a system can be considered within a physical metric highly free of human value distortions. Thus, energy measures provide useful complements to the **subjective** measures provided by economics and other value processes, contributes to reducing "market signal distortions," and improving the "signal quality" of the measurement processes we use to know our world.
- ✍️ Developing an understanding the behavior of all systems and their evolutionary propensity to ascend toward the climax state—or otherwise Knowing how energy processes work, particularly in terms of the accumulated "investments" in energy expenditures required to bring anything to some point in time and space, and when

used as an observable component in the processes of competition and survival in all systems,.

Ecology:

Ecology pertains to the interrelated aspects of natural systems and their processes of competition and evolution, among other things. Relative to human systems, the term ecosystems constitute part of both the recognized and unrecognized physical/ecological assets supporting and influencing the humans condition, tendencies, and options.

Knowledge of ecological processes, which as noted above are tightly bound to the physical-ecological domains, can be seen as inherently objective, even though humans can also hold very subjective values regarding ecological systems, which in the aggregate we know as nature.

Economics:

To a large extent, economists, have become the "official" keeper of the definitions of energy, ecology, and practically everything else in our society.

Economists are dominated by the belief economists that growth in production, consumption, and consequent wealth in human society is a nearly infinite process. The only real limits are human demand and inventiveness. To economists, economic growth is unconstrained by finite resources, including energy, as the primary attribute of progressive societies. Economists tell us that the marketplace, if left to function on its own, devises certain "efficiencies" which resolve resource problems by substitutions, including technological invention, innovation, and the availability of cheap energy.

Unfortunately, while economic analysis is very good at much of what it does, it breeds potential for disaster when it is depended upon to do what it cannot do. Despite the protestations economists are certain to evoke, economic studies must be complemented with analytical tools and procedures which let users see the physical/ecological structure and processes within which human society lives and upon which economic processes depend for their existence and function. These perceptual and analytical tools—which of course includes economics—can be selected on the basis of their appropriateness to meet users needs. In these more complete and accurate analytical processes, objective physical measures of energy storages and flows complement subjective cultural money measures to identify and quantify the circumstances and propensities related to system's structure, behavior, component relationships, and competitive tendencies.

Thus, economic studies address **subjective** human values as set in markets, most often using money as a value indicator. The bounds and limitations of economics are clearly stated by Nobel Laureate economist Paul Samuelson and his colleague William Nordhaus. In their popular college economic text, they provide a definition of economics that most economists would agree with. Their definition involves:

humans choosing;

alternative uses of scarce productive resources;

**in order to produce various
commodities;**

**and distribute them for
consumption;**

now or in the future;

**among various
persons or groups
in society.⁵**

In other words, the central focus of economic analysis is the study of human choice-making—the choice to buy and the choice to sell.

Economics treats the human process of choice-making as the dominant factor in satisfying human wants.

The primary choice-making arena in economic analysis is society and its marketplaces.

To the extent one needs a true understanding of the condition, behavior, and tendency of all systems of interest, the above definition means that economics as it is now known has critical shortcomings:

That which is not open for choice by humans in their society is, by the above definition of economic study, invisible to human concerns. Non-choice factors in the economic process, if not ignored by the study of economics, are only addressed indirectly and with great difficulty.

Economic study is further limited because the dominant arena of choice is the market-place, and the overwhelming tendency of economics to denominate the values placed on choice exclusively in the inherently subjective terms of money.

As Tolstoy was saying in *War and Peace*, and our experience is increasingly showing us, it just doesn't work that way.

Today's uncertainty driven experiences increasingly illustrate the critical need to supplement subjective economic value measures and analysis with objective analytical processes that are based on physical measures, specifically with energy measures which complement the workings of the human economy with the (often free) work of ecosystems. These complementary perceptual/analytical processes will provide more complete indications of systems structure, behavior, and tendencies—particularly where systemic change is influenced by factors which are poorly or not at all reflected in the price/market signal processes tracked by economics.

Complexity

Dynamic complexity in all levels of our lives is a major contributor to uncertainty.

The wonder is that anything works, and in many ways, much about our lives is increasingly not working due to complexity far beyond that known by any society in history. And while the Y2K problem tied to our digital technology is giving us some indication of all that complexity, its reality goes far beyond the circumstances of technology and reaches into all nooks and crannies of our social organization, from politics to health care, and from education to all aspects of our personal, local, and national security.

Thus, there is an immediate need to confront the management of complexity directly, so we can have the affect we want, avoid what we do not want, and make the best use of all resources.

Finally, this incorporation of physical/ecological parameters into our currently economics-dominated understanding of ourselves, as well as more effective management of the complexity in our lives will occur regardless of what conventional economists want, not because it ought to, or because it is ordained from higher authority, but for simple reasons any economist would recognize. A more complete and coherent analytical process provides the user with a better recognition of options and qualified choices. In other words, those who are best able to reduce uncertainty in timely ways will simply be more competitive and satisfied.

The Galileo Syndrome

Today, for all its recognition as a key component in understanding the social enterprise, the institution of economic study is very much like the role played by the central Church in Galileo's time.

The Church, in what can best be called the Galileo Syndrome, said Earth was the center of the universe.

Galileo—basing his argument on observations he was willing and able to share with anyone who looked through his telescope—said “Not so!”

Unfortunately, he was but one man against the power of entrenched institutional perspectives.

Today's equivalent to the central Church and its concept of the universe in Galileo's time are those economists (and this is the great majority of them) who hold that money and markets are the dominant factors in satisfying people's wants regardless of the role nature has to play in people's lives. To these economists, nature imposes its limits only because we bright humans have yet to find a way around them. Once price and market circumstances create sufficient demand, the dominant economic position holds that the limitations imposed by Nature will be overcome.

There are two reasons why it is important to know and address how the study of economics sets up what could be called a contemporary version of the Galileo Syndrome.

While a more involved discussion can be found later in this paper, it should be obvious that all systems compete on the basis of their available information. Those systems, as individuals, families, communities, and nations, who work with the most accurate and timely information will simply have more competitive opportunity than those who are less fortunate. Thus, the issue in dealing with the Galileo Syndrome, as with other circumstances of avoidable perceptual/analytical error has very little to do with right or wrong, and everything to do with what works best to advance our individual and aggregate interests.

There will be a day, hopefully not too far off, when the study of economics will admit its need to be complemented with an understanding of natural processes, resources, and their availability to support human interests

After all, in time, the Church did admit that the grand innovator was right. Unfortunately it took till 1992, some three-hundred and fifty years after Galileo's death, to make that call.

We may not today have all that much time to find the views that best serve our continuing interests

Table 1. Free ecosystem contributions to the economy of a place. (From a list started by Richard Saunier, Regional Programs Office, Organization of American States.)

Goods and Products

Potable water: surface and ground
Industrial water: surface and ground
Irrigation: surface and ground
Lumber and pulpwood: boat hulls
Firewood
Construction materials from wood: posts, beams, shingles, etc.
Ornamental plants: indoor, landscape, dry
Vegetable fibers: rope, cloth
Medicinal plants
Food for human consumption: fruits, chicle, honey, sap, shoots, tubers, seeds, nuts, leaves, bark
Aquatic plants for human consumption: algae, sponges
Food condiments: spices, salt, bicarbonate of soda
Plant chemical substances: dyes, stains, waxes, latex, gums, tannins, syrups, drugs, etc.
Fertilizers: minerals, fishmeal, guano, other dung, etc.
Land and aquatic precious and semiprecious materials, gems, gold and silver, pearls, coral, conchs, mother of pearl
Materials for artisan work: rock, wood for carving, fibers for basket making, etc.
Metallic minerals: bauxite, ores, nuggets, etc.
Non-metallic minerals: asbestos, clays, limestone, etc.
Construction materials: sands, clay, cinders, cement, gravel, rocks, marble, etc.
Mineral nutrients: phosphorus
Mineral dyes and glazes
Hides, leather, skins
Other animal materials: bones, feathers, tusks, teeth, claws, butterflies
Other vegetation materials: seeds, seed pods
Live fish: ornamental, pets
Live animals: pets, for zoos
Live animals for human work
Live animals for research
Fossil fuel: crude oil, natural gas, coal, lignite
Other fuels: peat, other organic matter, dung, biomass, wastes
Livestock forage

Ecosystems design, operations, maintenance, adaptation, and evolution

Nutrient cycling
nutrient storage
nutrient distribution: floods seasonal rains and snow, glaciers, sediment transport, etc.
Photosynthesis-respiration
Adaptation
Self-regulation of plant and animal populations
Competitive testing and design: population control, evolution
Mineral cycling
Habitat for local land, air, and aquatic animals, insects, plants, and other life forms (feeding, breeding, nursery, shelter, transport, education and training, etc.

Non-Tangible Goods and Services

Windbrakes
Shade
Recreational use of water: swimming, boating, diving, skating, sailing, surfing, etc.
Recreational use of land: hiking, spelunking, climbing, gardening, etc.
Recreational use of air: flying, gliding, parachuting, kiting, etc.

Recreational use of animals: sport hunting, sport fishing, insect collections, flower collecting, etc.

Recreational use of ecosystem, sightseeing, tourism, scientific tourism, etc.

Ecological analogs, values, and mythologies

Spiritual development and storage

Historical value

Cultural value

Early warning system: weather and climate change, ecosystem stress by lifeform change, earthquakes

Moisture modification and control

Light modification and control: tree leaves in winter/summer

Ultraviolet and other radiation filtration

Storage of life form adaptive (genetic) information

Non-Monetized Economic Services

Energy sources: wind, solar heat, solar photoelectric, hydro, tides, biomass, geothermal

Transport of contaminants: wind, water, animal consumption

Dilution of contaminants by air and water

Erosion control

Sediment control

Flood control

Ground water recharge

Space for urban, industrial, agricultural occupations, roadways, canals, airports

Waste and contaminant storage

Physical support for structure

Climate control and protection

Disease control and protection

The Forces of Uncertainty: Intellectual Traps, Distortions, and Misdeeds

The following introduces many, but by no means all, of the elements of intellectual dysfunction, distortions, and delusions so prevalent in this time:

- ✂✂ The distortion of contemporary intellectual progress by the dominance of traditional disciplines and reductionist thought processes.
- ✂✂ Distortions caused by knowledge for the sake of knowledge in a subsidized intellectual system;
- ✂✂ In the contemporary intellectual environment, the destructive role of competition and reward processes that function within narrow boundaries with little reference to the larger system and the behavior that enhances long-term, systemic survival and satisfaction;
- ✂✂ The imposition of "values," "ethics," "equality," "free market economies," "science," and other cultural icons without systemic understanding and measurement processes that function to ensure the proper role and use of such concepts;
- ✂✂ The difficulty in avoiding the trap of conventional wisdom (CW) in unconventional times, particularly if the CW has been reinforced with success for a long time, though for reasons that no longer exist as they did;
- ✂✂ The dominant drive (amplified by the disciplinary, reductionist intellectual tradition) to seek differences and distinctions, at the cost of discovering similarities and agreement.
- ✂✂ Our cultural failure to recognize the "fundamental postulates" that apply to all levels of our lives and determine, as Fred Cottrell said in his seminal book, ***Energy and Society***, "Energy determines much of what we can do, what we cannot do, and often what we will do;"⁶
- ✂✂ The insidious effect of secrets in a public, democratic, world—where the need for some secrecy is not denied, but its role in the general public enterprise must be constantly and seriously questioned;
- ✂✂ The disturbing effect of—and lack of alternatives to—a media which sees itself primarily rewarded for describing what is new and different, troubling, and exciting, (mainly for the purpose of increasing exposure to advertising) rather than addressing realities as determined by the above and other circumstances.
- ✂✂ The "Galileo Syndrome," where ideas as "truth proxies" as used by authorities, their supporting cast and public at large, acquire an inertia of their own—and ignores circumstances such as the observed character of nature and its workings;
- ✂✂ the "You just can't look at everything." Syndrome which is used by those who insist on constraining themselves to simplistic world views by denying the existence of dynamic complexity and the availability of tools for managing same;
- ✂✂ The "No one ever told us... Syndrome," where circumstances that were obvious to those who cared and were able to look could not be communicated to those who held center stage with patently vulnerable beliefs, (Eg., refer to mainstream media after events like the Challenger disaster, any energy problem, and most international debacles);
- ✂✂ Both the need for and limits to compromise. Here, compromise is an essential social mechanism for resolving differences in point of view. However, there is no way to compromise in terms of the physical/ecological forces driving our lives. Its difficult enough simply knowing these forces and their effect over time. Once having such

knowledge, its just plain silly to ignore it in attempts to satisfy human whim—no matter how entrenched and self-important it seems;

- ✂✂ The anthropomorphic spin—that human will drives the universe, and not Nature. See the last forty pages of Tolstoy's War and Peace ;
- ✂✂ The debilitating limitations of the study of economics in terms of what it can do (which is substantial) and cannot do, (which is critical) and its associated limits, distortions, confusions and destructive influences on our lives;)7
- ✂✂ The persistent failure to appreciate and enjoy the benefits of understanding the laws of thermodynamics and the associated aspects of systems behavior--such as the so-called "emission free," environmental requirements to meet the California 1998 automobile emission standards;
- ✂✂ Cause- and advocacy-driven activities that take on lives of their own, constantly seeking funding and increasingly focusing on confusing concepts of trivialization, reification, relational confusion, denial, etc., as a way of maintaining support.
- ✂✂ The semantic, rhetorical, and technological traps and distortions in "buzz" words, concepts, and dysfunctional political/cultural icons. Examples of such troublesome mind-traps are:
 - ? ? Economic growth in perpetuity (a physical impossibility catered to by the term "sustainability")
 - ? ? Sustainability (See McKibben, *The New York Times*, April 10, 1996) Nothing is sustainable, and are we really sure we would want it to be so?
 - ? ? Save Energy (you can't, its already saved by the First Law of Thermodynamics . The most fundamental fact of energy is that we use it. Use it well and we do well. Use it poorly and do likewise.)
 - ? ? Save the Environment (As American comedian George Carlin says, What a silly idea.) The environment was here before us and will be here after us. The big question could be: How long will the environment let us humans hang around. A better question is: What can we do to extract the greatest environmental benefit for all our interests, in as much perpetuity as we are allowed?
 - ? ? Nature as objects like cute furry critters, majestic whales, etc. (Fine for selling membership in the Sierra Club. Disastrous if you want to know how to live within and enjoy the full benefits of what nature has to offer.)
 - ? ? Promote or save diversity (Diversity is a process consequence of natural and human systems behavior. Addressing diversity directly by "saving things" (trees, animals, exotic places, etc) reifies the process and ensures nothing will be done about the forces wrecking not simply diversity, but peoples lives wherever this happens.) (Its like trying to steer a ship by manipulating the bubbles in its wake.)
- ✂✂ Supply side economics (I don't know what they mean.)
- ✂✂ Ecological economics (This makes the ecosystem subservient to the economy, a fundamentally backward idea.)
- ✂✂ Foreign Affairs (promotes **Us** vs **Them** at the expense of **We**. This sets people in different nations as adversaries first and as cooperating entities last, and gets in the way of finding the best course for determining mutual advantage and genuine threats.)
- ✂✂ Information and data as defined by the information sciences. (The reality of information is that it organizes energy, matter, and other information. Data is

abstract symbol elements we use to build the information we use—in one way or another.)

- ✂✂Tolerance (Sets up the potential for highly controlling tolerer/toleree relationship, rather than an objective pursuit of constructive diversity.)
- ✂✂Nature as good or bad (Like where a hurricane follows a path over a predictable area, with predictable force, and people are surprised when it runs them over and damages their interests.)
- ✂✂Helping without empowering (As the U.S. did and does with most of its "foreign assistance" programs
- ✂✂Good and bad, right and wrong, etc. (Far too often such categorization gets in the way of working out what we have to know and do to get the job done.)
- ✂✂Etc.

Conspiracies of Ignorance

Little in the above is really new. For example, almost a century ago, Homer Lea, a very experienced and successful military strategist was saying to the world:

No state is ever destroyed except through those avertable conditions that mankind dreads to contemplate. Yet nations prefer to perish rather than master the single lesson taught by the washing away of those that have gone before them. In their indifference, and in the valor of ignorance, they depart, together with their monuments and their constitutions.⁸

We should pay close attention to the word "ignorance." Notice how the first part of the word states "**ignore**," while, "**ance**," the second part to the word, attaches action. Thus, ignorance can be interpreted not simply as not knowing, but as the action of ignoring. In other words, ignorance can be seen as the process of ignoring; both in the world addressed by Lea, or the one we know today.

One human tendency stands out in a review of circumstances leading to our greatest human disasters—and human relationships to natural disasters. Virtually no one wanted to know that their pet ideas and initiatives were not very likely to work, and in many cases were to cause more harm than good (if for no other reason than that the projects wasted scarce resources and lost time).

Thus **ignore-ance** is a far more appropriate use of the word to describe the ways we see and want to work with our circumstances. And "valor" even when used sarcastically, is no where to be found.

This ignor-ance is perpetuated by often aggressively cunning people who, while wrapping themselves in the cloak of good intentions, live by reaction to a world that is changing faster than they are ready or willing to recognize and accept. In this world, we can easily characterize this ignorance as a disease, symptomized by those whose understanding is formed and perpetuated within a frame of reference of their own making. They have little interest, capability, or reward in knowing probable tendencies and alternative possibilities.

As for conspiracies...

To some, the word means the conniving collusion of secret colleagues. Through deceit and deception, shrewd individuals and organizations conspire to obtain their

objectives with grand schemes, fraught with dark and tangled webs of intrigue, of cunning plot and counter-plot, all wrapped in the enigmatic trappings of great secrecy.

To others, conspiracies are simply the illusory workings of their fearful imaginations, where they and the world are subject to the intentional acts of maliciously clever men and women. For the most part, such conspirators remain faceless, though often tagged with cryptic names, which serve more to amplify our uncertainties than to shed light on who they are and the nature of their intentions.

Certainly there are real conspiracies. Again and again across the grand panorama of human behavior, individuals have come together for the purpose of planning and acting in ways intended to meet their ends which though beneficial to their own interests, are unknown and may or may not be detrimental to the interests of society at large (or small.) That intentional conspiracy, real as it may be, is not the immediate subject of what is written here.

The fact is that few are capable of great evil. It is a calling of a nature that is much outside of our lives. A far greater evil is where there is broad and aggressive participation in creating and maintaining mythologies that conflict with the realities of our world.

Coupling the idea of conspiracy with the idea of ignorance at first seems like an oxymoron, a combination of contradictions. Ignorance implies freedom from the essence of conspiracy. In the ignorant we expect to find simplicity and no sign of the intentional sin, moral rightness, and lack of guile so often associated with conspiracy.

And yet the idea of ignorant conspirators is valid.

It is where people work together in a world they define within their own frames of reference.

In our ignorant conspiracies we find a combining and working together of events precipitated by the interests of specific actors. There are seldom intentionally evil actions, only a continuing collection of mostly small unconnected and innocent activities. The problems arise because these activities are not taken in isolation. And while the separate acts may seem simple, they in fact combine with other actions, interrelated across many domains of place and time and become components of greatly complex processes. The confluence of events means that what appears to be the small, the unconnected, and the innocent are forced by the circumstances of the real world of which they are a part, to become connected and interact in accord with a far larger scheme of things. In this larger world, the "scheme" is not some intentional process, but the aggregate workings of human and natural systems, pushed and pulled by events and circumstances far beyond the conceptual horizons of the original actors.

The tragedy is this: through our use of the best of our wisdom, energy, and intentions, we conspire through our willful innocence to continue in the no longer appropriate world view and ways of the recent past.

The Propensities of Progress: Competition, Quality, and Succession

Ecological succession is defined as Nature's tenacious propensity toward what is called a **climax** state. Over the past century, a ubiquitous and constantly repeating lesson of succession emerges—inviting us to know what our world and our lives are really all about.⁹

The persistent and pervasive lessons to be taken from the concept of ecological succession include the following:

- ✂✂ Nature is composed of systems, interacting aggregates of things and actions comprising a complex and dynamic whole involving the entire spectrum of existence.
- ✂✂ Over time, through common modes of behavior, regardless of where they are found, all systems have tended to behave in ways that result in what is called succession.
- ✂✂ Succession is a natural process of change with an inherent propensity to ascend toward a state called **climax**.¹⁰

The dominant characteristics of the climax state represent nature's expression of what in human terms would be called excellence. These characteristics are:

- ✂✂ most, if not all, available resources are recognized and well used;
- ✂✂ waste is minimized;
- ✂✂ connections between components, within the limits of available resources, are complex, dynamic, and (as systems ascend in successional stages) increase in mutual opportunity and benefits to the larger system first and then to components;
- ✂✂ there is a propensity to build storages of required consumables including required information, so an inherent systemic capability is to be able to bridge times of extraordinary stress and circumstances;
- ✂✂ competition becomes less between components of the system and more a mutual development of the system's capabilities to persist in ways that make the best use of all available resources;
- ✂✂ as systems go to higher levels of succession, the exploitation modes of behavior common to early, resource-rich succession shifts to working out mutual advantages and cooperation;
- ✂✂ ascending succession, within the limits of available resources, involves increasingly substantial investments in complex, dynamic systemic capabilities, such as increasing the symbiotic fit between components, increasing expenditures for maintenance rather than in growth and replacement;
- ✂✂ fundamental behavioral patterns in ascending succession systems favor constant learning, testing, and improvement, (the essential elements of Quality as set out by management guru W. Edwards Deming.);
- ✂✂ ascending climax expression, from the subtle colors of desert lithops to a parrot's feathers—and sounds, from the squeal of whales, the roar of lions, and the songs of birds, Beethoven's Ninth Symphony, all tell a story of who, where, how, and—for those of us who care to look—why;
- ✂✂ the diversity of surviving ecosystems are not so much differences as reflections of the many ways needed to get the job of living done in different places. In other words, the constant and evolving consequence of similar patterns of behavior which repeat over and over in every nook and cranny of our universe.
- ✂✂ Diversity in all systems is tied to availability of alternatives. In the human system diversity also means choice. The greater the diversity of components and actors, the greater the range of choices a people have to bring survivability and satisfaction to their lives (and this means as free participants, not as slaves in any form, economic or otherwise, or the holding of creatures in zoos or their cultural equivalent, such as where diversity is promoted for the sake of diversity alone.);

- ✂ In the progress systems make toward the climax state of succession, diversity is rewarded because it brings a multitude of possibilities for high quality survival;
- ✂ by knowing the way nature rewards not just the tolerance for diversity, but the active pursuit of differences as a means of strengthening the capacity of the total system in all dimensions, we learn of the critical importance of appreciating, promoting, and enjoying both the differences and the similarities between all of us;
- ✂ the successional process of building towards climax accumulates a value we can identify as quality. This idea of quality has very little, if anything, to do with good or bad, and everything to do with the diverse quantity of alternatives—constantly learning, being tested, and improved upon—available to physical, ecological, and cultural systems¹¹
- ✂ natural systems succession, wherever, whenever, and whatever it may be, has a universal and unrelenting propensity to ascend toward the climax state.
- ✂ The only systems capable of what can be called retrograde succession, of going against the ascending propensity of systems toward climax, are those guided by human behavior. Only humans, with their ability to suspend physical-ecological reality via their culture and its abstractions, often tend to behave in ways that are contrary to natural systems succession, e.g., toward a less complex, less diverse, less self-supporting, less dynamic, less tolerant, less powerful, less interesting, more demanding of maintenance investments, and lower potential state of being.
- ✂ In other words, humans take climax ecosystems and turn them into parking lots, while nature takes parking lots—and in time—turns them back into climax systems.
- ✂ (An extraordinary series of pictures, The Changing City and The Changing Countryside, by Jorg Muller, (Atheneum, New York, 1976) graphically demonstrates the systemic retrograde tendency of human behavior. These pictures show in a series of a city and country scenes created about three years apart between 1953 and 1973, shows how, over a twenty-four year period, near-climax human systems went in a de-evolutionary direction away from a climax state. After seeing these pictures, and nudged by the memory of military violence in Yugoslavia, Chechnya, Africa, and many other arenas of modern trauma, one wonders what the next twenty-four years will bring.
- ✂ A fundamental attribute of human culture is our ability to abstract and symbolize. This means that we can (and many will) hold that none of the above is true or relevant to our lives—and some will do otherwise.

Tropical rain forests are a popular example of where successional systems reach climax, yet there are many others: coral reefs, grass prairies, tundra, and any other community that has functioned for an appropriate length of time. In many places, one only has to look in their back yard, in the nearest park, and though less often than it used to be—in their local community.

Many people are surprised to discover that succession also works throughout the entire human domain of the planet's systems in much the same way it does in the natural system. We can see the analogs of natural systems succession, from weed stage to climax, in all aspects of our culture. It is most apparent in the way we fit in the countryside, the evolution of our cities, and in the changing patterns of all our institutions.

We should also recognize that the reference to weeds should not be considered as a value judgment. It is a definition of where the plants we call weeds are found in the

ascending processes of succession. In that process, weeds are the colonizing plants you find in the early stages of succession, such as when you just clear cut a forest, bulldozed off the land, and the ecosystem starts the long process of rebuilding the place. The weed stage is characterized by low diversity, high resource flow-through with little efficiency, uncomplex relationships, dog-eat-dog competition, and replacement of components rather than maintenance. Weeds are there because they work best at that stage in the development of a place. What we call weeds tie down the soil, keeping it from washing away and set the stage for the next level of succession.

Following the weed stage in ecological succession, and depending on environmental circumstances like moisture availability, temperature, nutrients, consumers and predators, sunlight, etc., there is a very well defined evolving pattern of life forms. The process is the same for all natural systems, from coral reef to prairies. The inescapable lesson of all this successional progression (we can also call it progress) is that natural systems all go through similar processes of ascending succession, no matter where they are found.

While there may be reversals in the inevitable tendency towards higher levels of climax, such as those caused by catastrophic, high stress events like drought, landslide, storms, earthquake, volcanic events, etc., the instant the stress is over, all natural systems continue their ascending successional processes to what ever level they are able to reach with their immediate circumstances. This includes incorporating into the process, any new resources that emerged as a result of the catastrophe itself.

The fascinating thing about natural systems succession is the propensity of all such systems to ascend to the highest possible levels of succession attainable within the resource/environmental circumstances of a place, wherever they are.

As noted above however, there is one exception to the tendencies of natural systems.

Human actions (never forgetting that we too, are part of nature,) for the time we are able to tap and use concentrated but limited resources, can result in tendencies which (for a while, until supporting resources are expended) are just the opposite of natural systems succession. This is an almost guaranteed result of the human ability to think and exercise our conventional wisdom, whim, belief, human styles, idiosyncrasies, and short-term "bottom lines." We demonstrate in the multitudes of the things we do—particularly those things we blindly justify as "economic growth"—a strong and persistent tendency to go in ways that lead to the opposite of the climax state.

In other words, in natural systems, succession ascends from the early weed stage toward a climax ecosystem as it can express itself in a given place and time. Humans, who with their abstract knowledge, are able to discover and use new (though limited) resources, begin by replacing their cultural equivalents of the climax state—and drive their systems toward the weed stage. This is the dominant lesson of our commercial strips, most residential or commercial development, shopping malls, and theme parks.

Even more simply, nature begins with weeds and makes oak trees. Humans, to the extent they have abundant available resources, tend to demonstrate retrograde succession. It is very often the human tendency to take a place like a climax oak system and turn it into weeds—or worse, parking lots (though only as long as they have the surplus resources to do so.)

All this brings us to several so-called "bottom lines" worth noting here.

The first bottom line is that our human propensity for retrograde succession only lasts as long as we have the physical power and other resources to support our will. When the concentrated physical power and resources (while not denying human genius, are always obtained from nature) are used up, nature takes over once again and starts its inevitable ascending succession toward its own form of the climax state.

The second bottom line is that human retrograde succession is completely consistent with nature's tendencies. The essence of the human condition is one of choice. We humans, of all the creatures on the planet, can choose among all the alternatives available to us. In fact, we can even choose alternatives that are not available to us, such as where our economic system and the wonderful financial machinations of investments, interest, and credit create (as has happened increasingly over the past several decades, the illusion of being able to do things without having the physical-ecological resources to back up our actions.

Thus, its possible that one of our roles in nature is to explore the wonderful things we are able to do because of our unique ability to abstract, symbolize, and make choices, particularly in our use of natures bounty.

However, coupled with this incredible human capacity to do things is also a unique need for responsibility and an associated capacity to make fools of ourselves. This is not a trivial circumstance. At our most foolish, we are accelerating the consequences of our actions in the larger scheme of things—and in so doing, we set up the circumstances that can select ourselves out of the systems in which we live.

Its like nature says: "Do things that work well for the system and prosper in perpetuity. Do things that work poorly or destructively for the system and you simply leave the scene—probably as you least expected."

This is no accidental or unknown process. It has to do with the regulatory processes that emerge to guide all systems behavior. High resource availability systems are prone to build highly positive feedback control mechanisms that amplify destructive behavior. In these systems, it is the exception in which people are able to step out (to the higher level of perception) of their day-to-day lives and see the real tendency of their actions. A subtle hint of all this may come from the evolved commonalities of the Sisserou parrot on the Island of Dominica, the Bird of Paradise in Papua New Guinea, and a compact disk (CD-ROM.) The surface of each has an iridescent shimmer caused by light interacting with reinforcing patterns of translucent materials. The iridescence, while telling nothing about the story or song the "packages" contain, suggests something far more than ordinary fare. Each of these "packages" represents a long history of things being done and done well—for if that had not been the case, the "packages" and their contents would simply not exist.

Determinancy

Across the spectrum of culture, from the sciences to the far reaches of belief and religion, there are almost as many concepts of determining factors related to human circumstances as there are humans themselves.

In fact, the single most important element in any inquiry into determinancy is that each of us faces the issue as individuals and in our own way, whether we face such concerns alone, or in the shelter of multitudes and grand institutions.

It is interesting to note that the idea of determinancy is abhorrent to a large part of our intellectual community. Of course, most of these people are also masssively

ignorant of any real understanding of the guiding circumstances of all systems, which may begin with thermodynamics? but includes and goes far beyond? the way gravity works to determine how we will be stuck to the surface of this planet.

The True Limits

As we learn more about environmental systems behavior, we will discover that it is the height of arrogance to think that we could destroy our planet—or the environment. What we are wrecking is the ability of the planet and the environment to support ourselves and our interests. Whatever way it turns out, the planet and the environment will continue long after we and all we have done are recycled back into the energy/matter/information pool that will become the next act of the universe in which we live.

It should also be noted that while the main implication of successional propensities in our universe, including human society, is a high, if not ultimate level of non-linear determinacy. This is substantially different from “Cartesian” form of railroad-track determinacy suggested by predominantly linear, cause/effect relationships.

The processes of succession, in physical/ecological systems, no matter where they are, is only one part of the story nature has to tell us. This is a story that reaches into every part of our lives and the world we live in. This story particularly includes the way we define ourselves through our many forms of expression—for it is only from what we know about ourselves and our circumstances that we guide ourselves toward future promise.

Systems Accounting

When Thomas Kuhn was describing what he called “paradigm shifts,” he missed one that greatly affects our interests today.

Sometime around the year 1494, a self-promoting, opportunistic, Italian semi-friar, and friend of Leonardo Da Vinci named Lucca Pacioli, took a collection of ideas, put them down in an organized manner, and caused a quiet revolution. The result was the first written description of double-entry monetary bookkeeping.¹²

The revolution was in accounting, an important matter to the trade and commerce of the day—and ever since. With double-entry (monetary) bookkeeping, you have a better idea of profit and loss, could cut your deals closer, and be more competitive in the market.

Herbert J. Muller, in his book The Uses of the Past, said Fra Pacioli's double entry treatise on accounting “probably had more influence on human life than has Dante or Michelangelo.”¹³

However, events are making the case that Fra Pacioli only discovered half of the accounting equation. In addition to accounting for debits and credits in the symbols and abstractions we call money, we must complement these measures with those of the physical and ecological things and behavior in our world. While accountants do call for physical inventories, what is needed must go far beyond simply counting widgets. In addition to accounting in monetary values, it's time to account in terms of physical capacities. This means considering, along with our monetary accounts, the debits and

credits of diverse chains of embodied energy that are used—with and without human will—as we move about in our diverse and complex world.

Calling the complementary blend of money and energy accounting double-double-entry accounting may be too much, but it is in the right direction. We can also be sure that as the idea becomes clear enough, a name will be found for it.

We should also be warned that as we find a name for this more effective process of accounting, we also begin the cultural tendency to reify the concept, to turn the process of full system accounting into a thing—which we will treat as we do all things—simply throw them away when they are inconvenient or no longer fit our immediate needs.¹⁴

Competition

The title of this paper is: *The Epistemological Revolution: Competitive strategies and tactics in a time of ignorant conspiracies*. In the preceding pages, some of the changes in our lives are described, along with how we can enhance and expand the choices our culture can deliver.

Competition was only mentioned as a part of something else.

We tend to have a very narrow view of competition, one of opposition and combativeness—most often limited to winners or losers.

Seldom do we see the issue of competition discussed in a larger framework than that

There is a larger view.

Thomas Jefferson said two things which relate to how we should address the issues raised here. First he said:

I know of no safe depository of the ultimate powers of society but the people themselves; and if we think them not enlightened enough to exercise their control with a wholesome discretion, the remedy is not to take it from them, but to inform their discretion.

Jefferson also said:

Eternal vigilance is the cost of freedom.

In other words, the success of the democratic process reflects the existence of a distributed intelligence—and there are many things that can act to destroy the ability to gain and build that intelligence, keep it current, and maintain the aggressive vigor needed to address changing times.

From an ecosystems perspective, competition is the fundamental process leading to and resulting in not only survival, but the constantly ascending process that leads to ecological climax—and this includes the competition of ideas as well as other domains of existence.

Further, an inherent element of survival is quality—consisting of the knowledge of and ability to know and act on real alternatives, which in human systems become choices. For humans, the more known choices, the higher the quality and the greater the survivability of the system and its diverse components. This is the "bottom line" lesson of understanding ecosystems—they teach us about real competition, and demonstrate the competitive process at work by the examples of rain forests, prairies, tundra, coral reefs, and even our own parks and back yards. In the workings of ecosystems in any place we can discover the excellence of things done well. Ecosystems competition is not the simple win/loss competition of politicians, business people, or

sports, but the persistent tendency of dynamic systems to evolve in ways that constantly make better use of all available resources. Thus, the example of ecosystems and their competitive behavior can provide human participants in their great enterprise called life and living with more real and satisfying understanding of the processes and consequences of competition as an evolutionary process than ever before.

Behavior, Change, and Motivation

Billions of dollars and enormous effort has been expended for many diverse purposes to motivate people's behavior in addressing change. For example, since the early 1980s, the U.S. Department of Energy (as of 1994) managed the expenditure of some \$5.2 Billion dollars to promote energy efficiency through state energy offices. This includes some \$350 Million spent on energy education curriculum.

Today, the U.S. public is little more informed of the impact of energy on their lives than they were in the early 1970s, when the then so-called "energy crisis" was making itself known.

Very little of this great, well financed program worked as intended. These efforts at assistance, while often beneficial to those directly involved in and paid by the "aid" process itself, seldom advanced the interests of either donors or recipients, and very often produced results counter to intentions.

These programs to promote energy efficiency advocated direct action. "Lets get to the bottom line." said their operatives. They said efforts to really understand the full circumstances of energy (and the environment) as they related to people's lives were a waste of time and money, particularly when it was clear what we had to do to simply save energy. There was no need to really understand the problem, work with the public, and then build the understanding that would drive their motivation.

And that was where this massive, expensive, and important enterprise failed.

In a world saturated with advertising, advocacy, and promotion, our personal interests have become far more resistant to such urgings than most believe. When someone tells us there is something we should do, such advocacy, regardless of how needed and well-intentioned it may be, triggers highly tuned defense mechanisms that work to shield us from the great flood of influence that barrages our sensibilities practically every minute of the day.

The sad part of this failure is that energy efficiency really does deliver high returns on investment at personal, community, and national levels.

In their rush to initiate "energy conservation" programs, and the great conceptual and institutional inertia that accompanied the development and funding of all those programs, the role of energy in peoples lives was essentially trivialized and confused.¹⁵

The real "bottom line" of energy efficiency, and this must include all resources and the environment as well, is that we need to become far better users of these bounties of nature than we have been so far.

The key to changing behavior so we are most likely to know opportunities and avoid problems is simply what it always has been—motivation by an appeal to self interest.

There is however, if our intent is to advance both the interests of the individual **and** society in which the individual lives, a critical caveat.

Self interest, for ourselves and others, must be defined by larger circumstances in time and relationship than simply appealing to our next choice in the immediate marketplace.

What is needed is to go beyond the immediate in action and circumstance. This means we should learn as well as possible, the full range of factors influencing our lives. Of course it means knowing our choices in the marketplace.

It also means knowing much more as well. In order to prosper and survive in the changing time now affecting our lives, we need to create a working world view, a accurate context, as noted above, in which we can see beyond aspects of available markets and immediate forces.

This means knowing the larger physical, ecological, and cultural circumstances that affect not only our immediate lives, but the lives of others who, while they may seem remote, are actually very closely tied to our interests across space and time.

Of course it is difficult to do. Building an appropriate context for knowing opportunity, avoiding problems, and managing the uncertainties is never easy—at least in the beginning.

However, once started, the process becomes actually self-motivating. The confidence that comes from knowing that you have done the very best to identify and make the best choices in your life can be almost addictive, even when your choices result in less than you expected. Even when disaster strikes—because no degree of knowledge is absolute protection against everything—such knowing becomes a powerful bulwark to fear, and makes it much easier to take the first steps toward recovery.

The questions then becomes, how is it possible to motivate people to know more than they do (or often want to know) about their lives, tendencies, and choices.

The answer may come to us from as far afield as the Greek classic plays. In his book, **The Comedy of Survival**, author Joseph Meeker tells us of the functions comedy and tragedy held in the classic plays.¹⁶ Speaking from the high ground of classical literature Meeker tells us of the distinctions between comedy and tragedy. He says comedy results from perspectives of context and overview, being above the situation being observed, and looking for the possibilities. Tragedy is living totally within one's circumstances or point of view, with no context for viewing one's self and surroundings.

In world of classical literature, the comic may or not be funny, but is constantly aware of the possibilities. The tragic figure may be hilarious, but it is a dreadful hilarity of consequence without reflection or overview, and with no perspective for knowing possibilities other than those of one's continuing predicament.

In the context of Meeker's Comedy, we can find motivation by looking for the possibilities.

The perspective used here is similar to the way improved radar, aircraft, and satellites allow us to gain a better perspective on the size, power and direction of hurricanes. This perspective also applies to new ways of seeing the worlds within and around us, including the problems and opportunities we are able to entertain because we are open to the possibilities. While it is true we must constantly look out for the band clouds of future storms, we must be equally on the lookout for alternatives that give us more choice in what ever future we obtain.

While little of what we see of the future may be humorous, the perspective being offered suggests the future can be more survivalworthy, secure, and satisfying—which is, after all, the prerequisite for genuine humor, and more—the satisfaction that comes with knowing you have done the best possible job of living with what was available and known.

The ultimate human choice—a choice to make or not make—is to manage our

lives in ways that know and take competitive advantage of these tendencies. This will become increasingly possible as we discover those absolute rules — recognizing that the constitution of nature is superior to the constitutions of man—and that our lives work best when the two are as one.

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 - 2 Kuhn, Thomas S., The Structure of Scientific Revolutions, 2nd Edition, University of Chicago Press, 1970.
 - 3 Elizabeth Kubler-Ross, On Death and Dying, Simon and Schuster
 - 4 This section is expanded upon in a companion paper **Basic TIMES**, that sets out a working cosmology for establishing a minimum description of the essential elements of the universe we live in.
 - 5 The actual phrase is: "Economics is the study of how people and society choose to employ scarce resources that could have alternative uses in order to produce various commodities and distribute them for consumption, now or in the future, among various persons and groups in society." Samuelson and Nordhaus, Economics, Twelfth Edition, McGraw-Hill, 1985
 - 6 Fredrick Cottrell, Energy and Society, McGraw-Hill, 1953.
 - 7 Like what someone once said about how economics is like a Bikini bathing suit: what it reveals is suggestive, and what it hides is vital.
 - 8 Homer Lea, The Valor of Ignorance, 1902
 - 9 There is a rich body of science describing the successional aspect of ecosystems behavior. Much of this science, strongly linked to the work of Boltzman, A.J. Lotka, Ilya Prigogine, H.T. Odum, and Robert Ulanowicz is now being reduced to very fundamental principles which are seen to function over practically the entire range of natural and human systems.
 - 10 I am indebted to Robert Ulanowicz at the University of Maryland for introducing me to the terms "propensity" and "ascendency" and their extended implications in relation to ecological succession and evolution.
 - 11 This is somewhat like the idea of "quality" Thomas Pirsig was defining in his book Zen and Art of Motorcycle Maintenance and is directly related to the idea of "quality" as used in W. Edwards Deming's concept of Total Quality Management.
 - 12 Luca Pacioli's treatise on double-entry bookkeeping is from Part I in Distinctio nona, Tractatus XI of Summa de Arithmetica, Geometrica, Proportioni et Proportionilite, published in Venice on November 10, 1494. (E. C. Bursk, et al, The World of Business, Harvard Business School, Vol. 1, Simon and Schuster, New York, 1962.)
 - 13 Herbert J. Muller, The Uses of the Past, Oxford University Press, 1957.
 - 14 A very good demonstration of this tendency to reify dynamic concepts can be seen in the history of the idea of "net energy." Before the net energy concept was fully explained, advocates for one form of the future or another was claiming that the concept supported their position. Once it was discovered this was not true, that net energy analysis was only a way of knowing the relative merit of energy technologies, interest in the subject virtually disappeared.
 - 15 Pervasive examples of this trivializing and confusion were often seen in the way alternative and renewable energies were stressed—to a public essentially addicted to great flows of highly concentrated energy supplies. There is no way those very low yield alternative energy sources could substitute for the main energies that power modern society. To suggest otherwise was at least silly, if not downright irresponsible.
 - 16 The Comedy of Survival, Studies in Literary Ecology, Joseph W. Meeker, Charles Scribner's and Sons, New York, 1972.