The role of sociocybernetics in understanding world futures

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Abstract

Purpose – The purpose of this paper is to set out some ideas about how sociocybernetics can contribute to understanding possible world futures. A central concept in cybernetics is “governance”, the art of steersmanship. As conceived by Ashby, Beer and others, this art is concerned with the management of variety. How do we face the challenge of managing all the variety that makes up “possible world futures”?

Design/methodology/approach – The paper uses the distinction between first and second order cybernetics as a way of bringing order to the wide variety of disciplinary studies that are relevant for the understanding of possible world futures.

Findings – Sociocybernetics is concerned with applying theories and methods from cybernetics and the systems sciences to the social sciences by offering concepts and tools for addressing problems holistically and globally. With its distinction between first order studies of observed systems and the second order study of observing systems, sociocybernetics provides a unifying epistemological and methodological conceptual framework. Within this framework, sociocybernetics accommodates a wealth of specialisms in the social sciences, ranging, for example, from the drivers and effects of technological development to sustainability to justice. The shared framework facilitates communication between social science specialisms and also between the social sciences, the natural sciences and the applied, technological sciences.

Originality/value – The paper will be of interest to anyone keen to see how ideas from cybernetics and the systems sciences can facilitate interdisciplinary approaches to the understanding of complex social systems.

Keywords Sociocybernetics, Cybernetics, Social systems

Paper type Conceptual paper

Introduction

Sociocybernetics is concerned with applying theories and methods from cybernetics and the systems sciences to the social sciences by offering concepts and tools for addressing problems holistically and globally.

Cybernetics is a transdiscipline (Latin trans – across) that abstracts from the many domains it adumbrates, models of great generality. Such models serve several purposes: they bring order to the complex relations between disciplines; they provide
useful tools for ordering the complexity within disciplines; they provide a lingua franca for inter-disciplinary communication; they may also serve as powerful pedagogic and cultural tools for the transmission of key insights and understandings to succeeding generations. However, as noted by Wallerstein (1997), past president of the International Sociological Association, if a transdisciplinary approach is to make a real contribution in the natural and social sciences, it must be more than a list of similitudes. It must also be epistemologically sophisticated and well-grounded. Cybernetics, with its explicit distinction between first and second order forms, can claim, not only to satisfy this criterion, but also to be making significant contributions to epistemological debates.

One of the founding predications of the cybernetics and systems movement (for expository convenience I package these together, although I am well aware of the ongoing debates about overlaps, similarities and differences between cybernetics and systems theory) is that systemic problems need to be addressed holistically (Beer, 1967). For sociocybernetics, this means addressing human system issues holistically within the context of varied ecological and, indeed, cosmological settings.

With its distinction between first order studies of observed systems and the second order study of observing systems, sociocybernetics provides a unifying epistemological and methodological conceptual framework. Within this framework, sociocybernetics accommodates a wealth of specialisms within the social sciences, ranging, for example, from the drivers for and effects of technological development to sustainability to justice. The shared framework facilitates communication between social science specialisms and also between the social sciences, the natural sciences and the applied, technological sciences.

This paper sets out some ideas about how sociocybernetics can contribute to understanding possible world futures. A central concept in cybernetics is “governance”, the art of steersmanship. As conceived by Ashby, Beer and others, this art is concerned with the management of variety. How do we face the challenge of managing all the variety that makes up “possible world futures”?

The distinction between first and second order studies makes clear there are two levels to this challenge, the variety and complexity of:

1. first order observed systems; and
2. second order systems, of interactions between observing systems.

Already, the distinction between the two levels has reduced variety. A key thesis of this paper is that both levels have to be addressed. Attempting to understand possible world futures with studies at level (1) only omits the challenge of bringing about change through social action. Using level (2) studies to address the challenge of bringing about change through social action can only be fruitful insofar as relevant models and data are available from level (1) studies. The paper briefly overviews what some current level (1) models and data are telling us about possible world futures. The paper also briefly overviews what some current level (2) models and data are telling us about possible world futures. The paper goes on to outline ways in which sociocybernetics can address the problems thus summarised. In particular, given some consensus about what level (1) models and data are revealing to us about possible world futures, what needs to be done to address the level (2) problems such that the identified level (1) problems can be addressed?
Being holistic about global problems
I discussed the question of what it means to be holistic about global problems in Scott (2002). I quote:

With respect to the need to be both holistic and global, Luhmann (1989) very clearly warns of two dangers:

(1) failure to “resonate” with the ecosystem (not being global enough in our concerns); and
(2) [...] too much resonance between social systems (not being holistic enough to dampen unfruitful noise and “excitement”).

Examples of (i) are many: being parochial with respect to one’s own ecological niche; focussing on one issue (e.g., “global warming” or “poverty”) but not taking cognisance of related issues (e.g., “opportunities for education” or “political freedoms”). Examples of (ii) are also many: the promotion of one scientific discipline over another; the promotion of one political ideology over another.

(However,) “being holistic” lacks meaning for an individual if the implied theoretical ideal lacks a praxis; the concept lacks consensual meaning if the praxis is not in some sense one that sociocyberneticians, as actors, may agree to apply together, in concert. In systemic terms, actualising holism requires a “nucleation”, a cognitive/affective centre around which the many facets and levels of our concerns may cohere and coalesce as insight and intuition. Where is such a universal “centre” to be found? I argue that it is precisely the perceived need for a holistic “centring” that is the “centre” or, rather, may serve as such a centre if we so choose. That is, as practitioners it is sufficient to intend to be holistic – and to share that intent – in order for ideas to be created fruitfully.

Sociocybernetics offers guiding principles that bear on the question of how a community of observers can establish and maintain consensus, including:

• Ashby’s law of requisite variety: only variety can control variety.
• Scott’s principles of observation: there is always a bigger picture; there is always another level of detail; there is always another perspective.
• von Foerster’s ethical imperative: act to maximise the alternatives.
• von Foerster’s corollary to his ethical imperative: A is better-off when B is better-off.

I am aware of very few examples where natural and social scientists are working together. One I came across was a workshop on human interactions with the carbon cycle. I quote from the summary:

The carbon cycle has recently become interesting to policy makers because human activities that release carbon-containing greenhouse gases are the primary source of the threat of global warming. In the United States, the carbon cycle has become a major element of global change research, although so far this effort has not yet integrated the relevant fields of the social and behavioral sciences. This report summarizes a November, 2001 workshop at the National Research Council intended to improve communication between the relevant research communities in the natural and social sciences, leading eventually to an expansion of the carbon cycle program element in directions that would better integrate the two domains.

The workshop focused on a small number of issues that are already recognized as important in the US carbon cycle research program and for which the relevance of the social sciences is readily apparent: (a) the future of fossil fuel consumption; (b) carbon implications of future land use/land cover transformation; and (c) modelling human interactions with the carbon cycle. Workshop participants identified a number of substantive research needs and other activities that they believed would advance knowledge in this field. These included the need to analyze
and test assumptions underlying carbon emissions scenarios, to improve understanding of how social and economic forces drive the carbon cycle, and the need to build a long and continuing historical record of human activities shaping the carbon cycle (Stern, 2002).

Even with this example, one can see that the concerns are quite narrow and specific, certainly not “global and holistic”.

First order problems
In this section, I briefly summarise some of the main challenges facing mankind in the twenty-first century in terms of observed systems, natural and economic. I have been researching the topic of “world futures” over a period of several months in my spare time. I have come across a bewildering amount of data: population growth, energy production and consumption, energy prices, food production and prices, differences in “ecological footprints” and “carbon footprints” for different parts of the world, data on birth rates, death rates and causes of deaths, data on poverty, literacy, opportunities for education, data on forms of government and abuses of human rights and all manner of data on damage to the ecosystem and biosphere. All I can present here are a few samples from all the data that I have come across.

A world on the move
Modern economies are based on forms of capitalism where returns on investment lead to reinvestment with the goal of continued economic growth. This growth requires a source of labour, much of it skilled and professional, to keep it going, together with the reinvestment of profits and readily available sources of energy and raw materials. With this growth the rich get richer and continue to do so.

The so-called developed world (e.g. Europe, the USA, Canada, Australia and Russia) sustains its economic growth by:

• reinvestment; and
• large scale immigration.

The so-called developing world (e.g. India and China and the Pacific Rim) have large populations to support economic growth and, as they develop, also attract and encourage economic migrants. Both developed and developing nations are investing in education and training and are creating relatively wealthy middle classes and super-rich plutocracies. There is a flow of labour, as legal and illegal immigrants from Africa, Eastern Europe and Asia into Western Europe. There are flows from South America into North America. There are flows into Australia.

Consequences of economic growth
The switch from hunter gatherer societies, over millennia, together with a growth in world population, has made humankind net consumers of the earth’s resources. That is, in the long-term economic growth is not sustainable. Forests are cut down, species are lost, oceans are depleted of fish stocks, and fertile lands become deserts.

In recent times, fossil fuels, as a source of stored energy and desirable byproducts such as fertilisers, plastic and pharmaceuticals, have fed economic growth and continue to do so. These developments have brought us to the point or, as many believe, past the point where the Earth can support and feed the human population.
The use of such fuels and other resources has triggered climate change, widespread pollution and damage to the ozone layer.

Population growth

The problems associated with continued economic growth are exacerbated by continued population growth coupled with a growth in the numbers, within the larger population, of those enjoying higher standards of living, such as access to energy and water services, access to education and social welfare programmes, access to a supply of (until recently, at least) relatively cheap foodstuffs and clothing. It has been estimated by some that it would take five earths to support the current population if everyone was enjoying the same standard of living as that now enjoyed by the Europeans, North Americans and other "developed" parts of the world. As we attempt to feed the world, we seem blind to the observed relation that greater availability of food leads to increase in population, unless, of course, measures are taken to encourage birth control or where other factors, such as AIDS, wars and natural disasters are increasing the death rate.

Many authorities believe that only a drastic reduction in population numbers and radical changes to how economies work can ameliorate the outcomes of this "sustainability overshoot". The terms "rapid population decline" and "one child per family" are gaining common currency.

Some argue that it is too late or impossible for man-made institutions to implement the changes needed, in which case the required changes will be brought about by wars, famine and natural disasters. They argue that we are on the verge if entering, if not already in, what is referred to as the "long crisis". A key factor in this long crisis is the problem of how to meet the demands for readily available energy. It is generally agreed that we have reached or are close to a turning point referred to as "peak oil", the moment when the demand for fossil fuels can no longer be met by supplies. As this happens, fuel prices will rise (as is being experienced as I write) with all manner of knock on effects. As yet, satisfactory alternative supplies of energy are not available.

Concerns about population growth have been around for a long time. Huxley (1978), writing in 1959, stated:

Over-population is quite clearly one of the gravest problems which confront us, and the choice before us is either to let the problem be solved by nature in the most horrifying possible way or else to find some intelligent and humane way of solving it.

In Meadows et al. (1972), the Club of Rome published the report *The Limits to Growth*, whose major conclusion was:

If the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity.

In March 2008, a conference on the topic *From Global Warning to Global Policy* was convened by the World Political Forum and the Club of Rome and chaired by President Mikhail Gorbachev in Turin on 28-29 March 2008. I quote from the final statement:

The participants concluded that the world has entered a period in which the dramatic scale, complexity and speed of change caused by human activities threaten the fragile environmental and ecological systems of the planet on which we depend. It is urgent...
therefore that the world community should agree rapidly on strategies and effective action to avert irreversible change in world systems, brought about by accelerating climate change, the ecosystems crisis, the depletion of energy resources and the diminishing availability of water, the degradation of environments across the world, persistent poverty and deprivation and the rising gulf between rich and poor within and between countries. Also, global population is in the midst of a transition from explosive growth to a new paradigm of development, never before experienced by humankind (www.clubofrome.org/news/news.php?id=84, accessed 28 May 2008).

Some data on population growth with possible projections is shown in Figure 1.

Here, as are extracts from an article by Peter Salonius, soil microbiologist and environmental activist, published in Science Alert, 30 April 2008:

News of food price escalation is bringing global carrying capacity for human beings “front and center” – with food riots all over the world.

At the core of our problems today has been our unwillingness to see the relationship between the population numbers that we have built up since the advent of cultivation agriculture, and the sustainability problems that we have been side stepping for 10,000 years. Many keen thinkers have understood that the driver enabling our numbers to shoot so far over long-term carrying capacity has been the one-time gift of fossil fuels, and that this overshoot has resulted in our rampant destruction of the biosphere. The global human population, before the start of the Fossil-Fuel Revolution, was about 1 billion, while it is now about 6.7 billion and rising. These holistic thinkers suggest that without oil, the earth will only support about 2-3 billion people. Their forward thinking has not yet included an understanding of the thesis that the other major factor that has enabled our numbers to shoot so far over long-term carrying capacity has been the one-time gift of erodible soils and the

![Figure 1. Projected figures for population growth](http://en.wikipedia.org/wiki/Population_growth)

vast store of nutrients they contained until we began to irreversibly mine them about 10,000 years ago with cultivation agriculture. I suggest that without petroleum, and after we stop mining arable soils, the Earth will only support the 100-300 million people it did before the advent of cultivation agriculture.


Climate change
Rosenzweig et al. (2008) state in the abstract to their recent paper on climate change:

Significant changes in physical and biological systems are occurring on all continents and in most oceans, with a concentration of available data in Europe and North America. Most of these changes are in the direction expected with warming temperature. Here we show that these changes in natural systems since at least 1970 are occurring in regions of observed temperature increases, and that these temperature increases at continental scales cannot be explained by natural climate variations alone. Given the conclusions from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report that most of the observed increase in global average temperatures since the mid-twentieth century is very likely to be due to the observed increase in anthropogenic greenhouse gas concentrations, and furthermore that it is likely that there has been significant anthropogenic warming over the past 50 years averaged over each continent except Antarctica, we conclude that anthropogenic climate change is having a significant impact on physical and biological systems globally and in some continents.

Species extinction
In a recent article on “Extinctions” by Dugan (2008), we have:

The world’s species are declining at a rate “unprecedented since the extinction of the dinosaurs”, a census of the animal kingdom has revealed. The Living Planet Index out today shows the devastating impact of humanity as biodiversity has plummeted by almost a third in the 35 years to 2005.

The report, produced by WWF, the Zoological Society of London (ZSL) and the Global Footprint Network, says land species have declined by 25 per cent, marine life by 28 per cent, and freshwater species by 29 per cent.

Jonathan Loh, editor of the report, said that such a sharp fall was “completely unprecedented in terms of human history”. “You’d have to go back to the extinction of the dinosaurs to see a decline as rapid as this,” he added.

In terms of human lifespan we may be seeing things change relatively slowly, but in terms of the world’s history this is very rapid.

And “rapid” is putting it mildly. Scientists say the current extinction rate is now up to 10,000 times faster than what has historically been recorded as normal.

The story of food
Over his lifetime, Fuller (1980) wrote critically about the problems of “planet earth” and proposed many solutions:

For the first time in history it is now possible to take care of everybody at a higher standard of living than any have ever known. Only ten years ago the “more with less” technology reached the point where this could be done. All humanity now has the option to become enduringly successful.
About 28 years later, we have announcements like this:

Agency warns of “silent tsunami” of hunger.

World Bank says food prices have risen 83 percent in three years (The Associated Press, 22 April 2008).


In the 1960s, population growth was far outrunning food production, threatening famine in many poor countries. But then wealthier nations joined forces with the poor countries to improve crop yields. Countries like India and Pakistan embraced new plant varieties, irrigation projects and fertilizer programs in a vast effort that came to be known as the Green Revolution.

Yields soared, and by the 1980s, the threat of starvation had receded in most of the world. With Europe and the United States offering their farmers heavy subsidies that encouraged production, grain became abundant worldwide, and prices fell.

From 1970 to 1990, the peak Green Revolution years, the food supply grew faster than the world population. But after 1990, food’s growth rate fell below population growth. Around 2004, the world economy began growing more quickly, about 5 percent a year. So as the food supply was lagging, millions of people were gaining the money to improve their diets.

The world began to use more grain than it was producing, cutting into reserves, and prices started rising. Early this year, as stocks fell to perilous levels, international grain prices doubled or even tripled, threatening as many as 100 million people with malnutrition.

Causes of food shortages include the following:

- rising oil prices affect costs of production, including fertilisers, processing, transport;
- growing crops for biofuels reduces amount of crops grown for food;
- adverse weather conditions affect level of production;
- with economic growth, as individuals enjoy higher levels of income, there is a tendency for them to eat more and to eat more expensive to produce foodstuffs; and
- with population growth, there is a need to continue to increase supplies of foodstuffs.

*Overview of first order problems*

Figure 2 is intended to be a simple holistic overview of what some current first order models and data are telling us about possible world futures.

*Second order problems*

Second order problems concern human behaviour and social interactions where the participants are observing systems holding beliefs with associated values, following institutionalised behaviour patterns, engaging in creative problem solving, learning and communicating, all in the pursuit of goals, some of which may be consciously articulated, some of which are the non-conscious consequences of participation in a culture and of genetic heritage.

Some important second order issues are:

- Differing kinds and levels of social and cultural development, including differences in quality of life, access to health services and education, problems of
identity and social conflict, for example, as set out in the hypothesis of there being a “clash of civilisations” (Huntington, 1997).

- Pathological belief systems which institutionalise ignorance, prejudice, discrimination and conflict.
- As noted by Luhmann, the problem of “noise” in the “marketplace” of ideas.
- The problem of empowerment for social action as in the lack of democratic forms of government and lack of access to opportunities for personal development.

These problems can be summed up in terms of two cybernetic principles:

1. Evil is that which restricts the right of actors to interact (Pask, 1991).
2. Act so as to maximise the alternatives (von Foerster, 1993).

The two principles are complementary. Both are predicated on two key assumptions: first, there is a shared gene pool; second, “persons” are socially constructed. The first principle helps identify blocks and constraints. The second principle helps to guide creative, positive action. Both are, in essence, corollaries of the law of requisite variety that “Only variety can control variety” (Ashby, 1956). Variety is controlled by identifying redundancies, patterns, and lawfulness. Hence, the importance of education (L. educare, to lead out of) and the importance of concepts that provide transdisciplinary and metadisciplinary clarity and coherence to manage the variety of theories and models.

Figure 2.
An attempt at a simple holistic overview of some global problems.
in the academic marketplace. Cybernetic concepts can serve the latter functions. In Scott (1998a), I set out some of the concepts from cybernetics which I believe should be part of the spiral curriculum that, ideally, is revisited throughout an individual’s education from primary to higher levels, at each stage with greater sophistication and detail. In Scott (1998b), I discuss the important role that higher education can play in helping to achieve sustainable development. In Scott (2004), I discuss the role that the internet and “learning technologies” can play in delivering this spiral curriculum globally.

In order to avoid the “scientistic” prejudices of “objectivism” (the belief that there is a pre-given objective reality to be discovered and explained) and reductionist materialism (the belief that reality can be ultimately explained in terms of laws governing the behaviour of matter/energy), the constructivist epistemologies found in second order cybernetics need to be promulgated as “metatruths” about what it means for observers to agree that something is “true”[1].

The problem of pathological belief systems is a very broad topic. How humans form and maintain systems of belief is a complex business, with rational and non-rational aspects (Wolpert, 2006). Even belief systems that are rationally constructed may in the longer term turn out to be flawed and misguided. A case in point is the faith of economists in classic economic models based on the concept of equilibrium between supply and demand. Ormerod (2005) points out that failure to predict the future is endemic in the business world. The world, as a whole, continues to surprise us. How many in advance of the events predicted the following:

- The fall of the iron curtain.
- The rise of China and India as economic superpowers.
- The rise of Islam as a global ideology and political system.
- The moral collapse of the west as an accompaniment of secularism and “scientistic” reductionism.
- The failure, despite decades of warnings, of political leaders to respond to the challenges of global ecosystem destruction.
- The failure to address the problems of continuous population growth, poverty and lack of educational opportunities.
- The lack of heavy weight intellectual and political leadership?

Francois (2007, p. 123) writes:

Ignorance of ignorance is much worse than simple ignorance as it frequently leads to self-deception and self-sufficiency. The only way to exempt us from such a calamity is to try to better our models of what we call “reality”. For this, once again, a wider cybernetic reasoning as a tool for understanding should be very helpful.

The successful financier, George Soros, has developed a second order, reflexive model of economic behaviour. As Umpleby points out, Soros is doing second order cybernetics. His theory is an example of the “wider cybernetic reasoning” referred to by Francois (see the Appendix). Table I is taken from Umpleby (2006). It summarises the key differences between classic “equilibrium theory” and Soros’ second order “reflexivity theory”.

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Looking for solutions
What might be done? As economies collapse, nation states and coalitions thereof may well go on a war footing, where new orders of doing things are imposed, for example, rationing of food and energy, bans on travel, investment in alternative forms of energy supply, imposition of birth control. As noted above, hopefully there may also be an accelerated process of education, awareness raising and political empowerment that includes the recognition that some belief systems such as “individualism” are unacceptable.

“Individualism” is the social disease, currently legitimised and encouraged in all parts of the world, of seeking, as an individual, to become rich and powerful relative to one’s neighbours. Legislative and economic practices reforms of some kind will be required. There will be (indeed, there is) also the requirement to educate, raise awareness and change belief systems.

The tough question is, “How do we (humankind) change our practices while the world is falling apart?” The battle for “correct thinking” has to be won as only “correct thinking” in the long-term leads to “correct action”. The populace in the developed countries with access to resources such as mass education and mass communication systems are not stupid or necessarily ignorant. They are seduced by consumerism and the lifestyles portrayed in popular entertainment. Insofar, as there is a growing awareness that disasters of one kind or another are imminent, this is accompanied by feelings of alienation and disempowerment. We will need a rapid change in popular consciousness delivering the right messages as disasters strike such that politicians and corporate leaders are obliged to change their ways.

It is of value for all of us, as “ordinary people” to engage in discussion about these issues. There are underlying empirical and logical truths as sketched out above, that need to be understood and promulgated. The “right thinking” produced by education will lead to the “right action”, including the action of promoting the right thinking and of commanding the means to do so. This requires educational activities to go hand in hand with the evolution of more effective means for democratic participation. The populous, made aware of what is required, must find its voice. We need positive feedback cycles where the demand for better education and more informed knowledge about what is happening and why leads to demands for even better education, knowledge sharing and ways of translating right thinking into right action.
With respect to “right thinking”, I have identified two fallacies which I believe need to addressed and corrected:

1. The fallacy of the particular: “I am all right because the problems are happening some where else.”
2. The fallacy of the general: “Humankind will survive somehow.”

In relative terms, Fallacy 1 was perhaps once true but is clearly false now that, globally, as noted below, “Everything is connected to everything else.” With respect to Fallacy 2, it is possibly true but, as a pious hope, can blind us to an awareness of the great cost in human lives and suffering that will be (and is being) paid as part of the survival of the species.

There follows a brief listing of some aspects of possible solutions that I have come across in the literature and in the media. There is not space here to present them in any detail. I present them as a means of promoting further discussion:

- Switching to renewable forms of energy.
- Using alternative forms of production and waste disposal that are truly sustainable, possibly using nanotechnologies and “synthetic biology”.
- Using just and humane forms of birth control to reduce the global population.
- Only interacting with the ecosystem in ways that are sustainable and healing of damage already inflicted.
- Education for social justice and quality of life, rather than for the individualism of wealth accumulation and consumerism.
- Education and legislation for empowerment as part of more effective forms of democratic government.
- A move away from the economic growth emphasis of modern capitalism as embodied in “limited companies”, “corporations” and “shareholders” towards cooperative forms of institution.
- New forms of tithing or taxation that change damaging behaviours and/or release resources that can be invested in developing sustainable ways of doing things.

**Concluding comments**

Given the scale of the problems at both first and second order levels, it is likely that mankind is inevitably facing major disasters on a global scale. Amelioration of these disasters will, in the limit, be in the hands of whatever communities emerge and survive locally. More global solutions are thinkable. However, as these entail a radical re-appraisal and re-education about what it is to be human, it is not obvious at this stage that these global solutions are doable. It may be too late for such a global transformation of human consciousness to be achieved. It may be that, as proposed by Morrison (1999) and many others, there are intrinsic limitations on the extent to which the human species can embody the beliefs needed to ensure its survival.

A majority of commentators appear to see no alternative to capitalism, economic competition, continually striving for more, for better “standards of living”. Some do question the values and their relative importance. What is more important; a high
income or safety from harm, riches or job satisfaction? And so on. There are alternatives to secular, materialistic capitalist ways of life. For example, there those based on the concept of sustainable living, abiding by Commoner’s (1971) four laws of ecology. I cite them here as key holistic, systemic, cybernetic ideas that are essential for understanding how we might manage the variety in global systems:

1. Everything is connected to everything else. There is one ecosphere for all living organisms and what affects one, affects all.
2. Everything must go somewhere. There is no “waste” in nature and there is no “away” to which things can be thrown.
3. Nature knows best. Humankind has fashioned technology to improve upon nature, but such change in a natural system is, says Commoner, “likely to be detrimental to that system.”
4. There is no such thing as a free lunch. In nature, both sides of the equation must balance, for every gain there is a cost, and all debts are eventually paid[2].

It is my belief that ideas such as these should be vital parts of educational curricula, from the cradle to the grave[3].

Notes
1. On being an observer: there has to be an observer for there to be a reality for the observer to observe (constructivist position); there is a reality prior to there being an observer (objectivist position).
3. A particularly impassioned statement of “Five core principles of sustainability” is to be found in Ben Eli (2008), see the Appendix.

References

Ormerod, P. (2005), Why Most Things Fail: And How to Avoid It, Faber & Faber, London.


Further reading


Appendix

Reflexivity is, in effect, a two-way feedback mechanism in which reality helps shape the participants’ thinking and the participants’ thinking helps shape reality in an unending process in which thinking and reality may come to approach each other but can never become identical. Knowledge implies a correspondence between statements and facts, thoughts and reality, which is not possible in this situation. The key element is the lack of correspondence, the inherent divergence, between the participants’ views and the actual state of affairs. It is this divergence, which I have called the “participant’s bias,” which provides the clue to understanding the course of events. That, in very general terms, is the gist of my theory of reflexivity.

I have come to distinguish between normal conditions and far-from-equilibrium conditions. In normal conditions, there is a tendency for the participants’ views and the actual state of affairs to converge or, at least, there are mechanisms at work to prevent them from drifting too far apart. I call these conditions “normal,” because that is what our intellectual traditions – including philosophy and scientific method – have prepared us for. I contrast them with far-from-equilibrium conditions, where the participants’ views are far removed from the actual state of affairs and there is no tendency for the two of them to come together. I have always found the far-from-equilibrium conditions much more fascinating, and I have studied them both in theory and in practice.

There are two very different kinds of far-from-equilibrium conditions: one is associated with the absence of change, and the other with revolutionary change. These two opposite poles act as “strange attractors” – an expression with which has become familiar since chaos theory has come into vogue.

So we can observe three very different conditions in history: the “normal,” in which the participants’ views and the actual state of affairs tend to converge; and two far-from-equilibrium conditions, one of apparent changelessness, in which thinking and reality are very far apart and show no tendency to converge, and one of revolutionary change in which the actual situation is so novel and unexpected and changing so rapidly that the participants’ views cannot keep up with it.

Extracts from *Sustainability: The Five Core Principles – A New Framework* by Michael Ben-Eli, The Buckminster Fuller Institute, http://bfi-internal.org/sustainability, accessed 3 June 2008:

The First Principle, the Material Domain:

Contain entropy and ensure that the flow of resources, through and within the economy, is as nearly non-declining as is permitted by physical laws.

The Second Principle, the Economic Domain:

Adopt an appropriate accounting system, fully aligned with the planet’s ecological processes and reflecting true, comprehensive biospheric pricing to guide the economy.

The Third Principle, the Domain of Life:

Ensure that the essential diversity of all forms of life in the Biosphere is maintained.

The Fourth Principle, the Social Domain:

Maximize degrees of freedom and potential self-realization of all humans without any individual or group, adversely affecting others.

The Fifth Principle, the Spiritual Domain:

Recognize the seamless, dynamic continuum of mystery, wisdom, love, energy, and matter that links the outer reaches of the cosmos with our solar system, our planet and its biosphere,
including all humans, with our internal metabolic systems and their externalized technology extensions – embody this recognition in a universal ethics for guiding human actions.

About the author
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