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Chapter Seven

CREATIVITY, CONSCIOUSNESS, AND THE DIRECTION FOR HUMAN DEVELOPMENT

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The reason to do a book or a chapter, like this, is because we very much believe there's a better way to be and a better way to live. In an endangered age (see Combs, 1995; Csikszentmihalyi, 1993; Laszlo, 2000; Laszlo, Grof, and Russell, 1999; Loye, 2000; Morin, 1999; Richards, 1997; Montuori and Conti, 1993), this is not even an option, but an absolute necessity. We write about creativity because this powerful construct—defined broadly after Frank Barron (1969) and involving the originality of everyday life—has always been a doorway to something more—to our evolving human possibility. But now we are in a particularly critical time in history, needing to avail ourselves of its greatest possibilities—and just in the nick of time, it increasingly appears, as individually and together we try to cocreate the considerably better *world*.

Key words: adaptation; androgyny; anxiety; authoritarian personality; autonomy; bifurcation; butterfly effect; chaos theory; chaotic attractor; choice; co-creation; cognition; complexity; conflict; consciousness; conservatives; creative evolution; creative transcendence; creative transformation; creativity; cultural creatives; developmental psychology; dialectical process; dialogic process; dissipative structures; domination;

ego-strength; enaction; equilibrium; evolution; evolutionary drift; feminine; flow; gender; General Evolution Research Group; homeostasis; human evolution; humanistic; independence of judgment; liberal; masculine; moral sensitivity; mystical knowing; natural systems; Neo-Darwinism; norm-changers; norm-maintainers; open systems; partnership; periodic attractor; psychology of creativity; psychology of murder; psychology of ideology; punctuated equilibria; reductionistic; self-organizing systems; self-reinforcing; static attractor; systemic coherence; systems perspective; systems theory; tolerance for ambiguity; transpersonal; willful bifurcation.

This chapter addresses one of the most important aspects of the challenge to the twenty-first century to develop the better theory of human evolution. This is the neglect of social science in the development of biologically reductionist theory. Here perhaps the most striking instance is the lack of incorporating the creativity research of a whole century into what is taught today as the theory of human evolution. Our goal here is to bring together and explore the wide range of what we know today about creativity that may be useful to the developers of a truly *humanistic, transpersonal,* and *systems scientific* theory of human evolution.

In doing this, we initially draw heavily on the perspective of the late Francisco Varela for a systems theory understanding of life itself and the nature of cognition, and from the work of Frank Barron, who has contributed much to our understanding of human creativity, doing so as well from a systems perspective.

The systems perspective, as we will see, is particularly productive in illuminating both the potential of our self-awareness and our power as creative beings. The creativity of which we write, we must also note, is not an elective matter or a special capacity of a chosen few. *It is a central survival capability that helps us improvise in complex environments.*

Creativity is an extremely complex phenomenon. The paradoxical situation we find ourselves in is that creativity—the human capacity to bring something new into existence—is both our greatest hope and our greatest threat. Creativity can assist us in developing alternative futures and overcome the problems of poverty, disease, overpopulation, and all the other problems facing humanity today. But those very problems are, in many cases, either caused or exacerbated by human creativity when it is applied to science and technology, and to the creation of power, goods, and weapons. The evolutionary challenge of creativity is embedded in the human capacity for choice. We can make choices about how, where, when, and for what ends we use our human creativity.

In the sections that follow, nine areas are addressed: (a) new views of evolutionary possibility; (b) human creativity from *process* and *person* perspectives; (c) self-organization and evolution in human systems; (d) ego-strength and systemic coherence; (e) core creative traits and their broader implications; (f) the relation of chaos theory to creativity; (g) creativity, chaos, and destruction; (h) the dynamics of mental process; and (i) our evolutionary challenge.

NEW VIEWS OF EVOLUTIONARY POSSIBILITY

Neo-Darwinism and the traditional "Darwinian" notion of evolution stress the *adaptationalist* notion that novelty is produced by random genetic variation, which is honed by the environmental demands of survival and reproduction. So far so good. But Varela and others (Bocchi and Ceruti, 2002; Varela, Thompson, and Rosch, 1991; Jacob, 1977) have pointed to the failure of this idea to account for the amazing diversity of life itself. For these theorists, and for us as well, the constraints of survival and reproduction are far too weak to account for such diversity. In plain English, the variety of life on Earth is much too great to be simply put down to the bare necessities of these dual constraints. Rather, it is argued that the proliferation of novelty is *limited* by the minimal demands of survival and reproduction, and beyond that is not determined by them. This notion is reminiscent of the notion of *creative evolution* expressed a century ago by Henri Bergson (1907) and similar ideas developed by modern systems theorists such as George Kampis (1991) and Ben Goertzel (1994, 1997).

An important concept developed by Varela and associates (1991) is that the complex internal processes of the organism interface with the complex features of its environment in a smoothly functioning ongoing engagement, or *enaction,* as he put it. This tightly coupled interaction of the organism and its environment evolves over time, both within the lifetime of the organism as development, and across the span of many individual lives. Varela called the transformation across generations of the organism intermeshed within the bounds set by its enaction with the environment, but not strictly determined by survival and reproduction *evolutionary drift.* We can easily imagine similar evolutionary processes in a variety of systems. Indeed, the fields of neurobiology, developmental biology, immunology, and linguistics all intermeshed with high levels of

profligacy, to say nothing of the study of cognitive psychology and human behavior.

Applying the notion of evolutionary drift to individual neuronal and cognitive systems moves the emphasis away from traditional population dynamics to the life history of the organism as seen in its interactions with its environment. Varela suggests that this process is best understood as a kind of *bricolage*, a coming together of processes in complicated arrays "not because they fulfill some ideal design but simply because they are possible" (Varela, Thompson, and Rosch, 1991, p. 196). Summing up these ideas, Varela notes that this creative coupling depends on three conditions. The first is the richness of the capabilities of the self-organizing networks within the organism itself. The second is the structural coupling with the environment that permits the unfolding of viable evolutionary trajectories. And the third is the modularity of the subnetworks of more or less independent processes that interact with each other by tinkering. We note that this tinkering occurs naturally at the boundary between order and chaos.

Stuart Kauffman (1993) was among the first to stress the importance of the boundary at "the edge of chaos" as the location of evolutionary viability. To find the edge of chaos we must seek processes that exhibit a significant degree of inherent fluctuation, or variability, over time, and connect them up loosely with each other. The elements of a watch do not fit these criteria. They are not variable, and they are tightly connected. Thus, the watch does not exhibit creative behavior—or at least we hope not. Since the parts are tightly connected, the watch is a machine. If they were connected too loosely, however, it would be nothing but a useless collection of shafts, springs, and gears.

Computers also do not qualify since their processes, routines or subroutines, are themselves invariant, and when they interact, they do so with logical precision. This conclusion is perhaps a bit unfair to those who hope to make creative computer programs by adding unpredictable elements into their subroutines—for example, random numbers or fractal values—or through the recombinant routines of genetic algorithms seek to add the requisite softness in routine and subroutine interactions. We have no argument with this approach, but note that its success is evidently dependent at least in part on the extent to which they can emulate the very edge of chaos.

However, the metabolic processes of living cells do fit the picture nicely—showing both inherent fluctuation among themselves and loose interconnections. They interact, in other words, in a flexible fashion with each other, while each exhibits its own individual changes over time. The result can be a living and adapting—in other words, creative—organism.

THE PSYCHOLOGY OF CREATIVITY

A good place to bring together evolutionary thinking with the psychology of creativity is in the ground-breaking work of Frank Barron (for example, 1969, 1990, 1995). Barron's conclusions are useful in the study of human systems because they provide a descriptive link between the "skeleton framework" of systems theory (Boulding, 1968) and systems-evolutionary thought (Laszlo, 1996b) on the one hand, and the creative complexity of human cognitive systems on the other (Csikszentmihalyi, 1988).

Creative human systems are, to reiterate our main point, evolving human systems. Understanding the evolutionary dimension can lead to a deep understanding of creativity, and vice versa. Barron (1969) has defined creativity very broadly as the capacity to bring something new into existence. Creativity as a capability allows us to respond adaptively to the need for new approaches and new products. It enables us to bring something new into existence purposefully—note again our potential for conscious, deliberate action—even though the process may have unconscious, or subliminally conscious, components as well as the fully conscious ones. And the overriding purpose is adaptive: "Novel adaptation is seen to be in effect the leading edge of evolution through the service of increased flexibility and increased power to grow and/or survive." (Barron, 1988, p. 80).

Barron and associates (Barron, 1969, 1990, 1995; Barron and Harrington, 1981), for example, found that highly creative people tend not only to be open to experience in general, but also are relatively comfortable with the depths of their own unconscious minds. Indeed, as humans, we are all open systems, far from equilibrium, in constant interaction with our environment (Combs, 1995; Montuori, 1989; Richards, 2000-2001), exchanging not only nutrients and matter, but information. Yet with highly creative people, this process may be even more open and marked, and less interrupted by personal barriers, defenses, dissociated areas, or prohibitions.

We will examine other key traits that distinguish unusually creative individuals, including a greater than average tolerance for ambiguity, complexity of outlook, independence of judgment, and androgyny—or a blurring of stereotypical female and male roles in the creative individual—as well as the capacity for achieving the optimal state of happiness in human functioning that Csikszentmihalyi (1990, 1997) has identified in many contexts of life as "flow." In the following pages, we will show how each of these traits can be seen as part of a larger personality system that operates in accordance with the general tenets of evolution mentioned earlier. Thus, the system traits of creative individuals can be said to

represent the adaptive and healthy way in which human beings can express their nature through open, dynamic, and evolutionary processes. On the other hand, these traits will be contrasted with the characteristics of persons who act as closed, equilibrium-oriented, nonevolutionary systems. Loye's (1977) differentiation between norm-changers and norm-maintainers illuminates these two types of human systems, and orientations, at a psychological and sociological level. Eisler's (1987, 1996) template of *partnership* and *domination* is used as a theoretical framework that places these differences in the broader context of cultural evolution.

SELF-ORGANIZATION AND EVOLUTION IN HUMAN SYSTEMS

In the following pages we will illustrate how an evolutionary systems approach can provide a much-needed framework to expose the evolutionary nature of creativity. Let us first note some of the similarities between descriptions of creative persons and the creative process, on the one hand, and the theory of evolving self-organizing dissipative structures on the other. The quotations below were chosen to demonstrate some of the striking similarities between the writings of scholars in these two seemingly separate areas of research.

Barron (1972, p. 111) writes that one may conceive of a creative human being as a "dynamical natural system, bounded yet open, that is in a continual state of disequilibrium." This "bounded yet open" aspect of the cognitive processes of a creative individual exactly mirrors Varela's concept of a biologically successful organism (Varela, Thompson, and Rosch, 1991), as well as creative intelligence, as *functionally open, yet structurally closed*. In biological terms, this means that the organism conserves its physical structure while remaining open to the flow of energy as well as information. Creative cognitive systems would seem to exhibit this relationship specifically in terms of information, retaining their basic cognitive structure while remaining open to the flow of new information. What we perceive and act upon, and the way we act, depends on how we have structured our understanding of the world:

> Knowledge, being a theory of the environment to which the organism has adapted, always reflects the specific self-referent constraints through which the organism scaffolds its own reality. (Guidano, 1987, p. 7)

Human beings are engaged in a constant process of adapting to and creating anew the conditions of existence, and our theories of self and

environment are therefore continuously subject to periods of uncertainty and even chaos. A process of self-reorganization is constantly occurring, whereby

> The key property underlying autonomy of any form of self-organization resides in a system's ability to turn into self-referent order the randomness of perturbations coming either from the environment or from internal oscillations. (Guidano, 1987, p. 10)

In Varela's terms, this is the idea of *enaction*, the engagement of the biological and cognitive systems of the organism with the ever-changing and complex features of its environment. Thus, the cognitive system of a creative individual is a complex, open, self-reorganizing system, one that maintains its structural integrity through a constant exchange of information with its environment, much like a biological system maintains its integrity though a structurally closed yet functionally open engagement with the energy dynamics of the environment (Briggs and Peat,1984; Ceruti, 1989; Csikzentmihalyi, 1988, 1990, 1997; Guidano, 1987; Jantsch, 1980; Morin, 1992; Laszlo, 1996a, 1996b; Prigogine and Stengers, 1984).

Open systems are stabilized by flow, but their structural stability is only relative because even its structure is gradually, and sometimes even rapidly, transformed by exchanges with the environment. This is especially true of human cognitive systems, which, to put it plainly, are modified by enriching experiences with their environments. The entire literature of developmental psychology attests to this fact, as it attests to the importance of relative structural stability as well.

Morin (1992, 1994) has argued that a more accurate and inclusive term to describe the process of open, dynamical systems is "self-eco-reorganizing systems." In the case of human beings this term breaks down into: *self-*, because knowing involves a knower; *eco-*, because a knower always exists in a context, never in a vacuum, and there is a complex relationship between self and eco: the individual is shaped by the environment and in turn shapes that environment; *organization*, because our knowledge is in fact organized, often with principles (categories, metaphors, frames) we are hardly aware of, through history, habit, culture, reflection, and so on; *re-*, because knowing involves a constant active process of creative exploration and reorganization, and because our organization of knowledge is constantly reorganized anyway through the process of existence and participation in the world.

Put differently, the order out of chaos that emerges in an open system's enaction with its environment is thus subject to fluctuation. When critical levels of fluctuation are created by increasing complexity, a

critical or bifurcation point is reached, in which the system can move in any one of several directions until a new and more complex order may be established after a period of turbulence. If a higher order of organization does not emerge, the system returns to a previous, lower level of organization (Briggs and Peat, 1984; Ceruti, 1989; Jantsch, 1980; Laszlo, 1987; Prigogine and Stengers, 1984). A similar pattern for evolutionary transformation is reported by developmental psychologists such as Kurt Fischer (1998); Robert Kegan (1982, 1994), Jean Piaget (Flavell, 1963), and Susanne Cook-Greuter (1999). We might therefore think of evolutionary transformation as an ongoing process of self-eco-re-organization.

Despite the ability of evolutionary systems to undergo creative tranformation with time and through exchanges with their environments, it is useful to keep in mind that their first and most immediate priority is to conserve their structure. Cognitive systems achieve this through the stability of internal schema (for example, Flavell, 1963) or algorithms (for example, Goertzel, 1997). Referring to the former, Jantsch observed that:

> A dissipative structure continuously renews itself and maintains a particular dynamic regime, a globally stable space-time structure. It seems to be interested solely in its own integrity and self-renewal. (Jantsch, 1976, 31)

Banathy (1984) describes a creative, self-renewing human cognitive system in this way:

> These are complex, ideal-seeking systems guided by images of the future they create themselves. They are both open and adaptive to the environment and are shapers of the environment. They are pluralistic and thus able to seek and explore new purposes. They are systemic in their arrangements and behavior. They exhibit such qualities as emergence, self-transcendence, and a tendency for cooperation and even integration with other systems and reorganization at higher levels of complexity. (p. 30)

It might be said that creative individuals constantly, and consciously, renew themselves (reorganize) by remaining open to complexity that may force them to reconsider set ways of doing and thinking. This is an inherently risky and destabilizing business, yet one that seems to provide pleasure to the creator, and is also a measure of improved health and well-being. A taste for this may be precisely the quality shown by Loye's (1977a) norm-changing persons. Here are individuals who live in the present, and in a world of flux and possibility, rather than grasping on to fixed ideas of self or how life should be conducted. Here too may be

people who communicate, collaborate, share, and care more about each other. Indeed they may find in their world additional joy and beauty (Combs, 1995; Eisler, 1996; Montuori, 1989; Richards, 2001).

Although, as above, the achievement of order through fluctuation is not necessarily a smooth process, we should not assume it must be a painful or negative one. It requires a flexible process view of life, which includes the strength to be open, and a willingness to face the unknown and the potentially disturbing. Although this sounds problematic, the approach allows for ongoing change in the moment rather than painful resistance and then major collapse when cherished delusions are finally shattered.

The structural constraints that help make an open system what it is, are mediated by a cognitive map or mindset in human systems (Cf. Ceruti, 1989). This represents another level of complexity and organization, and in creative individuals is related to the conscious and self-reflexive capacity of the human mind. This is part of our true genius.

Perhaps we should think about maps which more of us could adopt. Indeed, such awareness of self-in-world, and attention to the present moment, is a goal in many world contemplative traditions—and with the ultimate intention of going beyond the map, the human conceptual system, the still unquestioned and multitudinous assumptions which are woven in, to a vastly more profound truth (e.g., Goleman, 1977; Nhat Hanh, 1988, 1998). Such can benefit all beings and our endangered planet.

It appears to be in this direction that our creative systems thinking is pointing. And it is, after all, in such flexible evolving systems, and not in a fixed rigidity of lifestyle or worldview, that one will likely find the spearhead of human evolution.

EGO-STRENGTH AND SYSTEMIC COHERENCE

As indicated above, healthy creative systems are structurally closed in the short run, though they undergo evolutionary transformation in the longer term. The importance of the conservation of structure is witnessed in Barron's (1964, 1969) concept of *ego-strength*.

Developed in the early fifties, ego-strength can be defined in a psychoanalytic context as the "ability to retain reality and manage the forces of the id and superego" (American Psychiatric Press, 1988). It involves being in adaptive contact with our consensus reality. In Barron's conceptualization, ego-strength regards flexible maintenance of the open-system self as an evolving system, with an autopoietic structure. Ego-strength is to be distinguished from the term "ego" as used

commonly today, where it is typically viewed negatively with a recommendation to minimize its distorting effects of arrogance and self-centeredness. It is this fixed self-image and our need to maintain it against various challenges that can *inhibit* evolving dynamic systems. The goal becomes maintenance of rigid ideas and belief systems that sustain a fixed picture of who we are. Ego-*strength*, by contrast, allows us to change and evolve, to view our role in this process-based flux of activity, and be open to an ongoing movement. Whereas one understanding of ego sees it as a process of building a fortress around unstable foundations, Barron's concept of ego-strength can be thought of as a process of ever-increasing openness and dismantling of walls, based on a fundamental trust in the coevolution of self and environment.

Summarizing his research in 1964, Barron preceded the theory of self-organizing systems, with its emphasis on growth and feed-forward rather than homeostasis and feedback, by stating that his findings offer:

> [A] serious challenge to the concept of homeostasis, which posits a basic conservative tendency in organisms, a disposition to adopt patterns of behavior that are effective in reducing the need for counteraction. If homeostasis were the rule, organisms would act always in such a fashion as to produce an equilibrium psycho-physiologically. But these observations point to the need for more complex and inclusive formulation. There seems to be an essential and continuing tension between the maintenance of environmental consistencies and the interruption of such consistencies in the interest of new possibilities of experience. (Barron, 1964, pp. 80–81)

Ego-strength therefore does not imply a rigid, unyielding ego, but rather one that is open and accepting, capable of becoming disorganized and then reorganized without falling apart. This means sufficient integrity and sense of self to trust oneself to risk being shocked, or at least exposed to phenomena that are unexpected, unsettling, and contradictory without feeling the need to control them. The balancing function is critical in modulating the willing openness to accept new input and manage uncertainty.

Guidano (1987, p. 11) noted that to understand the temporal stability of a self-organizing system, the concept of homeostasis, or equilibrium, should be replaced with systemic coherence, an idea similar to Varela's notion of structural stability. Systemic coherence refers to the dynamic equilibrium of an open system that can be maintained but at times disrupted. A system retains its coherence despite the perturbations, and can even achieve a higher degree of coherence because of them. Ego-strength, as defined by Barron, involves precisely the ability to maintain systemic

coherence when faced with fluctuations and perturbations. Interestingly, ego-strength has also been found to be a measure of the ability to recover from illness, suggesting that it is associated with a resilience of the whole person (Barron, 1968). Nature itself gives us powerful evidence that human creativity is a very good thing. Creativity can not only help us solve problems personally but actually enhances our immune function (Pennebaker, et al., 1988; Richards, 1997), suggesting a provocative connection between psychological and physical health. Work on emotional disclosure and health (for example, Pennebaker, 1995) has shown how very healthy such openness can be. It is of considerable interest that this quality of *openness*, so central to the creative process, has also now shown up in mainstream psychology as one of the basic and underlying factors in a five-factor model of personality (see Costa and Widiger, 1994).

FIVE CORE CREATIVE TRAITS AND BROADER IMPLICATIONS

Now, let us move on to five of the actual characteristics of highly creative persons across fields (for example, Barron, 1969; Barron and Harrington, 1981), showing how they are analogous to those found in evolving self-organizing systems.

Independence of Judgment

In the creative subjects studied by Barron (1963, 1988), independence of judgment, or the ability to believe for oneself, was a crucial variable. This is related to the concept of ego-strength and the ability to rally from setback.

What emerges is the picture of an open, questioning person who is not going to take any position as given. This process of ongoing questioning might well (or hopefully) even include questioning her or his own assumptions, not just those of others. One may find instead a relative humility, combined with the openness to information mentioned earlier—both conscious and unconscious, and of the world without and "self within"—which such independent judgment is apt to draw upon. This style of processing may well be all the more self-reinforcing when it also leads to the happiness and self-satisfaction linked to "flow" demonstrated in the work of Csikzentmihalyi (1990, 1997) and to healthy consequences linked to openness, self-disclosure, and nondefensiveness (Pennebaker, 1995).

At the same time, independence of judgment can easily put creative persons at odds with pre-established societal ways of being and doing. As

such, it can to some extent easily lead to the development of creative people as "outsiders," people who see the world differently. Such people are not always welcome, and, as we shall discuss below, this raises issues about the relationship between creativity, conflict, and difference.

These findings also take on additional relevance in light of Eisler's (1987, 2000, 2002) discussion of two distinct forms of organization in social and educational systems: partnership and domination. In dominator systems, men dominate women, nature, and other men, and social organization is based on ranking. In partnership systems, women, men, and nature are linked. Whereas in a dominator system tension is reduced through the suppression of one term in an opposition, creative individuals may be said to strive for a conceptual—and social—partnership.

In closed systems, or what Eisler calls "dominator systems," with an extensive social hierarchy, gender inequality, and institutionalized volence, we find creativity repressed in all but a few chosen individuals. Independence of judgment is clearly not a characteristic that is encouraged, since it may lead to a questioning of the status quo. The process of political indoctrination, the brainwashing Lifton (1961) describes as part of the "psychology of totalism," is in fact an attempt to eliminate any form of independent judgment.

A creative independence of judgment is all the more interesting because it seems so intrinsically healthy. Ironically, it might at first seem to imply a dominator type of imposition of will or belief: "I'm going to think what I want and it doesn't matter what you say." Yet this is not the attitude intended here.

It is also worth stressing again—although it may perhaps seem obvious—that this creative independence of judgment implies a relatively greater pattern of *conscious awareness*. It is the dominator, by contrast, who may move more mindlessly through the day, not questioning the status quo and resisting others who might do so. The independent thinker is saying, "Wait a minute. I'm not sure I get that." This creator is then bringing the question to the forefront, creating precisely the inner dialog and search for additional outside information that may bring forth dynamic conditions for insight—for new solutions to jump out, and for personal evolution to occur.

Briggs and Peat (1984, p. 182) write that increased autonomy "is paradoxically related to an increased instability and openness, which widens and loosens pathways between what is 'inside' and 'outside' the structure." They go on to point out that in a process view there is really no inside or outside. This perspective on autonomy is of great interest because it regards autonomy not as a separation or abstraction from the

environment, but as a greater awareness of embeddedness and openness to process.

From this perspective, "independence of judgment" does not mean removing oneself from one's environment, but rather becoming more sensitive to it and also more sensitive to one's own values, beliefs, and perspectives. This characteristic points to one of the essential features one encounters over and over again in the study of creativity—namely, that in order to fully understand the process, it is necessary to approach it as a complex phenomenon that itself requires us to go beyond the very categories of traditional thinking, most notably the tendency to think in oppositions or polarities.

Tolerance for Ambiguity

The French biophysicist Henri Atlan (1987) has discussed ambiguity in the context of networks of communicating elements, noting the potential inherent in ambiguity to generate "complexity from noise." Ambiguity may be perceived as negative at an elementary level of systemic organization but positive at a more integrated level, leading to the development of greater diversity and stronger adaptive properties (p. 117).

Tolerance for ambiguity in human systems—or holding two or more ideas at the same time in one's mind—involves the capacity to remain open to input that is mystifying and perhaps contradicts our beliefs. It has been found to be a vital characteristic of creative individuals (Barron, 1963a, 1968, 1988). Ambiguity creates a kind of inner tension that demands resolution. Avoiding this tension, this oscillation, and falling back on predetermined answers is the mark of a closed cognitive system. A willingness to explore the ambiguity, attempt a synthesis, or simply allow oneself to live with it and struggling for integration on a daily basis reflects a more creative attitude.

Loye (1977a, 2003b) finds an intolerance of ambiguity in conservatives, or "norm-maintainers," in his studies of the psychology of ideology and moral sensitivity. This characteristic creates a "premature closure" as individuals insist on viewing ambiguous phenomena through pre-existing frameworks, literally imposing those frameworks on new phenomenon. Suppression of anxiety may be a strong factor in this perceptual orientation (Barron, 1968; Hampden-Turner, 1971).

Quantum physics and chaos theory seem to have emerged through a willingness to explore the apparent chaos that perplexed previous models in physics. The pioneers of these disciplines must have had a

considerable tolerance for ambiguity, independence of judgment, and preference for complexity, as Gleick's (1987) history of chaos theory indicates, for which Loye and Eisler (1987) provide an update for chaos theory in social science.

The element of choice, the conscious decision as to what to attend to, and what to do with it, separates human systems from other self-organizing structures. The mathematician Ralph Abraham (1988, p. 301) has coined the term "willful bifurcation" to distinguish those bifurcations that are willfully brought about through an act of choice. We can choose to remain in relative equilibrium by rejecting all input that does not match our existing order and cognitive/emotional organization, and by doing so choose to become a relatively closed system, or, as in the case of creative persons, we can be puzzled, intrigued, or simply frustrated by novel and complex events and seek to integrate them into our own evolving cognitive structures.

Trips to foreign countries, or the emergence of perplexing new data—as in the development of quantum and chaos theories—challenge our ways of thinking: Disorder and disequilibrium appear in existing ways of making sense of the world. One can reject the new data and the emerging theories, and after a period of turbulence return to set ways of thinking. Or one can integrate the information into a higher order synthesis and explore the implications of the new emerging reality. The phenomenon of culture shock seems to involve a similar period of turbulence that is then followed by integration or rejection (Furnham and Bochner, 1986). The vital factor here is the element of choice.

From Polarizations and Oppositions to Complex Thinking

An extremely relevant characteristic of creative individuals involves this ability to struggle with oppositions in a constant dialectic, an essential tension. These tensions seek release in a higher level of complexity and reorganization, and the ultimate synthesis must still be viewed as a process—not necessarily the elimination of oppositions, but the ability to live with them in a creative rather than destructive fashion. The stress is one of continuing creative tension rather than an either/or struggle between change and stasis, with its political analogy in the liberal/conservative polarity. This is what Morin (1992, 1994) calls a dialogic process, to differentiate it from a dialectical process. The latter has an inevitable synthesis of opposites. The former accepts that there may not be a resolution, but rather an ongoing relationship that is at once complementary, concurrent, and antagonistic.

The crucial factor lies in the refusal to polarize, to see the world in purely black-and-white terms. This involves being able to hold the ambiguity and complexity of, on the one hand, not coming to an immediate resolution in order to eliminate the anxiety caused by ambiguity and not-knowing, and, on the other, to see the relationship between the two "polarities" and the potential for a creative reconciliation if not synthesis.

It is particularly interesting to note that attempts by developmental psychologists to postulate a "post-formal" thinking—a higher form of thought, as it were—point to a kind of thinking that is "dialectical" (Kegan, 1982, 1994). In other words, the ability to hold two opposing thoughts and not be compelled to immediately choose one side over the other is a key ingredient of a more evolved kind of thinking. The inability to do so is also a clear indication of the classic authoritarian personality (Sanford, 1973).

Androgyny

An excellent example of the way creativity involves a different understanding of stereotypical polarities or dualisms manifests in the way creative persons relate to gender roles. Barron (1968) and others (for example, Albert and Runco, 1986; Bem, 1993) have repeatedly shown that highly creative people combine traits that, in our Western culture, are both stereotypically male and stereotypically female. Highly creative people, female or male, have been shown to be more free to be *themselves*, in the fullest sense, being both dominant and assertive, for instance (male stereotype), and sensitive and intuitive (female stereotype). In contrast, Sanford (1973) states that the authoritarian or dominator personality, which displays, in the large, characteristics opposite to those of creative individuals, is marked by a polarization of masculine and feminine characteristics. In fact, in authoritarians, and in dominator systems overall, men define themselves in opposition to women, and vice versa: "I am a man because I do not have feminine qualities." We can see how terribly limiting this is of the full human potential. Creative individuals, on the other hand, draw on the full spectrum of human potentialities, and create from them their own self (Csikszentmihalyi, 1997). Both males and females, of course, lose out with the partitioning of essentially human qualities and with restriction of roles and possibilities. This is an evolutionary process, moving from the polarization of Dominator thinking to the integrative complexity of Partnership thinking.

Sex-specific interests and traits that are descriptive of men and women in general seem to break down when we examine creative people

(Barron 1972, p. 33). Beyond this, females and males tend to score comparably on measures of creativity (see, for example, Torrance, 1990) and on measures of general intelligence up to and including the highest levels of giftedness (Eccles, 1958). Yet for all the reasons well known today after another century of struggle for the women's movement, they diverge sharply in accomplishment—and opportunity—when they enter the world of work (Eccles, 1958).

One should note that this is not limited only to gender-linked personality traits, or to a few jobs. At this juncture in human evolution, there is a startling range of false dichotomies, which divide us all from our fullest selves (Montuori, 1989; Richards, 1997). Many of these aspects of our lives are gender-linked, and are consequently valued or devalued accordingly in a modern society. Beginning with the more traditionally valued "male" qualities, these gendered polarities include: intellectual versus emotional, sciences versus arts, verbal versus nonverbal, objective versus subjective—and, consequently, "hard" versus "soft" sciences, and even quantitative versus qualitative research methods. And let us not forget conscious versus unconscious processing, or the plain mental states of ordinary reality versus the rich and revealing altered states of consciousness from which, as William James (1902/1958) put it, we are only parted by the thinnest of films.

In the relationship between masculine and feminine in creative individuals we see an excellent example of the dialogical nature of the creative process itself in action, in the development of the creative individual. There is not necessarily overarching "synthesis," but rather an ongoing process of reconciliation and integration of stereotypical masculine and feminine qualities.

Complexity of Outlook, Symmetry/Asymmetry

"At the very heart of the creative process," writes Barron (1990, p. 249) "is this ability to shatter the rule of law and regularity in the mind." By remaining open to complexity, creative persons allow for periodic moments of disequilibrium in order to make sense of what they are faced with. Complexity, in this sense, is any information that does not easily fit into a pre-existing system. It is not intrinsic in the phenomenon being observed, but in the observing system (Le Moigne, 1985). What appears to be a complex or even chaotic social system to a foreigner is merely the routine of everyday life to a native. We are speaking, therefore, of the phenomenology of complexity.

Barron (1969, 1990), has found that creative individuals show a marked preference for complexity over simplicity in the Barron-Welsh Art Scale, which consists of a series of figures ranging from simple geometrical patterns (circles, squares) to complex (freehand) squiggles. Subjects with a preference for simple order attempt to maintain an equilibrium, which according to Barron (1968, p. 198–99) "depends essentially upon exclusion, a kind of perceptual distortion which consists in refusing to see parts of reality that cannot be assimilated to some preconceived system."

Creative individuals, on the other hand, favor disorder and complexity because they wish to integrate it into a higher-order—yet simple—synthesis. Barron likens their goal to the achievement of mathematical elegance, "to allow into the perceptual system the greatest possible richness of experience, while yet finding in this complexity some overall pattern" (1968, p. 199).

Consistent with this—in an intriguing way—is preliminary evidence that creative persons may particularly prefer patterns of higher fractal dimensionality in images of the natural world (Richards, 2001). Results could reflect the concrete complexity of the figure itself or, even more likely perhaps, the complexity of the underlying "strange attractors" (see below) and the natural processes—and infinite series of possibilities—these represent.

Creating an overall pattern in complexity is what we fundamentally search for in trying to understand evolution and life itself. This drive to bring meaning into disorder is fundamentally an act of creation. In this respect creative individuals are evolving and self-organizing, reaching out beyond their own boundaries in self-transcendence, integrating complexity and achieving higher levels of organization as Jantsch notes (1980) in the advanced evolutionary tour de force of *The Self-Organizing Universe*. Discussing natural systems, Laszlo (1996b) writes: "The emergence of a higher-level system is not a complexification but a simplification of system function" (p. 25).

"'Dynamical systems,'" write May and Groder (1989, p. 144) "is actually a generic term that applies to the behavior of systems in which there is a continual change or flow." They go on to discuss the fact that the science of dynamical systems has changed our view of complexity. Complex systems have elements that "reciprocally determine each other," they write. They then point out that complex systems have been found to be much more orderly than was initially supposed, but that this order becomes apparent "through a global, geometric approach rather than through a local, analytic method" (p. 144). In keeping with the goals of an emerging evolutionary systems science and a revival for humanistic

psychology, this clearly suggests that complex systems should be studied using an evolutionary systems as well as a humanistic approach (Bocchi and Ceruti, 1985; Ceruti, 1989; Csikszentmihalyi, 1993; Laszlo, 1972, 1996a; Morin, 1999; Eisler, 2000; Loye, 2000, 2003a; Wilber, 2000). It is also worth noting that creative individuals, with their preference for complexity, tend to be "intuitive" in the Jungian typology, which means that they tend to be holistic, or "globalistic," in their thinking, rather than reductionistic (Barron, 1969).

Discussing natural systems, Laszlo (1996b) writes: "Less complex systems on a higher level of organization can effectively control more complex systems on lower levels in virtue of the selective disregard, on the higher, controlling level, of the detailed dynamics of the lower-level units," since "the selective neglect of irrelevant details is a universal property of hierarchical control systems" (p. 25). In order to represent the increasing complexity creative individuals choose to encounter, they have to think systemically and have flexibility as a "coding" or interpretive system. They maintain their characteristics as creative individuals and dynamical, self-organizing systems through a constant process of self-renewal marked by a desire to tackle apparent oppositions, or, as Morin would put it, an ongoing process of self-eco-re-organization through a dialogical process.

CHAOS THEORY AND CREATIVITY

As we have begun to delve into the relation between chaos theory and creativity, let us probe deeper into this highly productive development that provided the original impetus for the formation of Laszlo's General Evolution Research Group (GERG). As noted in Loye's introduction to this volume, the originating goal for GERG was to apply chaos theory on a grand scale to what remains the greatest challenge to human creativity and consciousness: how to save our species from moving from the endangered list to extinction. Among authors of papers in this book, Eisler and Loye were among the original cofounders. A paper by them in *Behavioral Science* (1987) was particularly influential in opening up social science to the use of the until then mainly mathematical development of chaos theory. The essential grounding, as they pointed out, is in terms of *attractors*, of which there are three basic types.

The *static attractor* is defined as a single state toward which a system is drawn, and at which it comes to rest. Also called *static equilibrium*, or a *rest point*, these were the first to be studied and extensively applied to the

biophysical levels for evolution through thermodynamics, chemistry, control theory, and engineering.

The *periodic attractor* consists of a cycle of states repeated again and again with always the same interval of time between states. Familiar examples often cited are the repeating sequence of states of a swinging pendulum, or the circular motion of a watch hand. Still woefully underexplored are the implications for evolution theory of alternations between liberal and conservative periods in history, or the alternation of periods of high with periods of low social creativity.

In many ways the most interesting is the *strange* or *chaotic attractor.*

The trajectory of an evolving dynamical system caught in a *chaotic attractor* is at first glance erratic, and casual observation of such a time series may give the impression of a random, unpredictable process. The long-run behavior neither settles to rest nor is it periodic. On the other hand, the system in question—for example the weather or the currents in a stream—demonstrate an identifiable pattern that can be recognized, often easily, on inspection (Abraham, 1988, p. 243–44). Chaotic attractors are a common feature of complex self-organizing systems, including brains, neural networks, and particularly cognitive as well as all other evolutionary systems. Such systems are subject to the "butterfly effect," which means that tiny variations in the internal or external environments can be very influential in determining the short-course future of the system. If such variations occur when the system has evolved near to a bifurcation, they can have a profound influence on the subsequent emergent pattern of organization (Laszlo, 1996b). Science made a notable shift when it began to recognize that such tiny variations can be of importance. According to Abraham (1988), the chaotic attractor, despite its apparently random behavior, "reveals a highly ordered geometric pattern" (p. 244). But in order to recognize this pattern, what is needed is a perspective that is both nonreductionistic, or complex, in Morin's (1994) sense of the term.

It is this feature of chaos theory that led members of GERG and other systems scientists in the 1980s and 1990s to attempt the breakaway from the prevailing reductionist Darwinian paradigm to the new open systems of creativity and consciousness perspectives on evolution that are the hope for the twenty-first century. Physicists long conceived of the universe as fundamentally symmetrical. Similarly, evolution theorists saw evolution as a gradual linear process over eons of time. But the late Stephen Jay Gould and Niles Eldridge (Gould, 2002) exploded this view with their case, in keeping with the dynamics of the chaotic attractor of chaos theory, for the operation of *punctuated equilibria* in evolution. What this suggests then is that periods of stability are occasionally punctuated

by periods of instability in which change occurs. This is not unlike Kuhn's view of periods of normal science punctuated by periods of revolution.

As research in creativity and consciousness repeatedly reveals, it is the breaks in symmetry that allow events to occur or structures to appear. In keeping with this observation, Barron (1990) has found that creative persons have a preference for asymmetrical forms over symmetrical ones. As with complexity, they seek to reorganize the complex, asymmetrical phenomenon into a higher level of order or symmetry, but the preference for asymmetry itself is a process whereby bifurcations are intentionally created. Barron (1963a) observed that originality is "equivalent to the capacity for producing adaptive responses that are unusual." Statistically unusual or infrequent responses, Barron goes on to write, can also be considered a function of "the objective freedom of an organism, where this is defined as the range of possible adaptive responses available in all situations" (p. 150).

In short, the preference for asymmetry and complexity, taken in the context of a desire to discover order in chaos, is a creative evolutionary process—it is an evolutionary "driver." The big difference is that with creative individuals there is an active choice involved in the breaking down of the established order. They actively seek to reorganize this order by challenging assumptions and articulating alternatives.

Barron (1963a) is fully aware of the political implications of his findings. He points out that although it is the combination of organization and complexity that generates freedom, organization may "operate in such a fashion as to maintain maladaptive simplicity" (p. 150). He reminds us that in totalitarian social systems, as in neurotic individuals, suppression is used to achieve unity. Suppression is appealing because in the short run it seems to work:

> Increasing complexity puts a strain upon an organism's ability to integrate phenomena; one solution of the difficulty is to inhibit the development of the greater level of complexity, and thus avoid the temporary disintegration that would otherwise have resulted. (Barron, 1963a, p. 150)

Here Barron's work showed the psychological correlate to the findings of Prigogine (1984) on bifurcations in physical systems, of pivotal importance in the development of advanced evolution theory at all levels. Bifurcations occur in periods of system disequilibrium. If we face a bifurcation point with an inclination to conserve order and simplicity we will most likely suppress perturbations, be they internal or external, and remain at a lower level of complexity. Loye's (1977a) classic work in the dynamics of norm-changers versus norm-maintainers—or, more popularly, liberals versus conservatives—as well as Maslow's (1968, 1971) classic depiction of growth versus defense motivation make the same point. Barron's work is crucial here because it illustrates the fact that human beings can, through an act of will, determine their own response to a potential bifurcation, choosing either growth or stasis. Barron is therefore showing us the human components of what Abraham (1988) calls the "willful bifurcations" that both lie at the core of and drive evolution at the human level of emergence. And here of course we find an entire existential level, beyond the evolutionary dynamics of natural systems, that takes the form of choices and of ethics.

CREATIVITY, CHAOS, AND DESTRUCTION

To further explore the relationship between creativity and chaos theory, in a study on the psychology of murder, Colin Wilson (1972) speculated that many of the most heinous crimes, such as serial killings and mutilations, are committed by individuals whose creativity cannot find expression, either through lack of training or inhibiting social circumstances. This suggests that if creativity is not encouraged and allowed expression, it may in certain cases turn into destructiveness. Typically, these are the acts of anomic, alienated, fragmented personalities. Ignored by the television and movie industry and even scientists concerned with this issue, research administering the Barron Ink-Blot test for creativity via cable television (Loye, 1996, 1977b) confirmed the core relation for this speculation in an extensive 1970s study of the effects of movies and television on adults.

Let us further add, since creativity tends to be open to inner conflict, and potentially able to heal it, that such troubled creators may include those most limited by particular stereotypes, false dichotomies, unconscious conflicts, and even dissociated areas of experience. Being creative is no guarantee of being ethical or altruistic, although all else being equal, it may tend in the direction of health (Barron, 1990; McLaren in Runco and Pritzker, 1999; Richards, 1993; Runco and Richards, 1997). The fullest conditions for creativity will involve both inner and outer openness and facilitation.

If Wilson is correct, the fostering of positive channels for the expression of our fullest and most human creativity is imperative for more than our society. Loye's (1977b, 1996) corroborating field study findings, reinforced with his more recent completion of a twenty year study of media impacts within an evolutionary systems perspective (2003b), clearly raise large questions regarding media impact and long-range species survival.

One could argue that we need subtler distinctions in our understanding of creativity that do not merely reduce it to a value-free, natural phenomenon that sometimes finds expression in unusual forms of destructiveness (whether the military tactics of Hitler's blitzkrieg or the horrendous events of September 11, 2001). Rather than this type of expression is originality, defined as unusual or unexpected solutions to problems, but perhaps not creativity in the sense of a prosocial evolutionary phenomenon.

This question of whether, through suppression or denial of creativity, we are driving ourselves toward destruction is implicit in Eisler's (1987, 2002) view of the impact of the dominator model and point of view. In a dominator system, at worst, human beings are forced to live in such an atmosphere of fear and guardedness that the openness, vulnerability, and temporary confusion created by complexity can often simply not be tolerated. Having to keep oneself on guard all the time means that a great deal of judgment occurs on an approach-avoid (safe-unsafe) axis, and much behavior involves dominance-submission rituals. Everything is simplified to these basic terms, and there is little tolerance for feeling, thought, or discussion. The temporary creative disintegration Barron speaks of is not permitted, since it would make a cognitive (or political) system momentarily vulnerable. And when the human capacity for original thinking and problem solving is applied, as Eisler develops in her articulation of the etiology of the technologies of destruction as opposed to the technologies of production and reproduction, its energy can be channeled into the savage reinforcement of domination.

In line with this, Barron (1990) has found that creative people who "manifest considerable hostility to others, are those who actually have more aggression to manage in themselves as a result of disturbing events in childhood" (p. 142). He goes on to observe that, based on his research, "the overall picture would seem to support the generalization that aggressiveness [when it occurs] in persons of excellent ego-strength stems from life circumstances marked by relatively greater discord in the home during childhood and by friction in significant personal relations" (p. 143). As an interesting added note, in a study of creative children, Dudek and Verrault (1989) found both elevated ego-strength and *decreased aggression* when they were compared with less creative children.

Even seemingly primitive (though still complex) self-organizing systems, such as metabolic networks in living cells, have what Jantsch (1976, p. 49) calls "a primitive, holistic system memory. The system 'remembers' the initial conditions which made a particular development possible, the beginnings of each new structure in its evolution." This is a natural consequence of the "sensitivity to initial conditions," or the butterfly effect, found with all chaotic attractors. Thus, complex systems "conserve" their

histories. Cognitive systems are highly sensitive to certain kinds of information, particularly "near those places that are crystallized 'memory' of past bifurcations" (Briggs and Peat, 1989, p. 145). In other words, systems become very 'touchy' when confronted with issues related to events that shaped their initial conditions, and indeed any events that echo formative episodes in their past. One implication of this is that people may use their creativity to much the same ends to which they used them in those sensitive periods of their past evolution.

One might hypothesize on the basis of these findings that what was lacking for many hostile people were "initial conditions" with what Loye (2003b) called the nurturing, feminine matrix for creativity, the supportive human environment. In sum, the environment plays an enormous role not only in the capacity for creativity, but also in the way that creativity is channeled into actions that are defined as either prosocial or antisocial.

THE DYNAMICS OF MENTAL PROCESS

To further uncover the neglected relevance of advanced systems studies of creativity and consciousness to the development of an adequate theory of human evolution, let's take a closer look at the dynamics of chaos theory—or, more properly, nonlinear dynamics—in human systems.

Creative Insight and the Edge of Chaos

A centrally debated aspect of creativity is the nature of creative insight, the "Aha!" moment (see Runco and Pritzker, 1999). Some creativity scholars (Abraham, 1996; Montuori, 1989; Richards, 1996, 2000–2001; Schuldberg, 1999) have written about creative *insight* as a phenomenon at the edge of chaos, and the reader might see if this has any intuitive resonance. Here, again, one has systems far from equilibrium (for example, this time, it's our understanding, represented as electrical activity, and "attractors," in the phase space of our mind-brain). Each understanding is in a somewhat tenuous "local minimum," a metastable state of mind that might, in any instant, give way.

Take a simple model of a sand pile, where grain upon grain is dropped from above, each grain when landing shifting a few others, perhaps just a little, and then settling into place. Unseen by us, the whole sand pile is actually shifting a little too—with subtle changes in forces and counterforces that happen with the arrival of each new grain of sand. Yet overall its configuration appears stable. This creation is actually a

complex dynamic system, built from simple beginnings but with a complex history and configuration. Further, it is ready to evolve in an instant when the key perturbation arrives. At that point, the sand pile collapses.

Here, too, is our creative insight. Disguised as a grain of sand, it drops abruptly onto decades of assumptions that make up a belief, attitude, cognitive map, or mental schema. The collapse leads to renewal in what is termed in living systems an ongoing process of self-reorganization (Morin, 1992). Suddenly, we see the world, or at least a small part of it, differently.

This is one instance of the famed *butterfly effect* in a nonlinear dynamical system, where a small effect—a puff of air in Moscow, as the anecdote goes—can create a storm system over New York City (Gleick, 1987). This is not any puff of air or any storm system, however. Rather, this is the last snowflake before the avalanche, or the proverbial straw that broke the camel's back. Such nonlinear phenomena are far from rare. We will discuss other instances and parameters of such effects later on too, including bifurcations, balancing functions, and areas of stability and change. Even the example above, which comes from Catastrophe Theory, is only one possibility for creative insight among several others (Abraham, 1996). Yet as Abraham said, it is less critical which process we specify for creative insight than that the process exist at all.

Abraham (1996) suggests, at least metaphorically, that "totalitarian regimes are almost completely convergent to fixed point attractors and ruthlessly squash emergent and divergent tendencies" (p. 395). In the worst case, one might also suggest that dominator systems seek the equilibrium of a point attractor. In situations of conflict, they do not take a whole system perspective, and seek to immediately eliminate the oscillation of the periodic attractor, or, worse yet, the unpredictability of the chaotic attractor. The self-other relationship must lead to the other being stripped of any difference it may have from the self. The dominator approach is one of dominance/submission, which, coupled with the equilibrium orientation, does not allow for creative, problem-solving tension, since the other's perspective is negated: "My country, right or wrong."

Conflict as Opportunity

We are reminded of Miller's (1976) statement that in dominator, patriarchal systems,

> . . . conflict is always made to look as if it always appears in the image of extremity, whereas, in fact, it is actually the lack of recognition of the need for conflict and provision for appropriate forms for it that leads to danger. This ultimate destructive form is frightening, but it also is not conflict. It is almost the reverse; it is the end result of the attempt to avoid and suppress conflict. (p. 130)

Maintaining this creative tension—which is after all a natural part of life—can bring about the necessary disequilibrium for a chaotic attractor to emerge, and this creative tension brought on by remaining conscious of the oppositions and seeking resolution may well be a way of creating what Abraham calls an evolutionary willful bifurcation. The preference is for complexity over simplicity, and there is not the immediate desire to forsake complexity for the relative security of simplicity.

We can thus hypothetically differentiate between *evolutionary* and *regressive* willful bifurcations. The former allow for the emergence of a chaotic attractor and a higher state of organization out of the mutual interaction of system and environment, with the complexity integrated. The latter avoid integration of complexity and return to the point attractor through the elimination of tension. "Psychic creation, including the creation of the self, is a form of evolution. It is part of the evolution of consciousness. A new kind of person is potentially a step in evolution" (Barron, 1988, p. 80). The evolutionary process is therefore inextricably tied to the systemic nature of the creative process, and this in turn is often linked to political ideology. As Jean Baker Miller's (1976) pioneering feminist analysis of conflict illustrates, dominator systems do not accept the evolutionary tension that allows for system transformation. They cling to their position so tenaciously that they eventually create destructive conflicts (pseudoconservatism). This is in agreement with Loye's (1977a) findings concerning political conservatives, or "norm-maintainers."

In other words, the creative person—with the whole system effort to remain conscious of oppositions—may well work to bring about a chaotic attractor. This tactic would be to introduce the element that destructive conflict—via the decision to come down on one side rather than the other, at the total exclusion of the other—eliminates: the destabilizing process of having to maintain two mutually opposing terms in mind, which causes the disequilibrium from which a higher order may emerge. Indeed, the creative process itself embodies tension, and individuals who distinguish themselves in artistic, scientific, and entrepreneurial creation exemplify vividly in their persons the incessant dialectic between integration and diffusion, convergence and divergence, and thesis and antithesis (Barron, 1964, p. 81).

To recapitulate: A dominator system may be said to function around a point attractor, and perceives imaginary oppositions such as self-other,

man-woman, system-environment, or mind-body as real, rather than as cultural, punctuations. It aims for equilibrium, the elimination of difference, of "the Other." The dominator-and-other system (or system and environment), when perceived as a whole, is in oscillation between the two opposite terms, a periodic attractor.

As reflected in the theories of Eisler and Goerner in their chapters in this book, a dominator system seeks to eliminate the turbulence of complexity and return to the point attractor's simplicity without integrating the new. It seeks to remain in equilibrium. Being able to maintain oppositions consciously can eventually lead to the emergence of a chaotic attractor out of the ensuing instability. This may then drastically alter the system in a higher order resolution. Among other things, it involves the necessary ability to embrace complexity, to see the whole, to think systemically, and requires tolerance for ambiguity, independence of judgment, ego-strength, and a preference for complexity. It is an evolutionary process where the new emerging order is a higher form of simplicity that has integrated the complexity.

New and Creative Syntheses

> When the distinction between subject (self) and object is most secure, this distinction can with most security be allowed to disappear for a time (mysticism, love). This is based on true sympathy with the not-self, or with the opposite of the things which comprise defensive self-definition. (Barron, 1990, p. 159)

Barron (1964) goes on to state the following "general conclusions":

> . . . in the sequence of related acts which taken together as a process result in the creation of something new, there occur consistently a rhythmic alternation and occasionally a genuine resolution or synthesis of certain common antinomies. By this I mean that certain apparently contradictory principles of action, thought, and feeling, which usually must be sacrificed one to another, are instead expressed fully in the same sequence, the dialectic leading at special moments to an unusual integration. (p. 81)

Evidently, this process of creative tension creates a period of disequilibrium during which a small or trivial piece of information becomes amplified at a bifurcation point to create a new order. As demonstrated in Loye's (2003b) study of creativity in the movie and television industry, this small piece of information, acting as a chaotic attractor, may then be all that is needed to create a whole new order, indicating again the

extreme sensitivity, openness to experience, and awareness needed by creative people.

The creator's mental effort can be pictured as circling around the problem or creative task, bifurcating to new planes of reference, returning to the old plane, branching to another plane and to planes that lie within planes. This mental effort engenders a far-from-equilibrium flux that destabilizes the limit cycles (periodic attractors) of habitual thinking. It also couples and phase locks feedback among several planes of reference and begins to spontaneously produce self-organization (Briggs and Peat, 1989, p. 194).

It must be noted that a dynamical system may have a number of attractors. This means that a successful creative outcome at a bifurcation point is not always to be presupposed. The work of Gruber (1988) indicates that the creative process of inquiry functions not unlike a network—or series of networks—and, along with the incessant probing and creative tension associated with the development of an insight, there is a continuous critical assessment of ideas and positions. Barron (1979) also stresses that

> . . . a new idea is not a single underived act, but the product of a conjunction of psychological processes. The new gestalt is an emergent, a pattern which is something more than all that went into its making. (p. 312)

He goes on to state that "the essence of change lies in the restructuring of the parts so that new patterns result, a pattern the distinctness of which cannot be characterized merely in terms of an increase or decrease of the number of its component elements." It is beyond the scope of this paper to discuss this research, but the thrust of it indicates that in what Gruber calls a network of enterprise there are in fact a number different "planes" of thought, different strands of thinking and learning that are combined and drawn upon to form a whole. Our emphasis here, particularly in the context of our earlier discussion of authoritarianism and the dominator system, is on stressing the characteristics that allow one to maintain the insecurity of the search, rather than "close the case" and deny complexity.

Our Evolutionary Challenge

As suggested by earlier chapters in this book, we need a broader vision that, in addition, is linked with our own awareness of humanity as only one part of this evolving whole. Our evolutionary vision of *partnership*

(Eisler, 1987, 2002) should extend naturally to the greater planet earth and all of its component parts and living beings if we are to gain the harmony in which we may find our fullest belongingness, identity, and joy (Chang, 1963; Pilisuk, 2001; Richards, 2001).

Here the two goals of *survival* and *benefit* seem to be fundamentally intertwined—and intertwined as well with our personal happiness and our finding of meaning in life. What we look for is evidence of some intrinsic evolution of ethic and purpose (Chaudhuri, 1974; Combs and Holland, 1996; Csikszentmihalyi, 1993; Krishnamurti and Bohm, 1986; Loye, 1997, 2000; Laszlo, Grof, and Russell, 1999; Wilber, 2000; Eisler, 2002) that can help energize and guide us. We, the authors of this chapter, believe that the joining of creativity, consciousness studies, and evolutionary systems thinking can provide a way to act on this hope, to discover and use our greater possibilities, and to find a way out of the increasingly grim prospects for us that our current global situation points toward.

Let's review some of the possibilities for creativity that this peripatetic survey has revealed. On one hand, we *homo sapiens* are rich with the human potential to recall, to represent, to symbolize, to construct narratives, to make meaning, and to imagine new futures—in short, we contain creative possibilities that other species (at least those of which we are aware) are lacking. We are consciously aware, and self-reflexive, and can make the most of this. Indeed, much research (for example, MacLean, 1990) indicates our homo sapiens brains were shaped and grew in size in response to the development of language and these new potentials. Our more creative characteristics, including our dynamic openness and preference for complexity, androgynous fullness of who we can be, tolerance of ambiguity, and independence of judgment, can both point us toward paths to a better future and keep us aligned toward the mystery and all we don't know.

Yet our very human potentials for thought, emotion, and self-reflection can also blind us, ironically, if we assume that we know all there is to know. Our use of representation, leaving immediate experience behind, and living within the confines of our constructs can be particularly limiting (Combs, 1996; Langer, 1989; Peat, 2000; Richards, 2000). If we use our capacities to build edifices of knowledge that are fundamentally static and closed, we can become trapped in limiting worldviews, strangled by our own assumptions. As Loye (2000, 2003a) develops in his exploration of the lost "top half" for Darwin's theory, it is the abiding human proclivity to be blinded by paradigm. We may then perceive only half, or much less of a fraction, of the evolutionary reality. We wind up living in the past, screened both from the present and the future, by our memories, representations, and habit patterns.

It is up to us, then, to become more consciously aware of the limitations we face, and how our remarkable human potential and creativity allows us to transcend and move beyond these limitations. It is up to us to delve into the adventure represented by the little prefix "re-," the ongoing reorganization of our ways of thinking and worldviews, and to use our creativity to maintain the (seemingly paradoxical) organization of constancies and the openness to change that allow creativity to flourish. This takes a combination of humility and vision.

Are we metastable? That is, are we teetering on the edge of where we need to go? We seem to be secure on this earth, but might a small perturbation suddenly, unexpectedly, topple us like a house of cards? The charge is serious. Can we, as humans, be creative enough to accept change and, in a sense, stay balanced on our feet, both ready and able to carry out the scale of personal and cultural transformation our situation calls for? Certainly, our identities and our fate are at issue in seeing world and self in a more complex, multidimensional way. Here the *evolutionary* systems view of creativity is of critical importance. How are we to actively intervene as *creatives* in building the better future?

Thich Nhat Hahn (1988) wrote a book called *The Sun My Heart*. The sun, he said, is our second heart; without the sun, we would quickly die. It's no less true for the second lung of our exemplary "tree," and the next tree, and the forests of the earth. In this and countless other ways we are profoundly connected to every other thing in our manifest world not just in an obvious or superficial ways. Not just through logical rules or a quantum mechanical principle of action at a distance. David Bohm (1980) noted that the *implicate order*, underlying our observable *explicate order*, is only a step in the right direction, a human flicker of understanding in deference to a greater truth—the *inexpressible*. There is greatly more here than meets the eye. Yet this too, is of us, and our human possibility, which is to say again our human creativity.

How are we to focus the diversity of this force of creativity we have been exploring on evolution. Or to put it in the perspective of the active agent—ourselves, each one of us and all of us together—how are we to actively intervene as *creatives* in building the better future?

This is the second of two books in which members of the General Evolution Research Group and other scholars have explored the relation of creativity to evolution. In the earlier book, specifically addressed to the action perspective, *The Evolutionary Outrider: The Impact of the Human Agent on Evolution* (Loye, 1998), four of this book's present writers and

two others specifically addressed this question of how as individuals and through groups we put creativity to work *for* evolution.

Eisler (1998) pointed to the factor of *cocreation*, or how evolution emerges from the action of many of us working together rather than at odds with one another. Along with futurist Hazel Henderson (1998) and chaos theorist Ralph Abraham (1998), Montuori (1998) spelled out the implications for the vital strategy of both exploring and *creating alternative futures*. Laszlo (1998), Loye (1998), and Montuori explored the bedrock factor of *self-creating*, which lies at the core of ethical evolutionary action. In an early essay for a concept that is by now hopefully activating millions of us, sociologist Paul Ray (1998) wrote of his work identifying the *cultural creatives* as the one in four broad segments of humanity most active in pushing for the better future, upon whose efforts the fate of our species indeed may depend. Here also Loye introduced his formulation of an Evolutionary Action Theory in which the thrust of creativity is a central concept, and the outcomes we seek are *creative transcendence*, or breakthrough, and *creative transformation*, or the kind of breakthroughs that take hold rather than being damped out by all that is rigidly set in place to discourage and undermine creativity and keep change and the better future at bay.

Elsewhere, the work of Combs (1995) and Wilber (2000) presents us with models of the possible evolution of consciousness. These maps open up possibilities by positing higher stages of human development, where, as we have suggested, new forms of complex, multidimensional thinking and greater emotional maturity can be attained through specific transformative practices.

Studies of the evolution of consciousness have pointed to a "post-formal" way of thinking (Combs, 1995; Morin, 1994; Wilber, 2000). Arguably, a next step in the evolution of consciousness would involve the development of a different way of thinking that is systemic, evolutionary, multidimensional, and dialogical. Such a way of thinking has all the hallmarks of creative thinking. And yet we are faced with a paradox. As we have hinted at before, in order for creative thinking to be understood and articulated, it requires the very kind of creative thinking that it seeks to understand. In other words, in order to develop a more coherent description of the systemic, evolutionary, multidimensional, and dialogical phenomenon of creativity and the creative process, we need a kind of thinking that is itself systemic, evolutionary, multidimensional, and dialogical. For instance, Barron's research demonstrates that creative individuals are both more primitive and more cultured, more destructive and more constructive, crazier and saner, than the average person, yet within our present framework it is difficult to articulate this complexity without referring to the paradoxical qualities of creative individuals because our traditional ways of thinking have been reductionistic, unidimensional, static, and polarizing (Montuori, 1989, 1998; Morin, 1994).

The debates in creativity theory demonstrate how a focus on one dimension, such as individual (lone genius approach) or social (zeitgeist), has lead to profoundly partial understandings of the phenomenon as a whole and the interaction between the dimensions (Montuori and Purser, 1999). One of the key challenges posed to us by the study of creativity is to develop a language, and indeed a way of thinking and researching, that is itself creative and does not reduce a complex, systemic, evolutionary, multidimensional, and dialogical phenomenon to the kind of mutilating simplicity that is demanded by traditional social science research, where creativity is reduced to one single dimension (either mental process, or personality, or the environment, and so on).

Many of the characteristics Barron has found in creative people seem precisely to be related to the capacity to live with uncertainty, ambiguity, the limbo of not knowing, the abyss of the unknown. This is not what traditional education prepares us for, or what traditional Cartesian ways of thinking, with their "clear and distinct ideas," propose as a desirable goal. Presently our very way of thinking is limited—it is a "simple thought," in Morin's terms, that in many ways has been unable to address the complexity of human life and the complexity of creativity itself. As we have seen, for Morin (1994) a reform in thinking is needed, in the form of the development of complex thought, a kind of thinking that does not reject uncertainty and ambiguity but rather feeds on it for a constant process of self-eco-re-organization. The integration of creativity into our dominant way of thinking, with all the characteristics enumerated above, would represent a leap in human consciousness towards the kinds of possibilities outlined in "post-formal" thought, "vision-logic" (Wilber, 2000), and complex thought.

Whatever the approach, thinking and acting in terms of our ever-so-real, if often seemingly invisible, interdependence is long overdue for our species. Would an *enlightened* humanity clear-cut the forests? What percentage of transformed humanity will it take to change norms, ethics, and our sense of the humanly possible in the needed directions? On all sides we face the call for the transformation of an intrinsic global ethic—one found throughout the world's great wisdom traditions (Smith, 1991; Kung, 1997), ideally corroborated by science (Loye, 1997, 1999; Wilber, 2000). Whether we call it love, compassion, moral sensitivity, selfless giving, or something else, it's about the greater concern and the greater vision our time calls for. While still deeply cherishing each individual as part of the whole, it is about *partnership* in the extreme—about a grand equality in our greater identity and mission together.

Is this saving ethic emerging within us now? Is it subtly but powerfully in places beginning to spread as we human lemmings press to the edge of the cliff? Is this what Darwin (Loye in this book and 2003a) may also have intuited and been writing about? Will we finally learn to hear the message? Let us all, as human beings, stay more broadly open, conscious, and aware, so that, unlike those partying on the *Titanic*, we will not be dancing in the parlor while the iceberg approaches.

As a closing note, let us keep in mind what William James (1902/1958) said of our essential unity based on nonordinary states of mystical knowing, which are similar across time and culture. He suggested each of us stop and pay attention to this one:

> In mystic states, we both become one with the Absolute and we become aware of our oneness. This is the everlasting and triumphant mystical tradition, hardly altered by clime or creed. [Across cultures there is] an eternal unanimity which ought to make a critic stop and think. (p. 321)

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Part IV

THE DARWINIAN END GAME