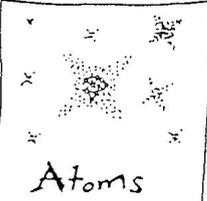
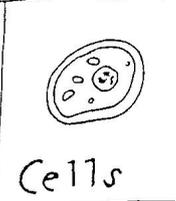
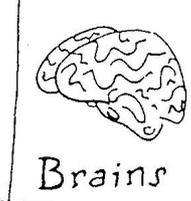
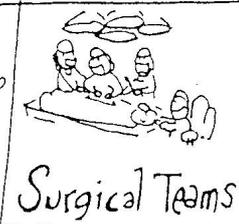
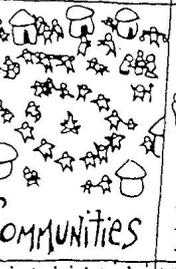
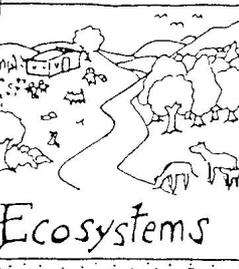
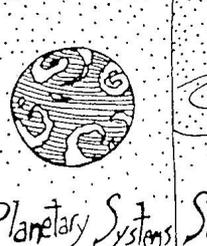


SYSTEMS THEORY:
 REDISCOVERING NATURE'S PARADIGM
 (unedited version)
 CREATION SPIRITUALITY NETWORK MAGAZINE
 volume 12, number 2, pp. 37-45 Christopher Chase 1996

Nature's Systems

 Atoms	 Cells	 Brains	 Organisms
$2+4+8-3=11$ ☺ = \$ 山 "nice dog"	 Families	 Rock Groups	 Surgical Teams
 Methods	 Communities	 Economies	 Ecosystems
 Planetary Systems	 Solar Systems	 Galaxies	 The Universe

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"Every particular in nature, a leaf, a drop, a crystal, a moment of time is related to the whole, and partakes of the perfection of the whole. Each particle is a microcosm, and faithfully renders the likeness of the world." (Ralph Waldo Emerson)

Introduction

If you look around yourself carefully, you may notice that our universe consists of a unified network of systems nestled within systems. Your physical body is composed of various organ systems, each maintained by groups of cells, molecules and atoms. Our families and social communities are embedded in ecosystems, the biosphere, the solar system, our galaxy and the universe. From this perspective, human beings are as much a part of nature as the oceans, trees, and stars. What's more, there seem to be certain patterns and processes which occur in natural systems everywhere, guiding the development of individuals and galaxies alike.

This article provides an overview of systems theory, a unified body of ideas that describe the common properties and characteristics of structures throughout the universe. The ideas in systems theory are based on careful observations of natural phenomena. They tell us how nature works, how all things fit together into larger systems and communities. Its concepts refer as much to cells and solar systems as to nations, corporations and basketball teams.

While many of the words and concepts of systems theory are new, systems thinking is not. Systems thinking is a way of looking at the world ecologically and holistically, where one focuses on patterns and processes, and how seemingly separate things form coherent wholes.

Systems thinkers have been with us since ancient times, providing wisdom and guidance in all cultures and every area of human activity. Some of the ideas presented here have their roots in ancient Greece, or in Eastern systems of thought, such as Taoism or Zen. Many indigenous communities have long had an awareness of the way nature's systems worked. They observed their environments carefully, watching the ways animals lived, how the natural world moved in cycles and patterns. Elaborate myths and rituals have helped native people to align themselves with the rhythms and processes of nature, to feel a part of their local worlds.

On the other hand, many civilized societies have moved away from a feeling of connectedness with nature, and an understanding of nature's ways. In the West, we have developed new ways of thinking, new methods for classifying and categorizing everything in the world. Our cities and communities both reflect and influence this thinking. Ours is a world of walls, boxes, and roads, of separation and specialization. Our social institutions are organized by a more mechanistic and linear paradigm, a less organic beat.

As the industrial revolution took hold in communities across the globe we have used this paradigm to organize all areas of our lives. In our educational institutions we have removed children from their families and natural surroundings. We have put them together in rooms and then asked a single adult to provide them with disconnected facsimiles of the world, to divide external reality into separate fields such as art, science, language, and history. What is often ignored in

this approach is the way these different phenomena are related, how things often flow together and influence one another.

In a field like science the natural world has been further divided into pieces. When we were young we studied biology, chemistry, physics, and geology-- as if each field existed separately from the others. We never received a coherent picture of the world that reflected the way nature actually organizes things, how these phenomena are related to one another and play a role in each individual's life.

Lacking a unified understanding of nature, our scientists and educators have often used very misleading metaphorical language in order to describe the world. Over the last few hundred years, leading Western scientists have talked about nature as if she were a woman to be dominated, a mindless machine, a struggle for survival, or (at best) a "glorious accident." These metaphors have influenced the way modern nations have dealt with internal social problems, other communities, and the natural world.

Our beliefs and metaphors for reality are conceptual tools. They help us create images and representations in our mind that we hope will reflect the way the world is actually organized. While these metaphors help to focus our attention on certain things they can also screen out and ignore a lot of information that is important. Over time our thinking has become increasingly rigid and reductionistic, frequently separating phenomena into fixed categories such as "us and them," or "smart and dumb."

In the United States, social or physical problems have often been viewed as adversaries people must struggle with or declare war upon. This dualistic thinking underlies the approaches we've taken toward poverty, drug abuse, cancer, and crime. It has sent missiles firing

into Viet Nam, Lebanon, Panama, Libya and Iraq. In most cases our wars have been ineffective, created new problems, or simply ignored the resulting violence and suffering caused.

Yet, while this hard-edged thinking may be out of touch with the organic complexities of natural phenomena, it has provided the key to the development of sophisticated tools, mathematics, and machines. New inventions (like the microscope, the camera, the steam engine and the computer) pushed change and shaped the unfolding patterns of mechanistic civilizations. They also allowed scientists to observe the rhythmic functioning of atoms, organs, and cells; to glimpse the history of our planets and the stars.

It is in this careful and methodical examination of the natural world that modern systems theory developed. Today we have detailed information about almost everything in the observable universe. We also have a large body of words, concepts and theories that describe how all these things fit together, how these systems provide evidence of certain recurring processes and patterns in the natural world. Setting out initially to classify and categorize nature, science has now brought us full circle, rediscovering nature's paradigm.

The Core Ideas of Systems Theory

To make the ideas of systems theory easier to understand, we can organize them into two separate (but fundamentally related) categories, what we might call the Unifying and Creative Properties of Natural Systems. Each word or idea described here focuses our attention on a different process or characteristic of the physical world. Although some of these concepts have their roots in pre-modern philosophies, they can be integrated into contemporary systems theory. By bringing ancient and modern wisdom together we may

regain our understanding of how our universe is structured, and how it creates new forms.

THE UNIFYING PROPERTIES OF NATURE

There are several distinct attributes and processes which play a role in maintaining and unifying all the systems in our world. From a systems perspective, many independent systems and polar opposites are actually fundamentally connected. Animals, ecosystems and the global economy are all UNIFIED systems. They are each composed of many interacting individuals, communities and sub-systems. Systems theorists often use the term COMPLEXITY to refer to these intricate structures and the webs of INTERDEPENDENCE that enable individual creatures (or sub-systems) and their surrounding systems to function together as coherent wholes.

A similar idea is found in the Taoist conception of yin and yang, where polar opposites like black and white are represented as interdependent parts of an indivisible whole. This fundamental relatedness can be difficult to perceive when one looks at the world in terms of mutually exclusive categories such as humans and nature, or good and evil. Dualistic logic screens out the complex interdependencies that actually exist all around us. Take the second world war for example. The ideas of communism, fascism and modern capitalism were all grounded in the extremely competitive picture of nature painted by Charles Darwin's theory of evolution. Our nations were locked into a polarized struggle for "survival of the fittest." Leaders on all sides were so intent on demonizing and dominating their enemy that they were willing to destroy millions of people rather than be defeated.

One of the things dualistic thinking ignores is our fundamental UNIVERSALITY, how we are part of one human family, how we are embedded in the

cosmos and it is embedded in us. If you were to trace the history of all the molecules, atoms and energy currently forming the cells of your body, you would find that you are composed of elements from flowers, oceans, dinosaurs, meteorites, our sun and earlier stars now long gone. Each of us is also embedded in a wide range of human systems, such as our nations, families, educational systems, work places, cities, and the global economy.

Another essential characteristic of natural systems is that they are SELF-ORGANIZING. That is, the many different parts that make up a system arrange themselves into coherent structures, patterns, activities and forms. This applies to living as well as non-living systems. Snow flakes, planets, brains, rivers, villages and street gangs are all self-organizing. Self-organizing systems often maintain their structure by creating states of DYNAMIC STABILITY. That is, unified systems and organisms are sustained through a process of constant self-renewal, a balancing act of rhythmic movement, patterned order and cyclic change. The earth rotates around the sun, as the moon circles the earth. Weather patterns dissipate energy and carry water over land in consistent seasonal patterns.

Dynamic organized systems such as the human body or the economy are sometimes called OPEN SYSTEMS because they are constantly gathering in new elements (in order to maintain their structure) and then returning them to their surroundings. This organic interdependency is one of the central insights heralded by the modern ecology movement. When we dump pollutants into our rivers it comes back to us in the seafood that we eat.

A related characteristic of natural systems is that of CENTRALITY. Creative systems that maintain their structure are often centered and unified by a specific place, pattern, purpose or goal. Musicians are intent on

creating and performing songs. A tribal village centers on the future and well-being of its children.

In order for complex organisms and communities to thrive they must center upon and value all of their component members or "sub-systems" equally. This may sound strange because of our tendency to think of "centers" in a geometric way, as points at the center of circles or spheres. But nature often organizes things organically, within and all over the surface of structures, where "centers" exist in a plural sense. The complex social problems of modern societies may have their roots in the way our social institutions place more of a value on some people than others. A family, nation, or institution that does not center upon all of its members equally should not be surprised if some of those members no longer prioritize the well-being of either themselves, or their surrounding social communities.

Connected to these ideas is the concept of STRUCTURED SPACE. This idea is based on the Taoist and Zen conceptions of space or nothingness (what I also like to refer to as the EMPTY CUP PRINCIPLE). Space here is viewed as a well structured place that invites participation, that provides room for relationships, and supports creative development. This differs significantly from the usual Western conception of space as a void or vacuum, a lonely vacancy we often feel compelled to fill.

Most of nature's systems provide structured space for other systems within them. The Earth's surface provides an environment ideally suited for the evolution of life. Local ecosystems provide niches for many different species of creatures. Human communities thrive as they provide opportunities for their members to participate and contribute creatively. Great art, science, literature, music, and education leaves space for the inner world of individuals, seeking

to stir our imagination and emotions, leaving room for our souls.

Another property which helps to maintain organizational unity is that of INFORMATIONAL FLOW, the communication processes linking independent structures in nature. Living systems like ourselves rely upon a constant flow of sensory information in order to maintain our internal processes, move about, and learn from our surroundings. Through our senses we are intimately connected to our local environments.

Sometimes when I walk in a lush natural setting I am amazed by all the information flowing around me. Flowers and trees are releasing genetic information for their kin through pollen, while scents and colors signal to insects and animals that a tasty nectar or fruit is available. Bees buzz about, returning to their hives to communicate the direction of local feasts. Birds are calling to mates or warning away approaching predators. Thousands of insects are communicating below the grass with chemical signals we can not smell. In the world around us, nature is "talking" all the time.

We humans seem to have taken this capability to a new level with our ability to communicate and represent information through spoken languages and written symbols. These tools have allowed literate societies to pass on very complicated information to one another and to future generations (much as DNA links our bodies to our direct ancestors in the past). This helps to explain the enormous complexity of modern civilization, and all our wondrous technologies.

We may be fooling ourselves, however, if we think that our tools (and books) somehow prove that we are smarter than nature. We are a fundamental part of nature, one of the newer expressions of a universe that came up with DNA coding and neural systems over

half a billion years ago. Nature offers us a living library of wisdom to learn from, a world that often "speaks" to us, if we listen carefully. As one Native American leader put it, "You know, if you take all your books, lay them out under the sun, and let the snow and rain and insects work on them for a while, there will be nothing left. But the Great Spirit has provided you and me with an opportunity for study in nature's university, the forests, the rivers, the mountains, and the animals which include us."

THE CREATIVE PROPERTIES OF NATURE

While the unifying processes of our universe link separate elements together, the creative properties of nature help to constantly bring new things into being. The most basic example of this creativity is the process of SELF-CONSTRUCTION, a term biologists sometimes use to describe the physical growth and development of organic systems. Building on a long and rich evolutionary history, each plant and animal must grow its bodily structure on its own. By contrast, human tools and machines are constructed, they have been built from the outside rather than growing themselves from within.

Many of the organized systems mentioned so far exhibit an incredible innovativeness and creativity that our present cultural paradigm does not acknowledge. Some of the recurring problems that Western societies have created may stem in part from our assumption that the natural world was constructed from the outside, much like a piece of pottery or a machine.

I will therefore use the term CREATIVE SYSTEMS to refer to any system that forms a unified whole and causes new things to come into being. A term like this can help us to transform our culture's rather limited conceptions of creativity. It recognizes the creative processes and systems characteristics shared by

individual artists, cultural communities, and the rest of the natural world. It opens our eyes to the methods by which our universe has developed and evolved complex structures over time.

The method of creativity most widely employed by creative systems is in many ways similar to what Darwin describes in evolutionary theory. First, components in a system generate a large number of variations. Next, other components or processes in the system (or in the surrounding systems in which it takes part) select or reward the form, structure or pattern which best "fits" with both the system and its environment as a whole. Families, societies, ecosystems and innovative organizations (like Toyota or NASA) produce things this way, through production, experimentation and the careful selection of those efforts which work best. While this idea of creativity builds on Darwin's insights, it also puts them into a broader context. The seemingly random and destructive activities of evolution can be seen as part of a self-organizing creative process operating at many different levels in the cosmos.

As Gregory Bateson has pointed out (in his book *Mind and Nature*), human learning often involves this kind of process. Whenever we first try to develop a new skill (such as walking, talking or making love) we begin by trying out a lot of things that don't work. We then select those specific efforts that are rewarded (through positive inner emotions, social praise, etc.) and continue using them in the future. Creativity is therefore not a rare quality that exists within individual people, it is a common process that requires interactions between systems and their environments.

This conception of creativity is related to the Greek notion of SYNERGY, the idea that individual methods or parts on their own can not equal what comes about when they cooperate together. Modern systems

theorists call this kind of activity NON-LINEAR DYNAMICS. What they mean is that the separate parts in a system or structure are working together in a way that cannot be computed or explained by traditional linear "1+1=2" logic. Numerous films (like Apollo 13 or Schindler's List) and musicians (like the Beatles) provide excellent examples of non-linear dynamics and synergy. They show us how high levels of human creativity often involve many separate individuals working together in unison.

Underlying all creative activity is the phenomena of MOVEMENT, and the fact that our cosmos is a flowing network of systems constantly involved in the process of CHANGE. When organized in stable patterns or cycles this universal movement takes temporary forms (such as atoms, cells, stars, birds, civilizations, etc). When these break apart we observe disorganization and chaos, until elements are reorganized again into a new pattern, or are absorbed as part of another system. Systems theorist Donald Ford describes this change process as "Organization-Disorganization-Reorganization." It is the fundamental pattern for systemic change in our universe, applying as much to civilizations and ecosystems as to waterfalls, relationships and learning.

In many cultures this change process has been represented through mythic ideas and religious images, such as the Chinese dragon, or Shiva, the Hindu god of destruction and regeneration. In Hindu and Taoist philosophy both chaos and order are viewed as unified aspects of the universal movement, where new structures continuously come into being only to eventually dissolve and reorganize.

Unfortunately, the model of nature currently dominant in Western science is rather one-sided. It emphasizes the role of chaos, or entropy, in the world around us. Our cosmos is thought to be ruled by the second law of

thermodynamics, which states that the overall orderliness of the universe is always decreasing. This ignores the change pattern just mentioned. It also overlooks the ENERGY UTILIZATION processes of creative self-organizing systems, how they transform chaos and utilize energy, working with it as a sailboat rides with the wind.

Take life on our planet as an example. Plants and animals exist thanks to the entropy production of our sun, which releases photons of free energy as it builds heavier elements in its core. The diagram presented here shows the complex and interdependent network of systems involved in capturing this energy and utilizing it to animate all life on our planet. Living creatures are solar-powered, thriving on the chaos and energy that surrounds us.

Because of the interdependent and dynamic nature of complex systems, an event or change in one system can have a RIPPLE EFFECT upon surrounding systems. This is also called the BUTTERFLY EFFECT in chaos theory, the idea that a butterfly's wings can set off a series of events that eventually effect weather patterns on the other side of the globe. While such cases may be rare they do happen. Two thousand years ago a young Jewish man taught about love. His words have rippled through cultures around the world. Five hundred years earlier the Chinese sage Lao Tsu said things about nature's ways that have spread out more slowly, but continue to stir highly transformational waves.

Two more important characteristics of creative systems are AUTONOMY and PARTICIPATION. Complex natural systems often exhibit a high degree of both freedom and interdependence. Individual structures are to some extent autonomous and yet must also operate within certain bounds, fitting into their surroundings as a whole, and supporting the larger systems in which they play a part. The human digestive system and

reproductive system function separately, but both support and partake in the life of a single creature. Individual animals have a great deal of autonomy, but also participate in social groups and ecosystems. What we commonly call "cancer" refers to groups of cells that are functioning autonomously, without participating responsibly in the life of their larger community, the body of the organism of which they are a part.

The dynamic interplay of creative and unifying processes often give rise to certain emergent properties in complex systems. As an example, nature's creations often possess a POTENTIAL for optimal balance, development, performance, or functioning. Our planet has the potential for evolving and supporting life. The physical bodies of animals have the potential for health and freedom from disease. Seeds are potential trees. Most human beings have the potential for developing complex skills in art, music, mathematics, and languages. When these potentials are not realized it is more often due to a lack of environmental support and opportunity, then to any lack of possibility within individuals themselves.

The idea of potentiality is important because it encourages us to focus on nature's successes, on the structures and capabilities that have come into being over millions of years. The ideas of preventive care and holistic medicine are focused on supporting the body's natural ability to maintain its healthy functioning (what physician Andrew Weil has called the healing system). Progressive educational programs try to work with children's inborn capacity for curiosity, perseverance, creativity, enjoyment and learning. It is often much easier and more efficient to nurture what has potential than to try to fix a situation after something has been neglected.

Related to this is the idea of ADAPTABILITY, the potential ability of a system to change, to adjust its patterns to that of internal or surrounding conditions. Researchers who study creative systems (such as the biosphere or the economy) often refer to them as COMPLEX ADAPTIVE SYSTEMS. A structure like the brain exists because it specializes in its ability to adapt a creature to constant changes in its personal needs or environmental conditions. Our social institutions are currently being challenged to adapt themselves creatively, to let go of out-moded methods and "fit" the people they serve.

Like most of nature's systems, our institutions have the capacity for SELF-TRANSFORMATION-- for moving beyond their current patterns or situations. Some creatures are able to transcend their physical identities dramatically, like tadpoles and caterpillars. Human children continuously move past one level of structural identity and into another. Few patterns in nature are fixed. In fact, evolution and transformation may be the only way dynamic self-organizing systems can maintain themselves over time.

One final concept that I will discuss is the principle of EQUIFINALITY. The idea here is that the same final state or condition can be reached using a variety of methods, with systems or individuals starting from different locations or positions. We see this in nature, in what is called parallel evolution. Eagles, humans and dragonflies all developed the ability to sail through the sky independently, each using a different method.

It is important for people in education and government to recognize the principle of equifinality. Since no two children, communities or nations are the same the best path to learning, economic development or peace may differ from one individual or group to the next. Unfortunately, many political and educational institutions often assume that there is one best path

which all should follow. Those whose backgrounds or experiences do not "fit" with the dominant approach may fail to receive the opportunities, support and experiences they need in order to change their behavior, develop themselves or learn.

Realigning Ourselves with Nature's Paradigm

The model of nature presented here has important implications for people working in every field of human activity. One place where the systems paradigm needs to be consistently applied is in the field of medicine. At the present time most hospitals are organized mechanistically, focused on controlling illnesses, repairing injuries and destroying diseases but not on supporting the complex interplay of social, biological and psychological forces that play a natural role in the human healing process. While many medical professionals do collaborate creatively, more can be done to bring patients and their families into this "loop."

Over the last few decades highly creative approaches have been emerging in the health care field, in the area of childbirth. Rather than ignoring the needs, abilities and natural physical processes of women, the most successful childbirth approaches are now aligned with them. Today many expectant mothers in the United States receive essential training and detailed information prior to giving birth. A woman can choose whether to give birth at home, in a hospital, a clinic, a pool of water; with a doctor, a mid-wife, family members (and with or without pain-killers). Here modern medicine, human abilities, and nature's processes have been integrated together synergistically, as a unified and creative system.

While it may surprise some people, the business community has recently shown a tremendous interest in systems theory. Many organizational text-books now

outline the difference between "open" and "closed" systems. Leading management consultants (like Stephen Covey and Tom Peters) have become keenly aware that the economy functions much like an ecosystem, and that companies are similar in some ways to organisms. They are also realizing that many successful businesses encourage creative cooperation among their workers.

Meanwhile, in the field of education, a growing number of schools are now taking a systems approach to learning. When I was a graduate student I participated in a school change program called the Accelerated Schools Project. Now working with over 500 schools in the United States, the project is focused on helping schools transform themselves from mechanistic institutions into creative learning communities.

Most educational institutions have been designed to function as selection systems. Tests and exams are administered in order to select out the "best and the brightest" from the "average" and the "dull." What this approach ignores is the way learning and development occur naturally, how children will self-construct skills and understandings by engaging voluntarily in social activities that interest and motivate them. In Accelerated Schools teachers are encouraged to no longer reward only certain children selectively, or compare children with one another. Instead, they seek to value and nurture all children, to provide interesting learning environments that "fit" with the natural ways children learn.

Students in these schools are now engaging in well-organized creative activities. They are not just studying-- they are writing books, making videos, designing museums, starting businesses, organizing festivals, exploring beaches, interviewing people, participating in pow-wows, and studying trash.

Students across age groups are working cooperatively on things and learning from one another. While teacher-centered instruction still occurs, studies have become more meaningful because they are linked to real projects and experiences, not just to grades or tests.

As for government institutions, they are beginning to help programs like this by supporting local community projects and promoting self-governance. Functioning less like a bureaucracy (and more like an ecosystem or the human brain) our centralized organizations have the ability to provide information, create networks, integrate and coordinate interactions, encourage experimentation, support success, nurture potential and help local systems maintain their stability.

In the future, governing organizations could also play an important educational role by facilitating the flow of communication globally. Through satellites and the internet, schools all over the planet could be plugged into events like the United Nations' global conferences. With the help of their parents, children could be involved in local research on air and water pollution, or surveys of community attitudes. They could be using computers to communicate with classrooms in other countries, collectively exploring topics like economic development or conflict resolution. Schools could become one of the sites where adults and children come together to create a more interconnected global community.

Meanwhile, for decades now many popular musicians have been helping to bring a more unified human society into being. In reggae, rock, and folk music we can hear repeated references to the themes presented here, to the wonder of human experience and the quest for freedom from the mechanistic paradigm. At a reggae festival, rock concert or rave gathering we sometimes find something akin to the ritual

celebrations of many indigenous cultures. People come together to dance as one, to transcend their social identities and celebrate their presence upon the earth. When these events become infused with a reverence for the rest of nature we begin to move into something transcending popular art and culture, carrying us into the realm of the sacred.

As we move towards the future, we will need more local events to remind us that we humans exist as a part of the web of life on our planet. While concerts and gatherings can play an important role, I believe that it would also be very helpful if Earth Day were made an international legal holiday. The incredible success of Earth Day 1990 (which fell on a Sunday) showed us that this event has the potential to be really big, with television specials, nature "theme" movies, school fairs, museum expositions, internet conferences, local gatherings and global satellite concerts.

With Earth Day providing a focus, film makers and the media can play a leading role in facilitating positive change-- by showing us where things have gone right, how different innovative systems create stability and work. An organization like Friends of the Earth could team up with actors and musicians to sponsor an annual "academy awards" type show, honoring successful ecological programs and innovations in business, education, economics, government, waste disposal, science, and technology. In order to help human communities reorganize themselves, they need models of how creative systems work, how unique solutions have been developed to address problems locally, in other cultures, and in the natural world.

Grounding Human Experience in the Fields of the Universal Creation

As a shared international holiday, Earth Day can play a central role in helping humanity re-organize itself. It

would provide an open and structured space, a day that invites us to celebrate our diversity, ingenuity, interdependence, and common evolutionary history. It would provide a day for people to experience our New Creation Story first-hand, brought to life through computer animation videos, theme park rides or virtual reality technology. As the picture (below?) demonstrates, all fields of knowledge can be connected and unified by organizing information visually, in a representation of Nature's systems as they exist in space and have evolved across "time." We return here to the language of visual images, like the cave paintings of long ago. Rather than representing the world in bits and pieces, scientists can collaborate with artists to provide a more coherent picture of human beings, our Universe and the way everything flows together.

By doing so we help corroborate the visions of some of the West's greatest mystics, artists, and poets, such as Eckhart, Whitman, Emerson, Blake, and Van Gogh. These individuals "saw" the presence of the Universe in all that surrounded them. Their works celebrate a Cosmos brimming over with unified structures and dance-like creativity. Rising above cultural categories and beliefs, they tried to describe a world where spirituality is grounded in the physical, and science merges into art.

The essence of their vision was simple: the Universe is not far away. It surrounds and infuses our world. The gift that modern science brings is a more detailed understanding of the history of our Cosmos, of the way it works on grand scales and in those things small. Yet, to be really useful we may have to release one of our most cherished cultural assumptions, our belief that we are somehow separate from the natural world. We may not fully understand ourselves until we accept that we are a part of this Universe, that we are intimately related to the rest of this creation.

The systems model presented here postulates that unity and creativity are the fundamental characteristics of our Universe, and that Nature's Systems are everywhere. Such a perspective encourages us to draw from our knowledge of creative processes, to think in the metaphors of activities like sports, games, gardening, weaving, building, music and dance. The wisdom of our spiritual traditions begins to make more sense. Our values and priorities begin to shift. All areas of social and individual activity could be profoundly effected by a model of the Universe that presents humans as creative participants in nature, and the entire Cosmos as a continuously unfolding tapestry of activity.

At this moment, the cells of our bodies are buzzing with activity, maintaining the processes of life. In a similar manner, our cities, businesses and communities are continuously maintaining and recreating themselves. All around us, the creative awareness inhabiting Nature looks out from countless points of view-- tasting, touching, moving and sensing this multidimensional wonder we inhabit.

As we release the limited thought patterns of the mechanistic age we become aware of the Cosmic Presence that surrounds and infuses our world. Centered in our present experience we begin to notice how our thoughts and emotions arise and self-organize. We start to recognize how the continuous dance of inner and outer conditions evokes this realm of experience, this unique position each of us occupies in the fields of the Universal Creation.

The spider, the cat, the child crossing the road, holding his mother's hand... Within each of us an inner life exists that is as complex and creative as the wider Universe which has brought us into being. Linking outward, with the current dance of Everything, we join the play of sights and sounds that surround us, the local

rhythms of the world. Our inner singularity begins to move in sync with the mountains and the birds... We are welcomed home.

Christopher Chase is an artist, writer, and university teacher living in Fukuoka, Japan. He is co-author (and illustrator) of two books, including The Accelerated Schools Resource Guide (Jossey-Bass, 1993). He received his Ph.D. in education from Stanford University

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Synchronicity: Science, Myth, and the Trickster by Allan Combs and Mark Holland (Marlowe & Company, 1996). A brilliant overview of the new sciences, and how they connect with Jung's ideas of synchronicity, as well as ancient Mythology. Very readable!!

Motivating Humans, by Martin E. Ford (1992, Sage). Ford presents a systems theory of motivation and explores its implications for promoting human learning and development in fields ranging from education and counseling to business.

Gaia: A New Look at Life on Earth by J. E. Lovelock (Oxford University Press, 1979, 1987). A very readable summary of the Gaia hypothesis, the idea that our planet is a creative self-organizing system.

The Turning Point by Fritjof Capra (Bantam, 1982). Includes an excellent chapter summarizing "The Systems View of Life."

The Voice of the Earth by Theodore Roszack (Touchstone, 1992). A call for members of the ecology movement to change their confrontational tactics, to lead society down a new path by illuminating Nature's way.

From Complexity to Perplexity by John Horgan (article in Scientific American, June 1995). A very interesting article. Horgan proposes that complexity studies on their own may not yield a unified theory of complex systems.

Models of God: Theology for an Ecological, Nuclear Age by Sally MacFague (Fortress Press, 1987). MacFague shows how Christians can evolve their conceptions of God in order to fit better with the findings of ecology and science, and our experiences of spirituality in the post-modern era.

SYSTEMS THINKERS

Tao Te Ching by Lao Tsu, with an introduction and notes by Jacob Needleman. (Vintage Books, 1972, 1989). A modern and highly readable translation of the classic work by one of the greatest and most important systems thinkers of all time.

Psychotherapy East & West by Alan Watts (Vintage Books, 1961). A wonderful book! Watts focuses on the implications that Eastern philosophies of nature and the emerging scientific worldview have for modern "civilized" societies.

Zen Mind, Beginner's Mind by Shunryu Suzuki (Weatherhill, 1970). A great but simple book presenting systems thinking, Zen style.

The Phenomenon of Man by Pierre Teilhard de Chardin (1959, Harper & Row). A modern systems thinker (and Jesuit priest) describes a model of ourselves and our universe that integrates biological science with spirituality.

The Power of Myth, by Joseph Campbell with Bill Moyers (1988, Doubleday). Campbell has done a wonderful job of illuminating the recurring themes and imagery of ancient mythologies. Many myths and archetypes symbolize the characteristics and processes of natural systems.

The 7 Habits of Highly Effective People by Stephen R. Covey (1989, Simon & Schuster). This book gives guidance on how to work with the natural forces and processes operating all around us. A "must-read" for any person who is trying to successfully lead, transform, work with (or simply survive within) a complex social institution or organization.