

KNOWLEDGE, LEARNING, AND CHANGE: EXPLORING THE SYSTEMS/CYBERNETIC PERSPECTIVE

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Introduction

There seems to be a general consensus among social critics, futurists, and other trend-watchers, that a global change of considerable proportions is occurring. It has been said that this change is from an industrial society to a post-industrial, or information society, or from a modern to a post-modern society, or even that it represents the emergence of a 'New Age' (Capra, 1980; Naisbitt, 1982; Lyotard 1984; Ogilvy, 1977; Thompson, 1978, 1986, 1987, 1989). Regardless of terminology, one of the main features of these analyses is a concern with the crucial role of information, and hence knowledge.

It seems that we are indeed undergoing a massive sociopolitical change at the end of this century, and knowledge is truly playing a powerful role in reshaping our world. The world is becoming more and more of an open system, with an increasingly freer flow of information. The events in the former Eastern Block, in China, and in the Gulf War of 1991 all attest to the power of information and knowledge in shaping world events. But does a mere increase in the amount of information available to each citizen necessarily equate somehow with human betterment? Or are we perhaps doomed to repeat our mistakes, this time simply at much greater speed, with computerized information making global stock markets tumble like dominoes in a day, and wars that break out only to be televised live?

An information age forces us to take a long hard look at what we consider 'information' and 'knowledge'. It requires us, specifically, to look at epistemology, or how we know what we know. As Tarthang Tulku (1987, p.29) states, "if we hope to affect the future rather than simply be subject to it, we must start now to gain a more comprehensive knowledge of knowledge."

Indeed we are moving from a simple belief that we can accumulate knowledge of objective facts to a realization that we must question what we consider knowledge, and engage in a self-reflective process of inquiry (Ceruti, 1989). This has led to an interest in the process of learning how to learn, or what Gregory Bateson (1972) termed 'deuterolearning'. This realization coincides with a move away from a linear image of progress viewed as the result of an application of accumulated objective, 'value free' facts, towards a more ecological image of a 'natural drift' of different viable ways of being and knowing.

In this paper I present a critique of the old view of knowledge, rooted in the industrial or Machine Age, and an emerging alternative, found in systems/cybernetic approaches and the concept of evolutionary learning. Although systems/cybernetic approaches mark an enormous advance over the realist/industrial “camera-theory” view of knowledge, I will argue that a further step is needed, namely the full integration of the observer in any discussion of knowledge. The Time Space and Knowledge vision presented by Tarthang Tulku, particularly in *Love of Knowledge*, can contribute not only to articulating the theoretical underpinnings of such a new perspective, but also contribute to the transformation of the knower.

The Systems/Cybernetic Paradigm Shift.

It is not surprising, perhaps, that the 20th century has seen the appearance of cybernetics and systems theories, and it is perhaps even less surprising that they should be close relatives to information theory, another product of a twentieth century grappling with a knowledge/information/communications explosion. The most significant development in epistemology, brought about to some extent within the context of the systems/cybernetic approach, has been a shift to a view of knowledge as constructed, rather than as a reflection of an ontological reality ‘out there’.

I will quote extensively here from Ludwig von Bertalanffy, the father of General Systems Theory, on the topic of epistemology, because I believe it gives the reader who is familiar with Tarthang Tulku’s work a fair introduction to the main aims and concerns of the systems/cybernetic perspective.

The epistemology (and metaphysics) of logical positivism was determined by ideas of physicalism, atomism, and the “camera-theory” of knowledge. These, in view of present-day knowledge, are obsolete. As against physicalism, and reductionism, the problems and modes of thought occurring in the biological, behavioral, and social sciences, require equal consideration, and simple “reduction” to the elementary particles and conventional laws of physics does not appear feasible. Compared to the analytical procedure of classical science with resolution into component elements and one-way or linear causality as a basic category, the investigation of organized wholes of many variables requires new categories of interaction, transaction, organization, teleology, etc., with many problems arising for epistemology, mathematical models, and techniques. Furthermore, perception is not a reflection of “real things” (whatever their metaphysical status) and knowledge is not a simple approximation to “truth” or “reality.” It is an interaction between knower and known, and is dependent on a multiplicity of factors of biological, psychological, cultural, linguistic, etc., nature. Physics itself tells us that there are no ultimate entities like corpuscles or waves existing independently of the observer. This leads to a “perspective” philosophy for which physics, fully acknowledging its achievements in its own and related fields, is not a monopolistic way of knowledge. Against reductionism and theories declaring that reality is “nothing but” (a heap of physical particles, genes, reflexes, drives, or whatever the case may be”), we see science as one of the “perspectives” that man, with his biological, cultural, and linguistic endowment and bondage has created to deal with the universe into which he is “thrown,” or rather to which he is adapted owing to evolution and history. (1975, pp.166-167)

Summarizing the recent revolution in science, brought about by the systems/cybernetic view, summarized in his own "context theory," Wilden (1987b) writes that the old

view is dominated by matter-energy, one-to-one linear causality, forces, atoms, singularity, closure, one-dimensionality, determinism, symmetry, sameness, simplicity, competition, short-range survival, and the past. Context theory, in contrast, is oriented to information, goalseeking, constraint, relationships, reciprocity, levels of reality, levels of responsibility, levels of communication and control, requisite diversity, innovation, openness, cooperation, and the capacity to utilize unexpected novelty, and thus towards long-range survival and the future. (p.310)

The changes outlined by von Bertalanffy and Wilden represent the foundation of a paradigm shift in our understanding of, and approach to, knowledge. Kuhn's (1972) work on scientific 'paradigms' is often cited in the context of studies which attempt to understand the process and nature of change, and the term paradigm is sometimes loosely used interchangeably with the term worldview (e.g., Capra, 1983). When too many anomalies arise in a paradigm, when too many unexplained and unexplainable phenomena arise, a new, more inclusive paradigm is required. The shift from Newtonian to Einsteinian and Quantum Physics is typically cited as an example of such a change. In hermeneutics, or the study and process of interpretation, a similar focus on breakdowns appears, as an avenue to understanding the nature and limits of a particular perspective (Palmer, 1969).

Many themes emerge as the concern of systems theorists, who feel that in order to make a 'paradigm shift' into a new way of seeing and being in the world, one based fundamentally on 'partnership' rather than an ongoing dialectic of domination or submission, it is of the utmost importance to develop a coherent systemic perspective (Eisler, 1987). Following this tradition, important work is being done by such scholars as Maturana, Varela, and Ceruti in the area of epistemology, Banathy in education and systems design, Watzlawick and Guidano in clinical psychology and family systems therapy, Loye in the study of moral sensitivity, Checkland, Henderson, and Purser, in business and economics, Eisler and Artigiani in cultural history, Laszlo in systems philosophy and general evolution--and this is clearly only a very partial list. This partial list of scholars merely scratches the surface of a much wider problematization of knowledge, which also plays a vital role in postmodern discourse (e.g. Lyotard, 1979).

The emerging age might distinguish itself as the one in which we have come face to face with our knowledge, and hence with ourselves. It may--but does not by any means necessarily have to--become the age in which human beings become responsible for what has been our greatest gift and our greatest source of sorrow, namely our capacity to reflect upon ourselves through the use of language and knowledge. This capacity has been called 'time-binding' in General Semantics because it has placed us in time, capable of 'remembering' the past and 'imagining' the future.

Our present consciousness reflects a particular moment in our historical development, and a particular worldview. Tarthang Tulku states that

our way of knowing and acting in our world, continually reinforced by our cultural conditioning, has established a complex interlocking system. Everything--language, educational systems,

economies, commerce, politics, and social institutions--is dependent upon everything else. Underlying this great superstructure are our concepts, beliefs, assumptions, values, and attitudes, which are linked together like an underground network of pipelines connecting across a vast continent. (1984, p.66)

Is there any way to explore those by now surely rusty pipelines that lie beneath our daily thoughts and activities? Can we break out of the deeper repetitive patterns of history and human behavior? A number of social critics have discussed the nature of worldviews and their effects on our thinking. Can we perhaps move beyond some of the fundamental assumptions of worldviews which have shaped our thinking for centuries, even millennia (cf. Capra, 1980; Eisler, 1987)?

Perhaps one of the ways of doing this is by looking at the nature of knowledge itself. Comparative studies in anthropology, history, linguistics, psychology, and sociology have taught us about the considerable differences existing in the way human beings view the world. A proliferation of worldviews has reflected the overriding human need to somehow make sense of the world. But thus far we have gained little insight into the nature of worldviews themselves. We may know about their content, but we know much less about how they manifest, how knowledge works in the construction of a worldview.

We now realize that worldviews are created by us, and the interpretive process is an active fount of human creativity, that perception is not a passive registering of 'what is'. Some psychologists (e.g., Gazzaniga, 1983) even argue that the interpretive function, the propensity to want to interpret events and make theories about why they happen, is hard-wired into the brain. This understanding of knowledge as a creative, active process of interpretation is the subject of a shift in epistemological inquiry.

Knowledge of knowledge.

In an important article outlining the shift from a natural epistemology to one described as 'radical constructivist', epistemologist Ernst Von Glasersfeld writes that

In the traditional theories of knowledge, the activity of "knowing" is taken as a matter of course, an activity that requires no justification and which functions as an initial constituent. The knowing subject is conceived of as a "pure" entity in the sense that it is essentially unimpeded by biological or psychological conditions. (Von Glasersfeld, 1984, p.31)

The Italian philosopher Mauro Ceruti (1989) writes that now

knowledge is studying its own genesis, and therefore a complex field of investigation is being outlined, summarized as the knowledge of knowledge. The notion of knowledge is being broadened and decentralized. The domain of discourse of epistemology is shifting from a study exclusively centered on acquired knowledge, to a study which traces acquired knowledge to its own roots and matrices, whether historical, social, anthropological, psychological, biological or physical. (p.59)

Ceruti (1989) has tackled the problem of the observer in systems theory head on, following in the tradition of Bateson, Von Glasersfeld, and Von Foerster. A system does not exist 'out there', but is created by the observer through an act of choice, 99% of which the observer is not aware of. Enormous complexity of experience is reduced to a manageable description. A system is constructed, not just seen.

This process involves something reminiscent of what Tarthang Tulku calls a 'focal setting': boundaries are traced, establishing what is 'in' the system and what is 'out', and at what level of detail one is choosing to study the phenomenon in question. Ceruti writes that

The observer's operations and decisions intervene on several levels in the process of system construction. They trace, first of all, the boundary between system and environment, and establish the relationship between system and subsystem, between global dynamics and components. A system is always, at the same time, a subsystem and a suprasystem, and its dynamic is regulated by the constraints of the dynamics in which it participates, and in turn imposes constraints on the dynamics of the various components. (p.107)

Ceruti thus makes the case that depending on one's perspective, and, in TSK terms (TSK being Tarthang Tulku's vision of Time, Space, and Knowledge), on the focal setting, different worlds emerge as reflections of different positions. No longer is it possible to start with the assumption, as classical science did, of an ideal of omniscience, beyond 'positions', requiring an inquirer who had been external to the observation and whose presence was 'neutralized' for maximum objectivity. Ceruti points out the significance of this:

The radical integration of the observer into the fabric of knowledge necessitates the development of a new theory of the observer, the emergence of a new image of the subject, and the constitution of a new cognitive paradigm. The elaboration of a theory of the observer is outlined today as possible and paradoxically necessary only by foregoing the view of the observer her/himself as a condition external to the domain being observed. This corresponds to the nonexistence of a fundamental observation point whose privilege corresponded, paradoxically, to both the project of an epistemology without a subject and to the ideal of a neutral language. (p.107)

Ceruti (1989) explains the historical nature of this shift in our conception of knowledge and knowing from a systems/cybernetic perspective by pointing out that it has rejected the ideal of a fundamental, objective vantage point, the result of a neutralization of the observer's values and perspectives. No neutral language is possible or even desirable, and the observer cannot be considered as somehow standing outside of the events which are observed. Von Bertalanffy's systems view of the world was what he called a "philosophy of positions," influenced by the philosopher Vaihinger. Discussing the latter's philosophy of As-If, he wrote that

Each interpretation of reality is an audacious adventure of reason, to use Kant's expression. There is only the alternative: Either we renounce any interpretation of the "essence" of things--which is the well-founded opinion of science--or, if we venture upon such an interpretation which is only possible if patterned after ourselves, we must remain conscious of its merely metaphorical character. For we have not the faintest proof that the "real" world is of the same nature as the

minute corner given to us in our own internal experience. Such an interpretation, therefore, can have no other value than that of an analogy, an As-If according to Vaihinger. (1975, pp. 70-71)

So from a systems perspective, von Bertalanffy sees all knowledge as analogical or metaphorical, not as a representation of ontological “reality.” As the Italian philosopher Vico wrote in the 18th Century, “the true is the same as the made.” We shape and create knowledge, we do not passively receive it. The work of Maturana and Varela (1987) has presented this case very strongly in recent years.

Having begun to understand how human beings create knowledge, the question then becomes whether we can unlearn some of the ways in which we have interpreted the world. It is no surprise, therefore, that the radical constructivist epistemology has generated great excitement among psychotherapists, interested in the human change process. If what we know is not, in fact, a representation of ‘ontological reality’, but merely a model, an interpretation, then it should be possible to ‘reinterpret’ or reframe our understanding of particular situations and feelings. It should also be possible, then, to view a particular situation from many different perspectives, having what Maruyama (1974) calls a polyocular approach as opposed to a monocular one, many perspectives versus a single one. The implications of this are considerable and run the gamut of human enterprise, from psychological processes to international relations.

The systems/cybernetic approach and the TSK vision concur on the way in which to approach the issue of ‘positions’. The emphasis is on open-ended inquiry, but the inquiry is self-reflective, attempting to understand what the dynamics are whereby its “truths” or interpretations which are taken to be Reality are set up in the first place. Tulku succinctly explains the methodological implications:

Asking “Why?” or “What is true” in the standard way calls for an ‘explanation’ based on stories or theories that express an underlying ‘logos’ or narrative. The outcome of such inquiry will reflect the limits implicit in the structures established through positions, oppositions, and presuppositions. Rather than follow along in this pattern, we can turn to a more accommodating form of inquiry, asking “How does it come to be?” Seeing ‘how’ form is created and ‘how’ patterns emerge, ‘how do we react? These are the issues that determine ‘how’ knowledge unfolds. (p.299)

The renowned systemist and family therapist Watzlawick (1990, p.104) has taken a similar approach: “To ask what? instead of why? is a cybernetic approach,” he writes. He cites cyberneticist Ross Ashby on the subject of transformation and change:

Notice that the transformation is defined not by any reference to what it “really” is, nor by any reference to the physical cause of the change, but by the giving of a set of operands and a statement of what each is changed to. The transformation is concerned with what happens, not why (Ross Ashby, In Watzlawick, 1990, p.105).

In terms of his therapeutic work, Watzlawick discusses the nature of patterns which exist in the here-and-now, and are the result of circular causality loops between the people involved. These circular patterns are of a systemic nature, whereby they cannot be reduced to one cause and one effect without totally arbitrary “punctuation” on behalf of the observer--in other words, when the

process can be said to have started, which behavior triggered what reaction, and so on. The same principle applies for mental (as opposed to social) processes.

The next section introduces a new perspective on learning which incorporates this polyocular approach in an ongoing learning process.

Evolutionary Learning: The implication of a systemic view of knowledge.

Banathy's work, and its elaboration by Montuori, stresses the importance of developing an approach to learning which is fundamentally different to our present realist approach. It involves, above all, making the process of inquiry, rather than the finding of certitudes and facts, of paramount importance. This is an essential aspect of the systemic perspective, as we shall see.

The emerging field of systems science and cybernetics has provided some rigorous concepts and theories which are helping us to reconceptualize knowledge (e.g. Bateson, 1972, 1979; Buckley, 1968; Ceruti, 1989; Maruyama, 1963, 1974a; Maturana & Varela, 1987; Laszlo, 1972; Watzlawick, 1984).

Evolutionary learning presents us with a broad new approach to knowledge and learning that is informed by systems/cybernetic concepts. Banathy (1987) differentiates between maintenance learning, the process which sustains the industrial age and evolutionary learning, the ongoing process of creation which makes the emerging information age possible:

while maintenance learning reinforces already learned ways of responding to known situations, evolutionary learning enables us to "anticipate" and develop the capability to face new, unanticipated, and unexpected situations. This type of learning will help us progress from unconscious adaptation to changes, to conscious anticipation and purposeful management of change. (p.137)

Banathy (1987) has written that

a curriculum of evolutionary learning will include such domains as : (1) the nurturing of such evolutionary values as cooperation, trust, benevolence, altruism, love, and the pursuit of harmony; (2) the fostering of self-realization ethics, social ethics and ecological ethics; (3) cooperative group interaction skills by which we can increase our capacities for entering into ever-widening human relationships and managing conflicts in a non-violent manner; (4) competence in systems thinking and practice, by which to understand complexity, grasp connectedness and interdependence, and perceive the notions of embeddedness and wholeness; and (5) competence in anticipatory thinking, problem management, and systems design. (p.291)

The approach stresses the need to embody a fundamentally different set of human competencies, since our present competencies emerged from what has been called the Machine or Industrial Age (Ackoff, 1981; Eisler, 1991; Montuori, 1989), and are inappropriate for our present situation, which is marked above all by an enormous increase in the rate of change, and a growing unpredictability. The Machine Age is a pervasive worldview affecting all our thoughts and actions. In other words, the beliefs and assumptions of the Machine Age are directing and shaping our thoughts and actions, and maintenance learning reinforces this by giving us set ways of responding to preexisting

situations. Evolutionary competence, is an ideal towards which we strive, and which we move towards through a process of learning together. It incorporates the kind of flexibility of mental perspectives implied by a radical constructivist epistemology.

Some of the features of evolutionary learning include:

a) The use of positive feedback, which amplifies deviation and changes, as opposed to the deviation reducing negative feedback of maintenance learning; this leads to a new openness “to change purposes and perspectives, transform programs, and transcend our systems based on a new look at ourselves, our goals, our structures, modes of operation, and our environments” (Banathy, 1987, p.137). This process is vital inasmuch as it involves the constant questioning of assumptions, and reorganization at a higher level of systemic complexity and organization.

Here a constant process of system self-definition can be useful in understanding the nature and characteristics of the system and the relationships which establish it. Maintenance learning, on the other hand, does not encourage 'deviation' of any kind, as Truths are given, and one is not encouraged to question, explore alternatives, or learn for oneself. Maintenance learning is not self-reflective. It is incapable of questioning its own assumptions and of engaging in any change but 'more of the same'. Unable to question its own origins and guiding framework, maintenance learning allows us to learn only within a preestablished framework, but does not allow for free inquiry.

Maintenance learning presents knowledge as labels, descriptions, and categories, which can be manipulated and measured as quantities of information to be absorbed. Evolutionary learning involves a process of learning which, according to Banathy, is more appropriate for a period of turbulence and rapid change such as ours. It allows us to learn how to learn, and make learning an ongoing, lifelong process, based on our values, rather than merely the unquestioning absorption of information, which itself may be out-of-date very soon.

Here we can see the origin of punishment as feedback for the deviation from the norm. No effort is made to encourage deviation from the already known, and exploration of the areas lying outside of those norms. Maintenance learning is all about learning the correct 'labels' for particular phenomena existing in specific categories. These are presented as 'objective facts,' when in fact they are created by the historical, cultural, psychological, sociopolitical and other dynamics within the larger system in which the 'learner' exists. Maintenance learning providing technological knowledge is fundamentally reproductive rather than creative. The epistemology allows only one interpretation of reality, the 'correct' one, which in fact reflects the values of the 'previous' knowers. This is second-hand knowledge, which would not be so bad if it did not pass itself off as timeless.

b) Evolutionary learning stresses change-directing and innovation, and “makes use of our creative potential to engage in the design and development of alternative future images of our systems, evaluating alternatives, and select and implement our designs,” writes Banathy (p.137). Beliefs can act as a powerful trap, particular if we function in the mistaken assumption that they are 'truth' as opposed to beliefs. Our history is riddled with political and 'religious' clashes among powerful groups attempting to impose one and only one 'Truth'.

Bateson (1972) has explored the notion of learning and stepping out of existing beliefs, and the importance of developing an understanding of knowledge which allows for the possibility of 'stepping out' of beliefs. This work has informed much of the systems discourse focusing on knowledge and learning.

In systems inquiry several forms of growth are recognized. One is homeorhetic, a "process of selection and combination WITHIN the given norms of the system" (Wilden, 1980, p.354). This is the kind of growth that is allowed within the context of maintenance learning. It consists of 'more of the same'.

A Systems Age requires a different kind of growth, one which is morphogenetic and itself capable of generating a variety of new discourses and perspectives. Wilden (1980) defines morphogenesis as a process which

can be described as the metaphoric EMERGENCE of new levels of organization (restructuring, renormalization). Such a discontinuous jump in organization involves some sort of goal-changing. (p.354)

Goal-changing is precisely what maintenance learning does not permit, since the goals are already established.

c) An emphasis on systemic and holistic approaches; our present interdisciplinary fragmentation has compartmentalized knowledge to the point of leading to sterile overspecialization and an inability to consider context, relationships, interdependence, and the embeddedness of every system in a large whole (Banathy, 1991; Churchman, 1968, 1971; Laszlo, 1972, 1987). Buckminster Fuller (1969) drew the interesting parallel between the old dictum 'divide and rule,' and our present overspecialization, to remind us that it is the generalists who have the whole picture and are therefore better prepared to govern and act. The systems approach to disciplined inquiry offers a clear alternative to reductionism.

The mechanized approach to knowledge leads to the development of neat disciplinary boxes (institutionalized 'positions') in which subjects are stored in such a way as to suggest the least possible interconnectedness between them. Disciplinary fragmentation breaks up our world into little pieces and frowns on attempts to broaden our scope of inquiry, thus reflecting a profoundly reductionistic worldview. It is possible to study political science without ever being exposed to the psychological, sociological, cultural, or economic factors which inform public policy, without once being directed towards an exploration of the role of the media, of psychological factors in international affairs, or our historical and cultural differences with foreign policy makers, which cause endless problems of cross-cultural communication (Fisher, 1989).

Wilshire (1989) draws on the work of the anthropologist Mary Douglas, and her concepts of purity and pollution, to illuminate this problem for us. The university lecturer undergoes several rites of purification, in which the polluting influences of adjoining fields of knowledge are slowly eroded, in order to maintain the purity of the clan. Purity and pollution are, in Douglas' framework, symptomatic boundaries of self and other, in group and out group. In terms of the university professor, what becomes important at this point is not any "romantic" search for knowledge or

wisdom, or anything that may have relevance in what is tellingly called 'the real world' by students. Rather, a reinforcing of the cognitive map that outlines one's field, and the discourse of that field, becomes of the utmost importance, a contribution to the self-perpetuating group that feeds one becomes the summum bonum. If this seems outrageous, as an example one might look at the renowned psychologist Mihalyi Csikszentmihalyi's (1988) need to defend his use of systems methodology, with its inevitable interdisciplinary implications, in a recent essay included in a book devoted to the psychology of creativity, but rather deceptively titled *The Nature of Creativity* (Sternberg, 1988), as if psychology were the only discipline entitled or capable of making a contribution to our understanding of creativity. Csikszentmihalyi's reference to what might be perceived as a "betrayal" of psychology in favor of more sociological or interdisciplinary elements is particularly relevant.

Again, we have seen an extremely restricted scope in our inquiry, one which attempted to isolate the single smallest variable at the expense of everything else. Clearly reductionism is not 'wrong' or 'bad' as such, as some seem of the more rabid 'holistic thinkers' to be suggesting, merely one of many focal settings available to us for inquiry.

d) "Evolutionary learning places primary emphasis on cooperation: cooperation as a mode and method of learning (e.g., team learning arrangements) as well as the development of competence in cooperative group interaction" (Banathy, 1987, p.137). Our society has largely been a dominator system, one where relationships are seen essentially as occurring within a narrow spectrum of domination and submission. This creates a situation where much continuous conflict is generated, without any attempt at conflict resolution, but only seeking a "domination switch" or "domination maintenance," as it were. In such a fear based system, mistakes are perceived as great dangers to be avoided at all costs. This clearly inhibits our capacity for learning.

The fear-based dominator system creates a situation where history is bound to repeat itself. It forces us to deny our mistakes, and choose not to learn from them. When we acknowledge our mistakes it is seen either as a great loss of face, or as a very courageous, exceptional step.

Evolutionary learning is directed towards change--the ability to cope with change, but also generate change; it requires a holistic or systemic perspective, which places our learning in a broad context. In order for this to emerge, mistakes have to be seen as forms of feedback which occur within the larger learning system and offer opportunities for learning.

Maintenance learning involves learning what is already known. A mistake means one did not correctly do, say, or think that which is known already. In these cases, not surprisingly, there is usually a knower who knows we are wrong and tells us so. Mistakes are only useful in so far as they act as a deterrent to making more mistakes, creating more fear, and thus restricting us even further.

Evolutionary learning, on the other hand, can view a mistake as a 'breakdown' in the regular pattern which allows us precisely the opportunity to learn more, since we are temporarily 'out of kilter', in an unusual position which allows us to explore the boundaries of our knowing.

Inquiry, the Self, and the 'Bystander'.

Tarhang Tulku's work explores and questions our deepest, fundamental assumptions about time, space and knowledge. By doing so it questions the very foundations of our existence. As regards knowledge, Tarhang Tulku (1987, p.3) states that

No matter who we are, or how we live, our lives are shaped by what we know. Knowledge determines what we hold true, what we stand for, and how we act; what we can be, experience, and accomplish. Knowledge has the power to change our lives and to change reality; indeed new knowledge has often transformed whole societies, even whole civilizations.

Tarhang Tulku (1984) highlights the profoundly unscientific and unecological view of the self:

Today, our many forms of knowledge all derive from a view of human being as separate from the environing world. We divide our world into self and other, and establish ourselves as agents acting upon and responding to situations. We have no direct knowledge, for we make ourselves separate from knowledge, and become the 'one who knows'. Knowledge itself becomes another object we possess. (p.69)

The division between self and 'other' is a very basic dimension of Western culture, it seems, one which permeates our Indo-European languages with a clear subject-object split. It is a fundamentally disembodied form of knowledge, which separates the knower from the known, and therefore creates a subject-object split which is most often fraught by insecurity and fear.

And given our feeling of isolation, we feel that in order to gain security the object of knowledge should be power, as Bacon pointed out so many years ago. This search for power is directly related to the knower and the self, but both power and self (or more broadly values and consciousness) have traditionally conveniently been placed out of the bounds of scientific inquiry. Unable to question its own value system and its own assumptions in the larger context of society with the same rigor it applied to scientific discourse, science was left with a blind spot which allowed funding and political interests to sneak in the back door and define much of the macro direction of the scientific enterprise. The same dynamics applied, but usually more explicitly, at the psychological or political level, where until the interdisciplinary fragmentation of the last century there existed a much greater awareness of values, particularly in what were the 'moral' or human sciences.

The view of the self as 'once removed' from the world it participates in is not unique to science, although here, as we shall see, it was taken to an extreme which would be considered pathological if it were to occur in an individual. Tarhang Tulku (1984) writes that in our present understanding,

knowledge results from the projection of a knowing capacity out into an unknown world. The self appears as separate from the events it knows -- a 'bystander' -- that extracts knowledge from experience without becoming directly 'involved' in experience. In its knowing of experience, it remains opposed to what it knows even though it also claims ownership over it. (p.264)

The 'bystander' described by Tarthang Tulku attempts to possess knowledge, and a specific form of knowledge which Tarthang Tulku describes as 'technological knowledge'. He writes that

Technological knowledge, with its emphasis on the objective realm, assigns primacy to knowledge of the 'already known.' The rule is put forward that knowledge must be based on the familiar; on labels, descriptions, and categories that are given in advance and serve as finite, discrete, and isolated 'counters' available for knowledge to manipulate. (p.43)

Technological knowledge, therefore, would encourage the practice of maintenance learning, which involves precisely the memorizing of preexisting labels and descriptions. But whereas maintenance learning views limits and constraints in a purely negative fashion, Tarthang Tulku (1990) reframes our understanding of knowing by stating that

Knowing limits as limits, we know them also as knowledge. Aware of the mind as the one that affirms limits, we can ask whether mind too is knowledge. If so, knowledge becomes freely available in a previously unsuspected way. Self-sufficient, self-reliant, and dynamic, the mind expresses knowledge not as content but as capacity. (p.327)

Here, in a nutshell, is the crux of the distinction between maintenance learning and evolutionary learning. Content and storage are clearly the major issue for maintenance learning. Can we remember where we put it all? Rote memorizing was, for a long time, an essential part of human education. Seeing knowledge as capacity, on the other hand, shifts us to thinking about the nurturing of the capacity for knowing and the myriad of ways in which it can go. The focus of our entire educational thrust shifts as we attempt to foster a capacity rather than fill a container with information.

There seems indeed to be something timely in this process. The faculty of memory was assiduously cultivated when print was not widespread, and clearly provided the most easily accessible reference source for intellectuals and other citizens alike for thousands of years. With Gutenberg's revolution that all changed, slowly, and now with the computer and its enormous storage capacity and possible links to virtually inexhaustible databases, human knowledge will indeed point towards capacity rather than content in an information age.

Tarthang Tulku argues that in order to fully appreciate our capacity for knowledge we must let go of the 'bystander'. And one of the crucial aspects of the bystander approach is the illusion that our knowledge can be free of values. This value-free thinking has profoundly influenced the discourse of science. A disembodied knower does not participate in the world s/he knows, standing outside of it in more ways than one. The 'objective' knowledge gained by the 'bystander'-- supposedly 'objective' precisely because of the uninvolved nature of the 'bystander' -- is claimed to be 'value-free', and makes the knower 'value-free' also. In effect, the bystander-as-knower cannot make claims pertaining to her/his or any one else's values because s/he has to claim to stand outside of any value framework in order to make valid claims to knowledge. The knower is, at the same time, unable to investigate the nature of the values themselves because they originate, in the knower's self, which is by definition 'out of bounds', because of the knower's purported inability to observe the self 'objectively'.

And yet values originate in the very same place in which knowledge does -- values are, after all, knowledge too -- but knowledge is supposedly 'received' or 'captured' with our camera-like consciousness, whereas values are 'created', making them 'subjective'. This is clearly not so, as von Bertalanffy and Tarthang Tulku point out, reminding us of the active or 'intentional' nature of what Banathy calls creating consciousness in both cases. As Tarthang Tulku states,

Patterns of perception seem to trace what is knowable. But perception in turn traces to an intrinsic sense of value. When we interpret what appears in space and time, our fundamental values and concerns determine how we accumulate data, make inferences, draw conclusions, identify experience, expand speculations, and collect and organize what appears in meaningful constructs. (Tarthang Tulku, 1990, p.403)

Unless the values themselves are questioned, in a self-reflective form of learning, we can never move beyond the already known. It is precisely this questioning, this ongoing process of inquiry, that evolutionary learning proposes.

Evolutionary learning, in my interpretation of Banathy's concept, sees learning as an ongoing evolutionary process of understanding and self-transcendence. Learning is viewed as a process with the emphasis on capacity for learning and knowing rather than content. Its purpose is to create a context for the development of individual, and larger, societal, learning systems.

Very simply put, the assumption implicit in the concept of evolutionary learning as presented here is that our knowledge is a contextual, shared construct, rather than a reflection of ultimate reality. Once one assumes that one does not know, and accepts fundamental ignorance, but also the responsibility for the shared interpretation of reality and creation of a framework for acting upon that interpretation, it seems to me that the emphasis may shift from attempting to impose one's knowledge on others to the development of a context in which we can learn together for mutually beneficial purposes.

Just as we have to change the way we learn, we also must learn the way we change. Evolutionary learning, and the knowledge-base for evolutionary learning in a new worldview, has presented the foundations for a shift in the way we approach learning, but the stress remains on the 'exterior' public structures and philosophical underpinnings which allow us to present such a new approach. The individual must also change, and the change must be a two-way process, a mutually causal interaction where the structures are in place in order to facilitate knowing which, in turn, allows for a greater embodiment of knowledge in those structures.

Ultimately we are confronted face-to-face with the subject-object dichotomy and the interpenetration of what we term 'inside' and 'outside'. This may be an extremely fertile area for systems inquiry, and indeed it is one that von Bertalanffy (1975) pointed to in his essay on Nicholas of Cusa, and Joanna Macy has addressed in her discussion of Buddhism and General Systems Theory. This direction is also clearly pointed to in the work of Banathy (1987, 1991), Bateson (1972, 1979), Bateson and Bateson (1989), Ceruti (1989), Laszlo (1972), Montuori (1989), and others.

Most recently, the work of Varela, Thompson and Rosch (1991), *The Embodied Mind*, points to an exciting new synthesis of phenomenology, cognitive science, and Buddhist psychology. It represents the new generation of interdisciplinary systems research into the embodiment of knowledge. Banathy's (1991) volume explores the specific educational implications of evolutionary learning and the design of educational systems, and Ceruti's (1989) work is a sweeping critique of epistemological positions in the history of science, with particular reference to evolution.

Contributions of the TSK approach

A considerable amount has been written on the intellectual underpinnings of our worldview, but unless there is a thorough exploration of the self which embodies these assumptions, and lives that world, it seems unlikely we will stop repeating the behaviors and thoughts it allows us. One of the most powerful contributions TSK can make is to move us beyond a discussion of comparative models and worldviews into the matrix from which these arise, not just intellectually, but experientially. It can provide both theoretical underpinnings for the inquiry into knowledge, and the lived experience of different forms of knowledge. The very format of the TSK volumes, with exercises interspersed throughout as an integral part of the learning process, is indicative of the kind learning experience the author is proposing.

This reflects the author's concern with making the reader aware of his or her knowledge, and the exercises serve as a way of 'unfreezing' the reader's 'positions'. Tarthang Tulku (1984) states that

While we see ourselves as using knowledge, it may be more accurate to say that what we know is using us: We are drawn into responding to all that occurs around us. (p.69)

Our knowledge defines who we are, and a relationship to our knowledge that rests on maintenance learning does indeed lead to a situation where knowledge uses us, inasmuch as it determines our preexisting responses to preexisting situations, without allowing spontaneity to enter into the picture. This kind of knowledge leads to mechanical responses, and its weaknesses and limitations become particularly apparent during social and psychological 'breakdowns', when established patterns of knowing do not apply and chaos and confusion ensue.

Despite this mechanical knowledge based on historical conditioning, our individualist society has given us the illusion that the self makes free and independent decisions (Sampson, 1983, 1988, 1989). But all understanding, judging, and perceiving, occurs within a "preexisting matrix" (Tarthang Tulku, 1987, p.173), and

in knowing, 'I' observe, categorize, and characterize; 'I' apply names and labels. This activity itself seems to be what 'I' label as 'I'. The unique energy that 'I' bring to knowing, mirrored back to 'me', confirms the truth of 'my' existence at the center of experience. 'I' find 'myself' reflected everywhere, for each known object, insofar as it is known, is 'my' creation. If 'I' as subject is only the reflection of what the object reveals, then which is truly subject and which is object, which is the actor and which is the acted upon? In this complex interaction, is the objective world 'my' projection, or is it perhaps more accurate to say that 'I' am its creation? (1984, p.195)

Discussing what he terms 'lower knowledge, Tarthang Tulku (1977) warns that

We have remained unconcerned about the problems caused by 'lower knowledge' because we are actually afraid to question them. We are afraid that we might indeed discover an alternative--we might actually find the answers to questions which convention deems unanswerable. We might end up with 'knowings' which go far beyond the scope of the self's territory. (pp.238-239)

He then addresses the fundamental issue of self-transformation.

The self does not want to know at the cost of losing its primacy in the overall scheme of things. It will not let itself acknowledge such 'knowings'; it would rather keep on playing with belief systems which seem to deal satisfactorily with the problems it has, but which instead -- due to the inherent limitations of these beliefs -- create a deep sense of estrangement, guilt, fear, and limited ability. (p.239)

This 'internal' dimension of self-transformation has remained the domain of the spiritual or mystical inquiry, and more recently psychology and psychotherapy, whereas transforming the 'outside world' has become the exclusive domain of science and politics. This dichotomy must now be transcended. Exploding the 'internal/external' polarity, Tarthang Tulku (1984) points out that "The attitudes we adopt in carrying out our investigation shape the attributes we find in the world we investigate" (p.307). Furthermore, "The object in being known reflects the interpretive structure that knows it; the subject in knowing the object is modified by the object it knows" (Tarthang Tulku, 1990, pp.423-424). A mutually causal dynamic (Maruyama, 1974) is at play. Discussing the opposition of 'objective' and 'subjective', Tulku (1990) states that

Between these two alternatives lies a third view based on interaction and feedback, in which subject and object relate in complete intimacy. When the self applies judgments to objects experienced as having specific attributes, object, attributes, and the judgments made by the self all sustain one another, with none more basic than the rest. An object is not 'beautiful' only because it is seen by a self who makes this judgment: Something about the object supports this judgment and thus makes it possible. (p.423)

In the history of ideas, this mutually causal dynamic, where what is known reflects the interpretive structure of the knower, and the knower is modified by the known is seen, for example, in the development of the Darwinian view of evolution. Darwin was influenced by Victorian culture, and the Victorian culture interpreted Darwin in a Victorian way. Victorian attitudes led to the finding of particular attributes in the world. Examples like this abound not just in the scientific literature but in international relations, family disputes, and generally all domains of human interaction.

What is peculiarly paradoxical, therefore, is that by focusing on 'external', 'objective' events, purportedly ignoring 'subjective' consciousness, we have nevertheless encountered that very consciousness wherever we have gone, projecting it out into the world unbeknownst to us. The very split of objective and subjective has created the illusion of seeing a world we believed 'real' and making it real by acting as if it were real.

Tarhang Tulku points to the possibility of a new, global knowledge, which accepts this as if nature of knowledge without 'buying into it'.

Attuned to conventional knowledge without accepting its assertions, a global knowledge would accept propositions as if they were true--either for the practical purposes of our lives, or for the specific purpose of cultivating greater knowledge. (1990, p.408)

This kind of global knowledge has what one might call a much more relativistic stance towards personal perspectives, cultural 'lenses', and worldviews. We now generally accept that two individuals in the same culture and in the same age can see the world differently. A worldview, on the other hand, acts as a common language and heritage that binds them and is mostly invisible to them. It is what actually allows us to define what differences are, and the way we talk about them. It operates at a much deeper level, and it is much more difficult for us to become aware of its effects. Global knowledge might make visible the invisible landscape on which different paths are created, and allow us to entertain many different possibilities, to the point of operating in 'pathless path'.

Tarhang Tulku goes on to state that

the distinctions of conventional knowledge have no substantial foundation, but emerge through an act of knowing. All that we know seems to be interrelated and interdependent, like the infinitely complex 'read-out' of a set of founding principles or a specific way of knowing, put into effect some time 'before'. (Tarhang Tulku, 1987, p.315)

Our distinctions are made, among other things, through specific focal settings, or decisions concerning system definition, as Ceruti points out. But these decisions are made for us, 'before' us, by a history which acts upon us through conditioning and a knowledge which uses us. We are not aware of the artistic, as-if nature of the stories we live.

The theories and constructs we rely on to make sense of the workings of mind, together with the axioms on which they are founded, rest on an enigma. The program generates itself, empty of substance; the wheel revolves with no one to turn it, establishing subject and object alike. We rely in each moment only on previous moments. The recognition of 'no-basis' is the obverse of the momentum generated by narrative flow, and of its psychological counterpart: the commitment that individuals make to the stories they tell. Momentum is essential for sustaining what has no substance. (Tarhang Tulku, 1987, p.329)

In other words, we take the as-if to be some ultimate touchstone for reality, the path we walk as the only path, when in fact it is only held in place by a forceful momentum which, as Tarhang Tulku points out, sustains what is of no substance at all. It is what has come before us that sustains what is now, rushing onward in such a fashion that we feel we cannot 'get off' without being thrown clear of any place to 'hang on' to. And at the heart of the momentum lies the self, which is the primary area of inquiry until recently left untouched by the systems/cybernetic approach.

Varela's work discusses the same self-sealing coherence which builds up momentum shaping the self in systems/cybernetic terms.

In a unit with operational closure, what appears as coherent or distinguishable behavior (whether in the domain of meaning or in the domain of molecular structures) has a peculiar nature indeed. On the one hand, it appears as a single property of the unit itself; on the other hand, when we attempt to examine the origin of such a property through its own properties, we find that there is nothing but an indefinite iteration of the same; it starts nowhere and it ends nowhere. The coherence is distributed through an ever repeating circle that is infinite in its circulation, yet finite, since we can see its effects or results as a unit's property. (Varela, 1984, p.306)

Interestingly, the operational closure of a system is directly related to its establishment of autonomy and identity. From this perspective, our relationship to knowledge takes on a different coloration. We suddenly realize very clearly Tarthang Tulku's statement that it is not we who possess knowledge, but knowledge which possesses us, and as Varela states, it also

reveals to us a world where "no-ground," "no-foundation" can become the basis for understanding that the age-old ideal of objectivity and communication as progressive elimination of error for gradual attunement is, by its own scientific standards, a chimera. (p.323)

Varela points us in the direction of a world where the image of a gradual progress, a gradual purification of human knowledge from all errors and towards the ultimate 'correct' answer is rejected in favor of a foundationlessness which seems to parallel Tarthang Tulku's work. But the final implication of this is that the persistence of the 'bystander' in systems thinking can only be eliminated with a radical transformation of the inquirer, of the knower, because it is the knower who keeps the foundations afloat. Unless this occurs, we will remain rooted in a 'founding story' which differs considerably from the systems philosophy we espouse, and is clearly at odds with it.

The narrative of the self's story amounts to an ongoing agreement the self makes with itself for the purpose of witnessing its own identity and affirming its ownership over experience. (1987, p. 207)

The discourse of science sought to eliminate the self and its values, biases, and perspectives. What is now becoming clear is that the self should not be eliminated, but, on the contrary, become fully integrated in the process of inquiry, and eventually transcended in its incarnation as the 'bystander' (Ceruti, 1989).

Transcending this problematic 'identity' is not, as yet, a major concern of systems science. There are now emerging important avenues of inquiry in this area, even at an institutional level. Recently special interest groups (SIGs) have formed in the International Society for Systems Sciences (ISSS) for the purpose of studying means of understanding and transcending the self.

While the story focuses on the immediate situation defined by self-concern, the vision encourages aesthetic appreciation of the whole. (1987, p. 240)

The TSK vision globalizes knowledge and shows the paradoxical self-concern of a scientific discourse claiming to be value-free. The founding story roots inquiry in preestablished concerns which determine the mode and subject of inquiry. With the globalizing perspective offered by TSK, our very understanding of knowledge, and consequently of being, is changed. "Free and open inquiry sees through the 'truth' of what the 'bystander' knows, investigating how the 'truth' is set

up without setting up a competing ‘truth’” (p.274). An ongoing process of inquiry would be set up in the spirit of evolutionary learning.

Distinctions bring forth an understanding of the world in a wide variety of perspectives, and the TSK vision would point us to the very capacity for developing perspectives, understandings, and distinctions.

When knowledge is more inclusive and evocative, it embraces the activities of knowing and seeing, strengthening their power. Instead of the linear relationship of ‘subject knowing object’, there is the ‘experience’ of ‘knowing’ the experience of knowing. The relationship between subject and object becomes accessible directly, with the consequence that subject and object alike are transformed: The ‘object’ becomes knowledge itself, while the ‘subject’ becomes experience. (1987, p.xiii)

Perhaps what follows may describe the kind of ‘knowing’ evolutionary learning might eventually strive for, as we learn to appreciate the whole, aware of how we create distinctions:

Within the luminous vitality of such knowing, existence would be transformed into ‘appearance as’. ‘Was’ would be ‘as’ and ‘is’ would be ‘as’; essence would be transformed into absence. Negation would be present within all appearance, as the heart of appearance. (1990, p.409)

Conclusion

Evolutionary learning represents an expansion of certain inherent aspects of the systems/cybernetic paradigm. As such it focuses on the practical aspects of developing a program of ongoing learning based on an epistemological position which recognizes a plurality of points of view and interpretations. The process of evolutionary learning ultimately involves a process of self-transformation. In this area in particular, TSK has a lot to offer.

First of all, TSK offers a powerful open-ended theoretical framework, and provides not a set of answers but rather opens up the possibility for ongoing inquiry. Secondly, TSK offers a set of practices and exercises which open up the possibility of experiential investigations into the nature of knowledge. These possibilities allow for a radically different form of inquiry which intimately involves the inquirer in the learning process and can, potentially transform the inquirer in the process because the inquiry is self-reflective as opposed to outer-oriented as it would be say, in the case of an ethnologist exploring another culture and only being aware of internal changes and learnings as ‘side-effects’ of the journey.

TSK therefore opens up the process of inquiry in such a way that a community of scholars can be formed with the potential to discuss the transformation of knowledge and the knowledge of transformation, a community which can itself engage in a process of evolutionary learning.

REFERENCES

Ackoff, R. (1981). *Creating corporate futures*. New York: Wiley.

Banathy, B. (1991). *Systems design of education. A journey to create the future*. Englewood Cliffs, NJ.: Educational Technology Publications.

Banathy, B. (1987). The characteristics and acquisition of evolutionary competence. *World Futures*, 23, 123-144.

Banathy, B. (1984). *Systems design in the context of human activity systems*. San Francisco: International Systems Institute.

Barron, F. (1990). *Creativity and psychological health*. Buffalo, NY: Creative Education Foundation. (Original work published in 1963)

Barron, F. (1979). *The shaping of personality*. New York: Harper & Row.

Bateson, G. (1979). *Mind and nature: A necessary unity*. New York: Ballantine

Bateson, G. (1972). *Steps to an ecology of mind*. New York: Ballantine.

Bateson, G., & Bateson, M.C. (1987). *Angels fear. Towards an epistemology of the sacred*. New York: Macmillan.

Bergson, H. (1935). *The two sources of morality and religion*. Notre Dame, Indiana: University of Notre Dame Press.

von Bertalanffy, L. (1975). *Perspectives on General System Theory*. New York: Braziller.

Buckley, W. (Ed.). (1968). *Modern systems research for the behavioral scientist*. Chicago: Aldine.

Capra, F. (1980). *The turning point*. New York: Bantam.

Ceruti, M. (1989). *Il vincolo e la possibilita`*. [Constraint and possibility] Milano: Feltrinelli.

Churchman, C.W. (1971). *The design of inquiring systems*. New York: Basic Books.

Churchman, C.W. (1968). *The systems approach*. New York: Laurel.

Csikszentmihalyi, M. (1988). Society, culture and person: A systems view of creativity. In R. Sternberg (Ed.), *The nature of creativity* (pp.325-339). Cambridge: Cambridge University Press.

Eisler, R. (1991). Cultural evolution: Social shifts and phase changes. In Laszlo, E. (ed.), *The new evolutionary paradigm*. New York: Gordon & Breach.

Eisler, R. (1987). *The chalice and the blade. Our history, our future*. San Francisco: Harper & Row.

Fisher, G.H. (1987). *Mindsets: The perception and reasoning factor in world affairs*. Yarboro, ME: Intercultural Press.

Fuller, R.B. (1969). *Utopia or oblivion: The prospects for humanity*. New York: Bantam.

Gazzaniga, M.S. (1985). *The social brain*. New York: Basic.

Von Glasersfeld, E. (1984). Introduction to radical constructivism. In P. Watzlawick.(Ed.). *The invented reality*. (pp. 17-40). New York: Norton.

Kearney, R. (1988). *The wake of imagination. Toward a postmodern culture*. Minneapolis: University of Minnesota Press.

Koestler, A. (1979). *Janus: A summing up*. London: Picador.

Henderson, H. (1981). *The politics of the solar age*. Garden City, NY: Anchor.

Henderson, H. (1978). *Creating alternative futures*. New York: Putnam.

Jantsch, E., & Waddington, C.H. (1976a). *Evolution and consciousness. Human systems in transition*. Reading, MA: Addison-Wesley.

Laszlo, E. (1987). *Evolution: The grand synthesis*. Boston: New Science Library.

Laszlo, E. (1972). *The systems view of the world*. New York: Brazillier.

Loye, D. (Forthcoming). *Sex, gender, and transformation: The end and beginning of morality*.

Loye, D. (1990). Moral sensitivity and the evolution of higher mind. *World Futures*. 30, 41-52.

Loye, D. (1989, June). *Moral sensitivity and the evolution of higher mind*. Paper presented at a symposium on the Evolution of Cognitive Maps, University of Bologna, Italy.

Loye, D. (1977). *The leadership passion*. San Francisco: Jossey Bass.

- Loye, D., & Eisler, R. (1987). Chaos and transformation: implications of nonequilibrium theory for social science and society. *Behavioral Science*, 32, 53-65.
- Liotard, J. F. (1984). *The postmodern condition: A report on knowledge*. Minneapolis: University of Minnesota Press.
- Macy, J. (1991). *Mutual causality in Buddhism and General System theory: The Dharma on natural systems*. Albany, NY: SUNY Press.
- Maruyama, M. (1974). Paradigmatology and its applications to cross-disciplinary, cross-professional and cross-cultural-communication. *Dialectica*, 28, 135-196.
- Montuori, A. (1989). *Evolutionary competence. Creating the future*. Amsterdam: J.C. Gieben.
- Morin, E. (1983). *Il metodo. La natura della natura. [Method: The nature of nature]* Milano: Feltrinelli.
- Naisbitt, J. (1982). *Megatrends*. New York: Warner.
- Ogilvy, J. (1977). *Many dimensional man*. New York: Harper.
- Sampson, E.E. (1989). The challenge of social change for psychology: Globalization and psychology's theory of the person. *American Psychologist*, 43, 914-921.
- Sampson, E.E. (1988). The debate on individualism: Indigenous psychologies of the individual and their role in personal and societal functioning. *American Psychologist*, 43, 15-22.
- Sampson, E.E. (1983). *Justice and the critique of pure psychology*. New York: Plenum Press.
- Senge, P. (1990). *The fifth discipline*. New York: Doubleday.
- Sternberg, R. (Ed.). (1988). *The nature of creativity*. Cambridge: Cambridge University Press.
- Thompson, W.I. (1989). *Imaginary landscape. Making worlds of myth and science*. New York: St. Martin's Press.
- Thompson, W.I. (Ed.). (1987). *Gaia: A way of knowing*. Great Barrington, MA.: Lindisfarne Press
- Thompson, W.I. (1986). *Pacific shift*. San Francisco: Sierra Club.
- Thompson, W.I. (1978). *Darkness and scattered light. Speculations about the future*. Garden City, NY: Anchor.
- Toffler, A. (1980). *The third wave*. New York: Bantam.
- Toynbee, A. (1964). Is America neglecting her creative minority? In C.W. Taylor (Ed.), *Widening horizons in creativity. The proceedings of the fifth Utah creativity conference* (pp. 3-9). New York: Wiley.
- Toynbee, A. (1947). *A study of history* (abridgement of volumes 1-6 by D.C. Somervell). New York: Oxford University Press.
- Tulku, T. (1990). *Knowledge of time and space*. Oakland: Dharma.
- Tulku, T. (1987). *Love of knowledge*. Oakland: Dharma.
- Tulku, T. (1984). *Knowledge of freedom. Time to change*. Oakland: Dharma.
- Tulku, T. (1977). *Time, space, and knowledge. A new vision of reality*. Oakland: Dharma.
- Varela, F. (1984). The creative circle: Sketches on the natural history of circularity. In P. Watzlawick. (Ed.). *The invented reality*. (pp. 309-324). New York: Norton.
- Varela, F. Thompson, E., & Rosch, E. (1991). *The embodied mind*. Cambridge, MA: MIT Press.
- Vickers, G. (1980). *Responsibility -- its sources and limits*. Seaside, CA: Intersystems Publications.
- Watzlawick, P. (Ed.). (1984). *The invented reality*. New York: Norton.
- Westen, D. (1983). *Self and society. Narcissism, collectivism and the development of morals*. Cambridge: Cambridge University Press.
- Wilden, A. (1980). *System and structure. Essays in communication and exchange*. London: Tavistock.

Wilshire, B. (1989). *The moral collapse of the university*. New York: State University of New York Press.