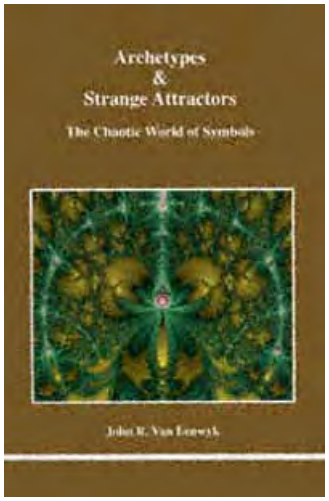

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Archetypes & Strange Attractors

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Archetypes & Strange Attractors

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John R. Van Eenwyk

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Never do human beings speculate more, or
have more opinions, than about things which
they do not understand.

C.G. Jung.

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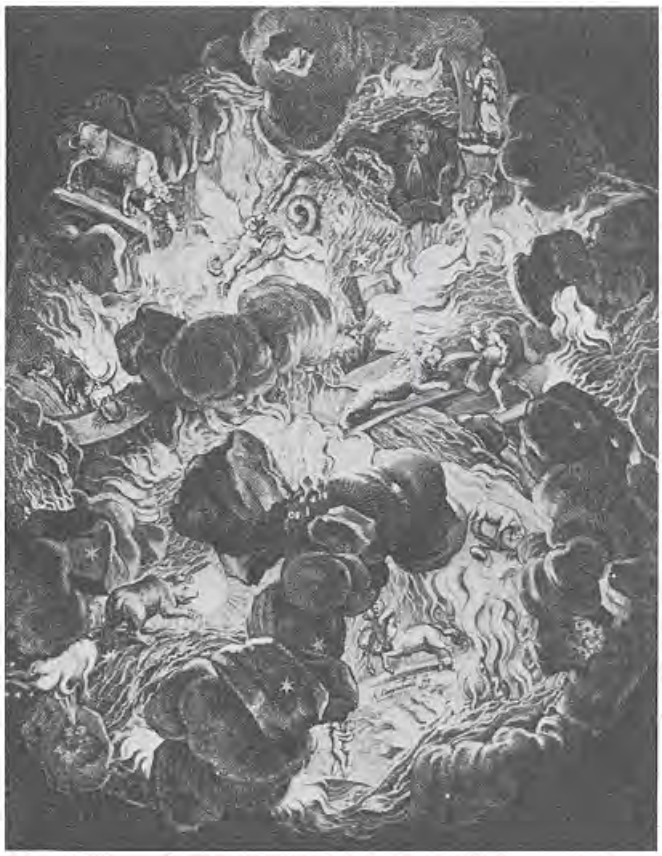
For Leah and Claire

living proof that
order emerges from chaos



The alchemical *prima materia,* or *massa confusa,* as a black, chaotic cloud
(Marolles. *Tableaux du temple des Muses,* 1655; British Museum)

Preface

How can we deal with the chaos that inevitably infects our lives? Perhaps more to the point, should we learn how to deal with it at all? Shouldn't we strive to eliminate it? Isn't chaos a sign that things have gone terribly wrong?

Maybe not. Carl Jung believed that our psychological development proceeds according to the influence of symbols in our lives. In counter-pointing our established points of view so that growth can occur, symbols invariably feel chaotic. At least, that's his theory. Until recently, there was little in the "hard" sciences to back him up. Now, however, with the advent of chaos theory, there is new support for his perspective.

This book is an elaboration of Jung's ideas in light of what we have learned from physics and mathematics about complex dynamic systems. Some of the material may be a bit chewy. But that is necessary to provide as complete an account as possible of what chaos is, how it appears in our psychological lives, and what we can do when we find ourselves in the thick of it. Each of us develops in ways that differ from others. Yet, we all experience roughly the same dynamics in our lives. In order to understand how this is possible, we must first consider the role that symbols play in our development.

Symbols occupy a unique place in the history of humankind, for their apprehension and interpretation lifts us above the level of mindless drudges toiling incessantly at the task of survival. Symbols reflect our ideals and spur us on to higher levels of existence. Unfortunately, they can just as often land us in lower ones, for symbols are ambiguous. They can lead to better, more humane and dignified relations with one another, or to the most horrifying exploitations.

Jung spent a lifetime analyzing symbols. He believed that their ambiguity derives from a fundamental dynamic within the psyche, which he called "tensions of opposites." In 1931, midway in his career, he noted:

> The conflict between nature and spirit is itself a reflection of the paradox of psychic life. This reveals a physical and a spiritual aspect which appear a contradiction because, ultimately, we do not understand the nature of

> psychic life itself. Whenever, with our human understanding, we want to make a statement about something which in the last analysis we have not grasped and cannot grasp, then we must, if we are honest, be willing to contradict ourselves, we must pull this something into its antithetical parts in order to be able to deal with it at all. The conflict between the physical and the spiritual aspects only shows that psychic life is in the last analysis an incomprehensible "something."1

To speak of "something which in the last analysis we have not grasped and cannot grasp," that is a function of a "psychic life [that] is in the last analysis an incomprehensible 'something,' "comes pretty close to the way most of us feel when in the presence of symbols. Symbols move us beyond ourselves: beyond our perspectives, assumptions, beliefs, andfragile as they are our certainties.

This book about symbols elaborates on Jung's research. Neither a handsome coffee-table book of enchanting pictures of symbols that clarifies their origins and references, nor a comprehensive list explaining their meaning, it is, rather, an analysis of their dynamics. It seeks to clarify how they work; how they accomplish what they do; essentially, the mechanics of our interactions with them. These concerns are more than academic. Studying what symbols do clarifies what symbols are. This, in turn, helps us to interact with them more effectively when they appear. And that, ultimately, helps us to manage the power they exert on us.

The danger of possession by symbols is very real and not to be underestimated. They can be powerful motivations for constructive growth or for destructive manipulation. Which side wins out depends on the extent of our understanding of the role of symbols in psychological development. Only when we understand and recognize the dynamics of symbols can we have the freedom to use them in the service of the highest ideals to which we aspire.

Humankind seems always at the crossroads of its destiny. Perhaps if we better understood how we arrive there, we could better understand which way to turn. The premise of this book is that insight into the journey is synonymous with knowledge of the mechanics of symbols. Bear in

1 "Basic Postulates of Analytical Psychology," *The Structure and Dynamics of the Psyche,* CW 8, par. 680. [CW refers throughout to *The Collected Works of C.G. Jung]*

mind that attempts to understand the mechanics of symbols can often themselves become symbolic, for in order to understand the phenomenon of symbols we may have to experience them. So do not be surprised if this exercise in understanding the mechanics of symbols becomes an experience of the very dynamics we are attempting to understand!

Finally, Jung believed that in the dynamics of the psyche chaos is inevitable. Consequently, he focused a great deal of attention on developing the means to find patterns in that chaos. That which has come to be known as "chaos theory" now suggests that his theories could be verified quantitatively were we to have the ability to keep track of all the variants. Analytical psychology and physical and mathematical science all employ virtually identical metaphors to understand particular phenomena, but this does not guarantee that they are accurate metaphors or that they describe the same phenomena. The evidence is growing, however, that chaos theory and analytical psychology are describing similar dynamics, albeit in very different realms.

Perhaps the most important implication of the correspondence between Jung's theories and chaos research is that fantasies about order, that spurious product of reductionism, being the most desirable state-of-being are slowly giving way to the realization that chaos is far healthier than previously imagined. If that proves to be the case, we shall have to revise some of our basic notions about mental health. Like Jung, we may be forced to conclude that, at least with regard to psychological development, chaos is not only unavoidable, but necessary.

Introduction

You don't see something until you have the right metaphor to let you perceive it.
Robert Stetson Shaw.

Jung believed that very few symbols always have the same meaning. Nevertheless, there were a few whose meaning he felt was relatively constant. Perhaps foremost among these is the ocean, which he considered the universal matrix from which all life developed. As such, it symbolizes the deepest layers of the unconscious, from which spring the complexities of our personalities. Like the human psyche, however uniformly water behaves, however constant the oceans appear, their dynamics are virtually unpredictable. Every wave, every interaction between waves, is actually chaotic.

How pleasant to stand on a beach, watching the waves tumble over the sand only to peter out harmlessly at our feet. Water is a wonderful medium for observing complex dynamic processes, especially turbulence. For example, as waves wash ashore on a gently sloping beach, small ripples on their leading edges intersect. At first glance all may seem orderly and predictable. It just seems natural for ripples to look the same coming out of their intersections as they did going in. But the question of how they preserve their character during their interactions is not easily answered. At the point where they intersect, all is jumbled up in turbulence. In fact, the dynamics of their interaction are so complex that they are generally relegated to that catch-all phrase: "chaotic."

How is it that a pattern can be preserved in the midst of chaos? How can one ripple look the same after interacting in an unpredictable manner with another? What can the word "chaos" possibly mean if order can emerge from it? For those familiar with analytical psychology, the emergence of patterns from disorder is hardly surprising. Nevertheless, that possibility has rarely enjoyed the confirmation of the "hard" sciences. Now, however, research into nonlinear dynamic systems (or complex dynamics) is yielding results that are remarkably consistent with analytical psychology. Consequently, it has a great deal to teach us about the

mechanics of the processes which Jung addressed.

Jung was an explorer who was well aware of the ambiguities of the territory he traversed. In 1938 he lamented:

> Theories in psychology are the very devil. It is true that we need certain points of view for their orienting and heuristic value; but they always should be regarded as mere auxiliary concepts that can be laid aside at any time. We still know so very little about the psyche that it is positively grotesque to think we are far enough advanced to frame general theories. We have not even established the empirical extent of the psyche's phenomenology: how then can we dream of general theories? No doubt theory is the best cloak for lack of experience and ignorance, but the consequences are depressing: bigotedness, superficiality, and scientific sectarianism.2

However ephemeral theories may be, they at least function as roadmaps, helping those who follow to find the paths of those who have gone before. Particularly in psychology, tracing the steps of those who lead is of more than just academic importance, for what is discovered increases not only our knowledge of the world, but of ourselves as well.

Some paths lead through thickets. Since Freud, for example, the theories of developmental psychology have been plagued by a conundrum. It concerns the premise that psychological development unfolds according to broadly discernible patterns that bring each of us to definitive stages at the same time in our lives. To some degree this fits our experience. Just as often, unfortunately, it doesn't. Even when researchers of the caliber of a Jean Piaget meticulously describe specific events in the learning process, their data rarely substantiates the "broadly discernible patterns" they describe.3 Accuracy, it seems, is highly individual. As we shall see from our study of chaos theory, small differences in where we start lead to enormous differences in where we end up.

How, then, does the "rampant variability of development, both among contexts and individuals" lead "members of a species [to] develop in a generally similar way?"4 Not surprisingly, there is little agreement

2 "Psychic Conflicts in a Child" (Foreword to the Third Edition), *The Development of Personality,* CW 17, p. 7.

3 See, for example, Esther Thelen, "Development As a Dynamic System."

4 Ibid., p. 191.

among psychologists. Psychoanalysts cite different reasons from behaviorists, who differ from cognitive psychologists, who dispute the humanistic psychologists, and so on. Further complicating the issue is the disagreement among those in each field. Among psychoanalysts, for example, Freudians often disagree with Jungians, who differ from Adlerians, and so on. And if that weren't enough, there is even disagreement within disciplines. Not all Jungians agree with one another, nor do Freudians, nor Adlerians. So what hope is there that adequate theory can ever evolve out of so much disagreement?

The answer, curiously enough, lies in the nature of this disagreement. It is, in fact, fractal, which means that it resembles itself across categories. Wherever fractal dynamics are at work, chaos is likely to be present. Wherever chaos exists, small differences become magnified over time. Wherever differences multiply. predictability disappears. Whenever predictability disappears, identical dynamics can generate vastly different results. So it is no wonder that minds that run on the same thought eventually end up at loggerheads with one another.

This is due to the nature of the psyche, which is basically a dynamic system. Dynamic systems are those that change over time. That we change our minds is hardly surprising. What is surprising is the degree to which chaotic dynamics contribute to such changes. We do not generally realize that the orderly routines of consciousness can be the product of chaotic dynamics. But they can, and are. Jung had some insights into this. How can we use his insights to live together more agreeably?

To understand Jung's theory of psychological development, or individuation, we must divide it into two concurrently operating processes. On the one hand are those that are cyclical, which we shall call the synchronic aspects of individuation. They constantly repeat themselves through the establishment of tensions of opposites, their resolution, and the subsequent appearance of new tensions between the resolution and new possibilities. On the other hand are those processes that are developmental. They build upon synchronic dynamics and move through time. We shall call them the diachronic aspects of individuation, for they begin somewhere and end up somewhere else, for instance, from less highly differentiated to more highly differentiated functioning.

Synchronic dynamics are sufficiently unpredictable and difficult to define that descriptions of their mechanics have previously amounted to little more than saying that they "happen." While we shall elaborate those mechanics in greater detail later, for now suffice it to say that the most favorable outcome of synchronic dynamics, according to Jung, is a working relationship between consciousness and the unconscious. This requires that the ego suspend its own definitions of clarity, rationality, and specificity while it considers the perspectives of the unconscious. The ego that is deprived of its grounding in familiar categories, however, usually finds such encounters pretty chaotic.

However much time and effort we may expend in trying to eliminate it, chaos seems to be an integral part of life. All dynamic systemsincluding the human psycheseem to have their share of it. But as we shall see in chapter two, sensitive dependence on initial conditions makes it impossible to predict where chaotic processes will lead. Nevertheless, the processes themselves are often very consistent with one another and can usually be defined by relatively simple equations. Could this account for the way in which processes common to all are able to develop completely unique individuals?

Perhaps the problem that developmental theories face has to do with the nature of chaotic dynamics, which are so complex as to defy definition. As we shall see in chapter three, they resemble Martin Heidegger's definition of "the essential trait of what we call mystery," namely, "that which shows itself and at the same time withdraws."5 Or maybe the generalizations that lead to developmental theories are themselves the problem, for when unique and baffling mysteries are reduced to known quantities, particularity becomes collectivized. If the truly idiosyncratic is beyond definition, theory will have a hard time summarizing it.

Jung wrestled with this problem. Like most psychologists, he looked to behavior for verification of his theories. Given the notorious differences in behavior among individuals, however, that proof came very grudgingly, if at all. So he turned to the images the psyche produces, on the assumption that they reflect the psychic processes giving rise to them.

5*Discourse on Thinking,* p. 55.

Unfortunately, in the realm of psychic images, one individual's fact can often be another's fable. After almost a century of intense analysis, for example, the interpretation of dreamsparticularly in relation to behaviorremains a matter of no little dispute.

This is not unique to psychoanalysis. In their efforts to describe the basic nuts and bolts of the functioning of the psyche, empirical psychologists try to limit themselves to that which can be definitively proven. While they have made magnificent strides in isolating the biochemical reactions in the brain that characterize those domains that are active during various perceptions and behaviors, they are no better than anyone else in accounting for the wide variability among individuals. Confined to the general, they are as helpless as the rest of us when confronted with the particular.

To expect them to do any better is hardly fair. After all, physicists long ago reconciled themselves to the impossibility of predicting the behavior of any one element in a group. While the behavior of a group can often be predicted statistically with a high degree of accuracy, the behavior of any one member of the group is impossible to predict. Werner Heisenberg's famous "uncertainty principle"that the location and velocity of a particle cannot be determined simultaneouslyis relevant to more than particle physics.

Whatever certainty may exist with reference to group behavior is of little comfort to individuals who are suffering the vagaries of their own development. Who cares about general experience when we are mourning the death of a child, for example? Fully aware of this, Jung developed the idea that the diachronic dynamics of development unfold from the synchronic dynamics. This two-dimensional view of psychological development postulates an interface on which dynamics common to all (synchronic) generate individuals with unique histories (diachronic). We are all forced to make decisions. How we make them eventually gives us a unique identity.

Jung devoted much of his analyses of the psyche to the premise that at the point of intersection of these two dynamics, chaos reigns. While he did not have at his disposal concepts such as sensitive dependence on initial conditions, fractal dimension and attractors, his theories say es-

sentially the same thing. His elaboration of the universal dynamics of individuation focused on where and how a particular individual's development is likely to proceed.

It is this dimension of Jung's theory that we shall explore. We shall compare the dynamics of the intersection between synchronic and diachronic aspects of psychological development with chaos theory, in order to clarify the processes that lead each of us to blossom in our own particular ways. We shall, of course, focus on symbols. The lens through which we shall view the psychodynamics of symbols is that of complex dynamics, or "chaos theory."

So let us begin by outlining Jung's theory of the structure and dynamics of the psyche, paying particular attention to the synchronic and diachronic aspects of his theory of individuation. We shall see how the shadow influences the psychodynamics of symbols. Then we can summarize those aspects of chaos theory that pertain to the activity of symbols. For our experiment, we shall apply our insights to the analysis of a folk tale and a myth. Finally, in chapter eight we shall see how chaos theory coincides with Jung's in a manner that provides insight into how to deal with life's turbulence. For if the chaos of the psyche is essentially deterministic, we should learn how to work with it, rather than trying to seek its elimination.

1
Psychodynamics

Man is a synthesis of the infinite and the finite, of the temporal and the eternal, of freedom and necessity.
Soren Kierkegaard.

Introduction

A number of years back I was surprised to discover that my children were sleeping in a zoo. Every night they shared their beds with an amazing menagerie of animals: bears, ducks, mice, rabbits, a dog on skatesyou name it, it was there. While one or two favorites were always present, during times of stress they would immerse themselves in virtually every stuffed animal they had. These were their friends, protectors, and comforters. Sometimes stuffed animals are described as "transitional objects" that help children to transfer their affections from their parents to their peers. But if these cuddly little surrogates led their owners into the world of interpersonal relationships, they also moved them far beyond it, into the realm of symbolic images. In that sense, these "transitional" objects continue a unique relationship with their owners to the present day.

There are, of course, many reasons why children become attached to stuffed animals. They feel comforted by virtually anything that is pleasant to the touch. Blankets, pillows, random pieces of cloth, all remind them of the warmth and security of their mothers. In the case of stuffed animals, however, the experience goes beyond touch, for soon children are introduced to folk tales and other stories wherein animals behave like humans. Later, they will hear and read of animals in many different roles, from the mythic to the everyday, from fantasy to fact, for the successors to their little bed mates have their counterparts in adult life as well.

Stories involving animals are so ubiquitous that Jung believed they reflect a basic imaginal capacity of the mind. Thus, children come into the world equipped with the capacity to recognize stuffed animals as something important. That is, the propensity to connect with animals in that

deeply emotional way so characteristic of children indicates that something in the mind reverberates with animal images. Simply the ability to apprehend a phenomenon (in this case, animals) suggests that we are in some way prepared to recognize it. The essence and dynamics of such an ability to recognize things comprised the central focus of Jung's work.

Early in his career, his interests in the Assyrians and Egyptology led him to consider becoming an archaeologist. But as he lacked the money for such studies, he decided to enter the more practical field of zoology. Unfortunately, he soon realized that the primary opportunities in zoology lay in teaching, which did not particularly interest him either. Then he remembered that his grandfather had been ableby virtue of his medical trainingto study the natural sciences. So it was that Jung decided to pursue his interests through the study of medicine.

He never lost his interest in archaeology, particularly that branch concerned with paleontology. He even considered his work as a psychiatrist to be "historical comparative psychology," which, like paleontology ("the study of the archetypes of the animals") consisted of "the study of archetypes in the soul. [Just as] Eohippus is the archetype of the modern horse, the archetypes are like the fossil animals."6 In other words, the way in which we perceive life is strongly influenced by our previous experience throughout the millennia. We aren't born with empty minds. Much of the experience of our ancestors comes through to us in our genes. Does this mean that we can perceive only that which our ancestors experienced? If so, how did they perceive things?

Some say that the psyche's affinity for certain kinds of images (its propensity to respond more to some than to others) is simply a matter of conditioning. Perhaps our psyches learn to respond to that which they repeatedly encounter. Suffer attacks in the darkness enough times and the species might just develop a fear of the dark. Jung did not dispute that such is often the case. But he questioned why certain images seem to be more important, appearing as they do in the myths and folk tales of peoples of widely differing backgrounds. Why do some images seem to influence the human psyche more than others?

6*C.G. Jung Speaking,* p. 209.

And furthermore, why do infants display certain predispositions toward particular behaviors virtually from birth? Harlow, for example, demonstrated that young monkeys, when given a choice, preferred "cloth mothers" to "wire" ones. And literally right out of the egg baby chicks cringe in fear at the sight of a picture of a hawk flying overhead.7 Unquestionably, the psyche responds more dramatically to some images than to others. To explain this, Jung hypothesized that our minds at birth must contain inherent predispositions to perceive in categories. He called these *archetypes,* which he defined as "deposits of the constantly repeated experiences of humanity. . . . a kind of readiness to produce over and over again the same or similar mythical ideas. . . . recurrent impressions made by subjective reactions."8 In short, the more we notice something, the more recognizable it becomes.

Certainly we humans resemble one another in our thoughts and feelings more than we resemble other species. Just as dogs differ from cats, humans differ from the other animals. We think differently. So differently, in fact, that it is considered abnormal to think like the other animals. "You think like a duck" would hardly be a compliment. So how is it that we think so much alike? For Jung it was fairly simple. It is due to the way our minds are constructed. We all share similar genetic material, so we all have similar minds. Our minds think the same way because they are set up to do so. These capacities to think in certain waysdecidedly human waysare the result, said Jung, of the activity of the archetypes.

Archetypes

Of all Jung's concepts, that of the archetypes is among the most difficult to understand. The most common mistake is to confuse archetypes with the images through which their influence is manifested. In other words, the archetypal dynamics of an image are often mistaken for its content.

For example, suppose we are speaking of the "mother archetype." Just what is that? According to Jung, it refers to all the aspects of mothering that are possible. Any kind of mothering that has ever been experienced

7 H.F. Harlow and M.K. Harlow, "Social Deprivation in Monkeys."

8*Two Essays on Analytical Psychology,* CW 7, par. 109.

by any human contributes to our understanding of what the mother archetype means. But here we run into a few problems. If we identify the archetype with a particular image of motheringour own mothers, for instancethen we shall miss all the other aspects of mothering that may not be included in that image. There is simply no image of mothering that says it all, for the archetype that alerts us to mothering must be able to identify anything at all that qualifies as mothering. So the archetype is purely potential. It cannot be adequately expressed by anything actual, just as a whole cannot be adequately defined by one of its parts.

Jung grounds his analysis of the psyche in some assumptions. The major ones are that there are such things as instincts, that they are present in the organism at birth, and that they have the power to command the attention and behavior of the organism. But if instincts provide the impulses to action, archetypes portray the objects of those actions. They give instincts something toward which to direct the organism's attention, generally in the form of mental representations (images) of that which can gratify the instinct. It's one thing for me to have a vague feeling that my life needs to head in a new direction. It's quite another to have a sense of what that direction is. It is the archetypes that draw my attention to those things in my life that can help me to develop in new ways.

Agriculture is a good example. At one point in humankind's development we seem to have realized that we did not have to be slaves to the vagaries of wind and weather. We could cultivate plants to produce more reliable harvests. According to Jung, it was the archetypes that directed our attention not only to this possibility, but to the means to actualize it as well. Consequently, archetypes play a role both in the gratification of basic instincts and in the more highly developed areas of functioning. By investing everyday perceptions and experiences with a value, they lead certain things to stand out from others. When perceptions and experiences become invested with the power of an archetype, they command our attention and influence how we orient ourselves. If all goes well, archetypes lead us into encounters (situations and relationships) that increase our adaptive capacities. By taking our interests and attractions seriously, we can actively engage the psyche's natural evolution. Our decisions about what career to pursue, school to attend, partner with whom to

share life, are all influenced by archetypes. What is ultimately at stake is our survival: physical, mental and spiritual.

The mechanics of this process involve the generation and flow of psychic energy. Jung defined the psyche as a manifestation of psychic energy, "a hypothetical, fundamental striving."9 Psychic energy, defined simply as "life energy,"10 is generated by tensions of opposites:

> The concept of energy implies that of polarity, since a current of energy necessarily presupposes two different states, or poles, without which there can be no current. Every energic phenomenon (and there is no phenomenon that is not energic) consists of pairs of opposites: beginning and end, above and below, hot and cold, earlier and later, cause and effect, etc. 11

Note that while Jung proposes in this passage an explanation for movementor changein the psyche, he grounds that explanation in the premise that the psyche is part of the natural order and obeys its laws. This will be an important point to remember in our discussion of chaos theory and its applicability to psychic functioning.

Thus, "the psyche is characterized by differences in potential,"12 which Jung believed are reflected in the activity of the archetypes. These differences in potential keep energy flowing, rather than stuck in some backwater of the mind. Because archetypes participate in the polarity that generates psychic energy, they balance the psyche by establishing counterpoints to that which exists.13 These counterpoints have a "charge" (Jung used the term "value"), which mobilizes psychic energy in various "directionalities."14 If, for example, I become too invested in material things, the archetypes may create a hunger for something that can feed my soul.

For Jung, these were the psychodynamics behind what we mean when we say we are "following our inclinations." Were there no alternatives to what is, we would simply be borne along on an immutable course. It is

9 "On Psychological Understanding," *The Psychogenesis of Mental Disease,* CW 3, par. 418.

10 Ibid., note 16.

11 *Psychological Types,* CW 6, par. 337.

12 Elie Humbert, *C.G. Jung: The Fundamentals of Theory, and Practice,* p. 92.

13 *Psychology and Alchemy,* CW 12, par. 553.

14 Humbert. *C.G. Jung,* p. 92.

the possibility of otherness that generates the alternatives that create the openings for choice. With the need for choice, of course, comes the need for consciousness. Consequently, the bipolarity of the archetypes leads not only to the emergence of consciousness, but to its development as well, for by creating an "otherness" pole in contradistinction to our conscious standpoint, archetypes create tensions between what is and what could be that command our attention. It's as if we had a bug in our ear constantly whispering, "On the other hand . . ."

Tensions generate psychic energy and balance the psyche. Fundamental to Jung's metapsychology is that archetypes lead the psyche to be inherently self-correcting. That is, when too much energy is invested in a particular point of view, archetypes incline psychic energy toward other, underemphasized viewpoints. Like the weight on the other end of a seesaw, they sit down and balance us. Not surprisingly, the bipolarity of archetypes leads us to assign seemingly contradictory dimensions to phenomena. Opposing points of view, pros and cons, the many sides of an issue, the horns of a dilemma, are simply a few of the ways this is typically described. Yet, the tendency to perceive in dualities that are not necessarily reconcilable forces the psyche to struggle with its options.

Invariably this leads to a tension between consciousness and the unconscious. Yet, because the unconscious often seems opaque, its contents and dynamics are often mistaken for more familiar contents and dynamics in the environment that happen to share a generic similarity with those of the unconscious. In other words, through projection onto the world around us, we experience concretely the more abstract and elusive qualities of our own unconscious. If I have never thought of myself as having any inclinations toward laziness, I'll probably find myself noticing lazy people wherever I look. While some may be truly lazy, many may simply be more casual about things that I essentially overemphasize. Thus, that which I cannot accept as part of my own identity I cannot help but see in others.

A primary task of psychoanalysisas well as of life itselfis to recognize those aspects of our own selves that contaminate our perceptions of others. Recognizing our projections helps us to distinguish between the reality of that which surrounds us (the things in themselves) and of

that which is ourselves. This, in turn, helps to clarify our relations with the world around us. Too oftenparticularly in our most emotionally intense momentswe interact more with our projections (and, thus, with ourselves) than with that which is actually there. When the world fails to confirm our presumptions, we often believe that it is crazy. This further erodes our relationships, leading to a downward spiral whose only remedy is a healthy dose of ego-effacing consciousness.

Synchronic Individuation

Consciousness and the unconscious balance each other. Early in life, when consciousness is barely formed, our viewpoints are dominated by the unconscious. Then the archetypes attract our energy toward experiences that build consciousness. Later in life, when consciousness tends to dominate our perspective, the archetypes direct our attention toward the perspective of the unconscious. To us, of course, this feels like a series of conflicts and resolutions. We can express this schematically:

The Conscious Situation	The Unconscious Situation
A Perception	Its Opposite
Perception + Opposite = Conflict	Its Opposite (Resolution)
Resolution	Its Opposite (Conflict)

The explanation of this process is fairly simple. When consciousness invests a certain amount of its energy in a particular perspective, other perspectives are left with proportionately less energy. For example, the limited focus of the workaholic leaves little room for more relaxed approaches to life. This establishes a disparity between consciousness (that which is emphasized) and the unconscious (that which is not). Such a disparity polarizes the unconscious, generating a flow of energy from the over- to the underemphasized. The former, of course, is more conscious than the latter. The result is a conflict between consciousness and the unconscious that at first appears to be a function of the world around us (projection: we become obsessed with the laziness of others and find ourselves in conflict with them). If we can realize that the conflict perceived in the world around us, or between us and that world, is a reflection of a conflict within ourselves, we can bring our attention to bear on thatbring the conflict into consciousness.

When our conscious perspective becomes focused on conflict, however, possibilities for resolution sink into the unconscious. Torn between overzealous work habits and the need for a more relaxed attitude toward life, we feel stuck. Yet now another polarity has been established, this time between conflict and resolution. As energy moves to the unconscious, resolutions strangely begin to suggest themselves. We find ourselves vaguely aware that alternatives to our dilemma exist. Maybe we'll realize that we can adopt a more relaxed attitude toward our work. Or maybe we'll quit our jobs and move to Tahiti. Either way, according to Jung, the archetypes have solved the conflict by drawing attention to its unconscious opposite, namely, resolution.

But if we see this resolution as a function of the world around us, for example, if we expect the government to solve the problem of the laziness we see around us, then we become dependent on the world to solve our problems. When that happens, we often become willing to invest people and programs in that world with enormous amounts of our resources. Unfortunately, this simply exacerbates the problem. The stupid politicians simply can't do their job, we think. How much improved our lives would be if we could recognize that resolution needs to begin with ourselves. That, of course, can happen only to the degree that we recognize our internal conflicts consciously. Only then can we enjoy resolution without being slave to the world around us.

Or can we? As we can see in the above schema, as soon as we become aware of the resolution of our conflict, the unconscious generates its opposite. Thus, in the dynamic between consciousness and the unconscious, resolution breeds conflict and conflict breeds resolution. As one philosopher has said, "True rationality is always dissatisfied with itself."15 This captures the essence of the repetitive dynamic that generates psychological development (or, as Jung called it, *individuation*). Because this dynamic occurs over and over again, it is called *synchronic*. Like a conveyor belt, the ceaseless turning around and around of the pulleys at each end makes it possible for the belt to move from one place to another. Synchronic dynamics, which are a product of a constantly recurring dy-

15 Robert Nozick, *The Nature of Rationality* (quoted in Richard Marius, "The Browser," p. 125).

namic between consciousness and the unconscious, move consciousness toward an increased ability to recognize and appreciate the paradox and ambiguity of the unconscious.

Thus, tension builds consciousness. And because everything has its opposite, the potential for tensions to develop is limitless. Throughout a lifetime, the tensions between what is and what could be generate growth. Without such tensions, growth stalls. Death ensues. But if the ego can become aware of this process by which change and growth occur, it can cooperate with the unconscious to improve its adaptability.

Unfortunately, like infants who first experience their needs through discomfort, we tend not to like the tension between what is and what could be. The conflict-free life seems to offer a paradise where discomfort, fear and worry do not exist. Although such an existence retards the development of consciousness, many of us prefer it. We resist the effort required to become conscious of our own internal tensions and conflicts, preferring instead to assign them to the world in which we live. No wonder a major task in analysis is learning to value our discomfort rather than trying to get rid of it. Much in life remains a mystery. To some degree, we must simply learn how to be comfortable with not knowing.

The Structure of the Psyche

Archetypes play a key role in the synchronic dynamics of individuation by mobilizing psychic energy into a kind of alternating current between consciousness and the unconscious. The interplay between conflict and resolution is one way in which the archetypes play a role not only in the dynamics of the psyche, but in the development of its structures as well. Like magnets whose fields are invisible until they take shape in a substance that reveals their character, archetypes arrange psychic energy into patterns through which their character becomes discernible.

For example, consider the classic demonstration of a magnet's field. First, place the magnet on a table. All that is visible is the magnet itself. There is no hint of the magnetic field surrounding it. Now place a piece of thin cardboard over the magnet and sprinkle metal filings onto the cardboard. Shake the cardboard gently, or blow lightly on it, and the filings will arrange themselves into a coherent pattern that reflects the

magnet's field, usually a series of swirls. However, because the cardboard covers the magnet, only the magnet's field, rather than the magnet itself, is visible.

Archetypes are like that. Their power (field) is revealed by what becomes "caught" in it. If I notice a member of the opposite sex in my field of view, and the archetype invests that image with its power, I may very well fall in love. To define that archetype as that person, however, is tantamount to defining a magnet as the metal filings that reveal its power. Those filings do have something to say about the magnet, of course, for had we sprinkled wheat flour, or plastic beads, or sand on the cardboard, no evidence of an underlying magnet and its field would have appeared. With regard to both magnets and archetypes, some contents are conducive to arrangement and some are not. Had the only person available to be empowered by the archetype been, say, the the ugly stepsister in "Cinderella," the phenomenon probably wouldn't have occurred. That only certain kinds of things become arranged by a magnet or archetype is important. But it would be a mistake to define the arranger solely in terms of the arranged.

Jung believed that the structure of the psyche reveals itself in its dynamics. Like the metal filings and the magnet, elements of everyday life that come under the influence of archetypes share in its dynamics. Each element takes on the particular character, or "leitmotif," of the archetype that informs it. The elements of everyday life that participate in the leitmotif of an archetype, Jung called *associations,* within which the archetypes function as *nuclear elements*. The conglomeration of associations that gathers around a nuclear element (archetype) constitutes a *complex,* the leitmotif of which is a "feeling-tone."

Complexes

Feeling-toned complexes are the building blocks of the psyche. Constellated around the power of a particular archetype, each grows in size and influence as it weaves more and more perceptions and experiences into its feeling-tone. A complex, therefore, in Jung's words, is

> the *image* of a certain psychic situation which is strongly accentuated emotionally and is, moreover, incompatible with the habitual attitude of con-

> sciousness. This image has a powerful inner coherence, it has its own wholeness, and in, addition, a relatively high degree of autonomy, so that it is subject to the control of the conscious mind only to a limited extent, and therefore behaves like an animated foreign body in the sphere of consciousness.16

Suppose, for example, that my father was relatively absent from my childhood. Perhaps he was absorbed in his work, tired when he came home, and limited in his involvements to community affairs. All the potential fathering has to offer ends up having a very limited expression in my father. The "archetype of the father," so to speak, which could direct my gaze toward all that represents fathering, has little to work with. Consequently, I have a great deal of emotional investment in a very limited example of fathering. I even tend to equate fathering with absence.

My father complex will lead me to notice in new father figures those dimensions of fathering I have already experienced. I may expect that my coach will never put me in the game. My resulting sullen attitude may ensure that such is the case. Later on, I may find myself focusing on the inadequacies of my teachers. They may pick up on this and, feeling defensive, try to ignore me. That will simply reinforce my beliefs. Finally, I may see my boss as uninterested in the work I do. Or if I am female, I may marry a man who is a workaholic, tired when he comes home, or overly involved with community affairs. Essentially, my complex comes alive in my surroundings.

However, among the many complexes is also the ego, whose leitmotif alone is rationality, rather than feeling. Unlike the other complexes, the ego complex is organized by consciousness. If my ego complex can begin to sort things out and to assimilate to consciousness data previously based on feelings, maybe I can recognize that my coach, teacher, boss, or husband really isn't identical to my father. For one thing, the location and time are different, For another, they do things my father never didthings I have difficulty noticing because they haven't been in my experience. They may resemble my father in certain ways, but those resemblances may account for only a small part of their overall interactions

16 "A Review of the Complex Theory," *The Structure and Dynamics of the Psyche,* CW 8, par. 201.

with me. Thus does consciousness gain the opportunity to peel a layer off the feeling-toned complex and associate it to rationality and reflection.

In the language of complex theory, when everyday experiences become mixed with feeling-tones they are stored as associations. Through their connection to feeling-tones, these associations become arranged by the archetypes into configurations that become the structures of the psyche. Consequently, the only existence anything in the psyche has is as a quantum of psychic energy imbued with an archetypal pattern. My father complex is not a gathering of molecules in my brain, or a set of neurons in my spinal chord. It is simply memories tied together by feelings that influence my perception. These configurations of psychic energy, or complexes, are the stuff of the psyche. The ongoing development of the complexesand particularly that of the ego in relation to the other complexescomprises the diachronic aspect of individuation.

As we now turn to the diachronic process of individuation, bear in mind that psychological growth occurs as a result of the tensions, especially those between opposites, in the psyche. Among these are conflict and resolution. But perhaps the most important is that between consciousness and the unconscious. Jung believed that

> libido, if left to itself, would probably be stationary or spasmodic. The observing ego with its questioning attitude and its inexorable needs are necessary if differentiation is to occur at all.17

Without a functioning center of consciousness (the ego), synchronic dynamics simply repeat in endless cyclesour conveyor belt doesn't go anywhere. We get caught up again and again in endless conflicts and resolutions without learning anything. Only through the integrating power of consciousness can we attain the highest levels of adaptability and survival. Without it, we simply repeat "the same old, same old."

Diachronic Individuation

At the beginning of life, consciousness is conspicuously absent. Feelings, it seems, predate thought. As a result, feeling-toned complexes are busily assimilating and processing perceptions and experiences long before the

17 Humbert, *C.G Jung,* p. 92.

ego comes into existence. By the time consciousness has developed sufficiently for the ego to begin to function, the other complexes are pretty well entrenched. Their ability to assimilate new associations gives them a strength and diversity that competes with the ego. They behave much as if they were personalities. When my behavior is dominated by my father complex, I may wonder what got into me. It's as if something other than me is running the show. That the ego is born into an enterprise that is already underway leads inevitably to tensions between it and the other complexes. Having sorted things out for years, their feeling-tones seize upon any new life experience that comes along. The ego faces a formidable challenge in trying rationally to rearrange such experiences.

Early in a child's life, rational consciousness exists primarily in its surroundings, where others ascertain and fulfill its needs. This does not mean that infants are unaware of their needs. Rather, that awareness is expressed in an unreflecting, automatic, instinctive manner. Typically, pleasure and discomfort are about all infants are able to communicate with regard to the need to be fed, changed, burped, or put to bed. These communication devices do not always work to the infant's (or the parents') satisfaction. Sometimes the environment is slow to respond, sometimes it responds inadequately, and sometimes it cannot figure out the need of the infant at all. Then the complexes assert themselves all the more: the infant cries more loudly, kicks, squirms and screams. Primarily in the service of alerting the environment to the infant's need, the raised intensity of this kind of behavior also serves to impress upon the infant its own distress. Generally, the greater the disparity between the need of the infant and the capacity of the environment to meet that need, the more intently the attention of both environment and infant become focused on that need. Such focused attention invariably raises the level of consciousness. It is virtually impossible, for example, to listen to an infant crying without trying to understand what is the matter.

As children become increasingly aware of their discomfort, they become more sophisticated at its removal. Early on, they simply proclaim their needs more vociferously. Later, however, they learn more effective means of having their needs met. They learn that some behaviors work better than others. Further on, they learn to articulate their needs and de-

sires more accurately. If all goes well, this replaces their protest of others' inability to discern their needs. As they come to understand the nature of the world they inhabit (gain better definition of others' abilities or inclinations to meet their needs), they begin to behave like the kind of people to whom the environment responds most positively. By adopting behavior befitting their surroundings, however, their identity changes: it becomes more congruent with other's expectations. In Jung's terminology, the child develops a persona, that is, a personality style that tends to make the environment want to provide for the child what it needs.

At this stage of diachronic development, a tension arises between who we are and who the environment wants us to be. The *persona* is a structure of the psyche based on the latter. Also a complex, the persona consists of

> a complicated system of relations between the individual consciousness and society, fittingly enough a kind of mask, designed on the one hand to make a definite impression upon others, and, on the other, to conceal the true nature of the individual.18

The feeling-tones of the persona revolve around acceptance and rejection. In putting together a persona we learn to sift out of our personalities those characteristics to which the environment reacts negatively, and to emphasize those to which it responds positively. Consequently, personas vary according to the environments they are meant to serve.

All that which by nature we might be but aren't, due to the demands of our surroundings, comprises the *shadow*. By this Jung meant

> the "negative" side of the personality, the sum of all those unpleasant qualities we like to hide, together with the insufficiently developed functions and contents of the personal unconscious.19

Like the persona, the shadow is a complex, whose feeling-tones also revolve around acceptance and rejection. Because the shadow is built up from personality traits that are not acceptable to those around us, it may contain many of the essentials of our individuality. The environment is always to some degree mass-minded. It often wants us to filter out some

18*Two Essays,* CW 7, par. 305.

19 Ibid., par. 103, note 5.

very useful idiosyncrasies. Where it has succeeded, we may need to look into our shadows to see if there is anything there we ought to resurrect.

So, as various functioning centers develop within the psyche, numerous opportunities for polarities develop. These mobilize the activity of the archetypes and, to the degree that the ego recognizes them, can lead to further differentiation of consciousness. As we shall see in the next chapter, the synchronic dynamics of psychological development resemble oscillations: between tension and resolution, actual and potential. When consciousness becomes involved with these oscillations, it experiences the ambiguities of alternative points of view. As it alternates between various perspectives, consciousness begins to develop oscillations of its own, particularly those between differentiation and integration. Then, the relatively automatic processes of synchronic dynamics can generate diachronic dynamics, which are the developmental processes of the individual. In short, individuation takes place.

Throughout life the archetypes continue to attract aspects of our everyday experience into clusters that become other complexes. There is really no limit to the number, but some of the more easily recognized are the father complex, mother complex, inferiority complex, messiah complex. In short, anything that has an identity and carries feeling is a complex. There is even a complex organized around future potential, which is often characterized by feelings of longing, excitement and challenge. For the man, Jung called this complex the *anima;* for woman, the *animus*. Ego, persona, shadow, anima, and animus are the major complexes concerned with individuation. Each has its characteristic feeling-tone. And above and beyond all these parts is the regulating center or archetype of wholeness, which Jung called the *Self*.

While this is far from an exhaustive list of the dimensions of the psyche, it contains those that are the most important for the diachronic dimension of individuation. It is not necessary for our purposes to know precisely what they are, only that they exist and participate in the synchronic dynamics of individuation. For, according to Jung, we are more than we think we are. In fact, that which we normally define as ourselvesthat to which we refer when we use the words "I" and "me"is a relatively small part of the total psyche. The rest is "unconscious,"

meaning that it organizes and expresses itself in ways that are generally foreign to "me," the ego. Consequently, while the almost limitless potential for growth that each of us has is located within ourselves, it remains unconscious until life's events stir it toward consciousness.

Individuation

This brief introduction to the structure and dynamics of the psyche allows us to assemble a coherent account of Jung's theory of psychological development, or individuation. He did not consider the development of the personality to be simply a byproduct of learning. Rather, development unfolds as the power of the archetypescontentless forms that act as organizing centersarranges data received from everyday experience into clusters of emotionally-valenced, feeling-toned networks of associations: the complexes. Like snowballs in the psyche, these structures roll along gathering material from daily life, ever-increasing in size. One of them, organized around the phenomenon of consciousness, develops into the ego. Those that are not compatible with the ego-identity become unconscious, where they exert their influence through affect.

To complicate matters, the ego develops an image of itself that is based as much on that which it perceives the environment to expect as on its own essential uniqueness. Through positive, negative or lack of reinforcement, the ego learns to construct an identity that reveals some and conceals other dimensions of itself. Positive, negative and lack of reinforcement often depend on the ego's perspective, for in some cases the ego may feel positively toward a behavior that the environment considers negative and vice versa.

For example, if I want to be included in a local street gang, I'll become whatever they want me to be. While this may gain me the inclusion I seek, I'm likely to be roundly rejected by other groups: my parents, teachers, the police, even other friends who have no use for the gang. The result is the same: my identity is based more on my persona than on my ego. Because my persona is derived primarily from the influence of the gang, I have a rather collective identity. This is true of any identification I have with a group, be it family, group, tribe or culture.

To the degree that psychological development proceeds with the envi-

ronment as a major point of reference, we inevitably develop less as we may naturally be than as survival appears to dictate. Often we don't have much choice in putting together an identity. If we grow up in an oppressive society, we may learn not to have opinions about anything. Then we become determined by collective values, by collective assumptions, and by collective expectations. We participate in a mass mentality. Yet, while we may lose touch with our individuality, it does not simply disappear. Rather, it resides in the shadow. Consequently, to learn to withdraw projections is to see the variety of the world within our own souls, which is the first step toward recognizing our own individual authenticity. Then we can regain our own unique potential for development.

In summary, the psyche as a whole builds up over time as a result of our life experiences being worked on by the archetypes, which are present in the psyche at birth. Psychological development needs an ego that is goal-directed and adaptable so that it can make maximum use of the tensions of opposites that drive the synchronic and diachronic dynamics of individuation. Individuation is a repetitive process that constantly destabilizes us so that we can take advantage of the potentials for growth that we might not otherwise see. No wonder it often feels chaotic! But if we can understand the dynamics of those tensions and conflicts that regularly occur in our lives (the synchronic dynamics of individuation), we have a better chance of turning those dynamics into something useful. Thus are we able to discern and selectively to reinforce the activity of the archetypes. And to do that, one must be aware of the role that archetypes play in both the structure and the dynamics of the psyche.

The Transcendent Function

Strange as it may seem, cooperating with archetypes involves a good deal of faith. When chaos and confusion strike, how are we to know what to do? According to Jung, we must try to withstand the temptation to side with one aspect of the conflict while we wait for the archetypes to move us beyond it. For example, suppose I must choose between two careers. Rather than impulsively choosing one over the other (assuming the advantages and disadvantages of both pretty much balance each other out), we should hold the tension and monitor what happens. What do I find

people saying to me? What appears in my dreams? What kinds of experiences do I have?

In short, we must take a symbolic attitude toward life. That is, we need to see the everyday events and circumstances as having meaninga meaning that relates directly to the issue at hand. For example, if we arrive at the door of the office to deliver our application and find it locked, and the secretary refuses to listen to our entreaties, we should consider bowing to circumstances and walking away instead of trying to beat the door down.

Jung called this active role that the archetypes play in resolving the conflicts generated by the synchronic dynamics of individuation the *transcendent function*. He defined it as

> a natural process, a manifestation of the energy that springs from the tension of opposites, and it consists in a series of fantasy-occurrences which appear spontaneously in dreams and visions.20

"Transcendent" is used here not in the metaphysical sense, but with reference to transitions from one attitude to another. Admittedly, this is pretty mysterious. Suffice it to say that whatever the transcendent function is, it helps us to move from conflict to resolution, as long as we can contain ourselves and hold the tension between options.

Symbols are essential to the mechanics of the transcendent function. Marie-Louise von Franz describes their role thusly:

> Jung called the symbol-making function of the unconscious "transcendent," for not only does it transcend our conscious grasp, but it is the one thing which, through symbol-formation, enables man to pass from one state to another. We would be forever stuck in an acquired habit of consciousness if this transcendent function of the psyche did not help us over into new attitudes. by creating the symbol, which shares in both worlds. The symbol is associated with both present and future psychic states, and therefore helps us over.21

Images that "help us over" are known as "uniting symbols" in light of their ability to combine opposites into a symbolic unity. They are the platypuses in the world of symbols, resolving tensions by combining

20 Ibid., par. 121.

21*The Golden Ass of Apuleius,* p. VII3.

seemingly contradictory elements into a unique whole. As such, they are extraordinarily powerful symbols that transcend and transform the perspective of the ego, leading to new directions and patterns for growth. By creating transitions, such symbols "give rise to becoming, to individuation, to the metamorphosis of personality."22

The essence of individuation is precisely this process by which images invested with archetypal power draw the attention of the ego into dynamics that lead to its continual development. The ego need only relinquish its grasp on what it thinks it knows in order to be drawn into the world of the possible. Thus, said Jung, "Underlying all rebirth symbolism is the transcendent function."23

This is the difference between us and the rest of the animal kingdom; we can ponder all that happens to us. Other animals are tied to and governed by inherent predispositions to respond to some things over othersin other words, instinct. For humankind, consciousness supplements the instincts. It allows us to see above the fray, to perceive the directions in which life takes us.

Conclusion

The process is, as we have said, a bit chaotic. So before we move into the world of chaos theory, let us remember that Jung's theory of developmental psychology is inextricably linked with physiology. Archetypes are essentially the interface between psyche and substance. That is, they convert the activity of the brain into an understanding of life events. He was also quite clear that the mechanics of the psyche, both repetitive (synchronic) and progressive (diachronic), obey the laws of physics. But that was then. Do they still? Did he actually figure something out, or was he simply spinning an attractive and elaborate fantasy?

Until recently there were very few good metaphors for the relationship between the unconscious and the rest of the psyche. In fact, even complex theory lacks a sophisticated image for the interactions of its components. Yet, during the last decade, we have discovered powerful images

22 Peter Homans, "Psychology and Hermeneutics: Jung's Contribution," p. 353.

23 "Psychological Commentary on 'The Tibetan Book of the Great Liberation,' " *Psychology and Religion,* CW 11, par. 828.

that seem to display many of the characteristics that Jung ascribed to psychodynamics. Surprisingly, these images have come from the hard sciences: physics, biology, physiology, meteorology and mathematics. With the advent of the computer, we have been able to represent complex nonlinear equations by images that seem to defy logic.

These images exhibit a number of very interesting features. First, boundaries are never sharp and distinct, but constantly interweave with all the solution sets to the equation they are expressing. Second, when a boundary is magnified, it seems to be made up of ever-smaller versions of the original interweavings, ad infinitum. Finally, the outcome of chaotic dynamics is virtually impossible to predict. The smallest differences in the beginning lead to extreme differences down the road.

That the psyche is polaristic, that energy is generated by tensions of opposites, and that there is an ongoing oscillation, or jumping back and forth, between actuality and potential suggests some interesting parallels between Jung's metapsychology and chaos theory. Synchronic dynamics are essentially oscillatory dynamics. Furthermore, that psychological development is a function primarily of the resolution of tensions (emphasizing the ego's awareness), corresponds with one of the more intriguing hypotheses about chaotic dynamics, that of symmetry-building bifurcations, whereby chaotic dynamics actually generate a higher order result coming out than existed going in.

So those little stuffed animals mentioned at the beginning of this chapter play an even more important role than we thought. For they not only help children to connect with others, they also give them a feeling for what those connections are like. Eventually, children relinquish their little companions for their flesh and blood friends. They learn to let go of the more familiar and to reach out to the less familiar. Nothing is more critical to the development of their egos.

While transitional objects lessen the chaos of transitions, they do not eradicate it. It is always there. So let's take a look at chaos. What is it, and what do we need to understand about it?

2
Chaos

It was after all modus operandi among those select few willing to work in the realm of the incomprehensible.
Kem Nunn.

Background

To apply chaos theory to psychology is to enter a conundrum as old as psychology itself. The relationship between mainstream science and psychology has always been ambivalent at best. First of all, there has been little agreement about whether or not psychology is a science. Behaviorism seems closest to empirical science, at least in the sense that its results can be replicated. But when the higher functions of the brain come into play, which other schools of thought refer to as "psyche," "spirit" or "mind," there is less agreement. In fact, psychology and science often disagree on whether such objects of research even exist. It is against this backdrop that our analysis of chaos theory plays itself out.

Science's claim to precision is very appealing. To assign numbers to events in search of "foresight and understanding" is to foster the hope of some day mastering those events.24 Yet, no one knows better the imprecisions of science than its practitioners. Those who distrust science often overestimate it, inflating its power while at the same time decrying its cold, formulaic reduction of all to numbers. They label as "mad" any scientist who accepts Pierre Simon La Place's challenge that

> if we can imagine a consciousness great enough to know the exact locations and velocities of all the objects in the universe at the present instant, as well as all forces, then there could be no secrets from this consciousness. It could calculate anything about the past or future from the laws of cause and effect.25

Those most unnerved by this kind of statement are often the ones whose lack of scientific knowledge leads them to accept it uncritically.

24 See Stephen Toulmin, *Foresight and Understanding*.

25 Gert Eilenberger, "Freedom, Science, and Aesthetics," p. 175.

Scientists rarely go that far. While giving words to every researcher's ultimate dream, La Place was well aware of the magnitude of the "if" that began his fantasy. But in human affairs, prediction is even more difficult. Jung, himself a first-rate scientist, lamented that psychology was so difficult to express mathematically. Lacking the clarity of numbers, psychology was further saddled with an object of research that could not be taken apart. Until we developed CAT-scans and magnetic resonance imaging, which can look into the brain without cutting it open, seeing how the brain operates could be done only by inference. Frustrated by the fact that, in Jung's words, "there is no medium for psychology to reflect itself in: it can only portray itself in itself, and describe itself,"26 psychologists sometimes feel that the apparent objectivity of the physical sciences is simply beyond their grasp.

Then there's the maddening problem of separating what the psyche sees from the process by which it sees it, for the psyche plays a role in all scientific discovery. This problem is as old as philosophy. For example, Jung said, if "we ever succeed in doing something to Mars with the aid of atomic fission, this too will have been brought to pass by the psyche."27 In other words, everything we do is a function of our psyches. The main question is to what degree we see what's there and to what degree we are seeing ourselves.

Not only does this make it difficult for the psyche to gain a perspective on itself, it also makes prediction particularly difficult, for the psyche that can observe what it does can also decide what it wants to do. So when consciousness enters the picture, predictability suffers. Simply to be informed that the best scientific analysis predicts that we are fated to turn our heads to the right in the next moment is to tempt us to defeat that prediction by doing otherwise. Perhaps due to the instinct for survival, human beings are generally hostile to the notion that their behavior can be predicted. So just let psychology try to prove that its theories have one of the essential ingredients of good science, namely, foresight, and we all get the opportunity to prove it wrong!

26 "On the Nature of the Psyche," *The Structure and Dynamics of the Psyche,* CW 8, par. 421.

27 Ibid., par. 422.

We know we can choose not to be predictable. Knowing that we are also part of the natural order can lead us to view science's claim to reliable prediction with more than a little skepticism. It's one thing for a bridge to support its weight, a building to remain upright, an airplane to stay aloft, a vaccine to prevent a disease. In those cases science looks pretty good. We can readily grant that predictability can lead to reliability, and vice versa. But let science claim to be able to predict all the consequences of its experiments, let alone human behavior, and we draw the line. If nothing else, predictability has its limits.

For example, as noted earlier, Heisenberg's uncertainty principle summarizes the impossibility of simultaneously ascertaining a particle's velocity and location. Since we can measure velocity only by timing how long it takes to get from one place to another, knowing something's precise location doesn't tell us anything about its velocity. And if we are measuring its velocity, we can't know precisely where it is. One solution to this dilemma is to look at a group of particles in which the eccentricities of individual particles are averaged out. But knowing how a group is likely to behave doesn't mean we can be certain of how a particular particle will behave. Knowing that the droplets in a cubic foot of river will end up in the sea is one thing. Predicting the exact course of any one droplet is quite another. The same is true for predicting the behavior of any one individual.

The key element is repetition. If a dynamic repeats over and over (orbits, chemical reactions, symbols), it is possible eventually to figure it out. That which occurs just once, however (miracles, the creation of the universe, a crank telephone call) is infinitely more difficult to decipher. Repetition creates patterns that can be scrutinized. Single occurrences are incomparable, hence they tend to be labeled "random."

Analysis is difficultif not impossiblewithout a pattern. Consequently, when orderly systems dissolve into disorder, we have a hard time specifying exactly what is going on. How can we examine, let alone explain, unconscious behavior? In the field of psychological research, psychoanalysis found a way around this limitation through the use of unconscious images, like those in fantasies and dreams. Jung was a pivotal figure in this discovery, for he found similar unconscious patterns in a

wide variety of behavior, from the normal to the psychotic. He believed that we can discern patterns in even the most chaotic of unconscious contents if we can understand the language of the unconscious. Consequently, by recognizing symbolic patterns, he was able to discern order in what seemed to be disorder.

The synchronic dynamics of individuation, which constantly repeat themselves, create patterns that are analyzable. Diachronic dynamics, however, lead to individuality, which is unique. There, generally recognizable patterns are hard to come by. How do the heavily-patterned and repetitive synchronic dynamics generate unique structures? What does the transition look like? Chaos theory proposes that when repetitive dynamics begin to interact with themselves they become so complex that they defy definition. Yet, from these "complex dynamics" there eventually emerge new patterns that are based loosely on the old. In other words, while chaotic systems break down order, they also reconstitute it in new forms.

Throughout my education in science, the usefulness of chaos was rarely a popular topic. At that time, of course, chaos meant entropic chaosorder that disappeared, never to return. In college, for example, when physics experiments didn't match the theories, the problem was assumed to be with the experiment. Events just didn't live up to the models. In effect, reality was seen to exist in a fallen state. Clinical psychology often did much the same. For example, patients whose perceptions and behavior failed to conform to prevailing theories and models were labeled "schizy," "borderline," "resistant" or, perhaps closest to the truth, "atypical." The profound discomfort many clinicians feel when in the presence of such deviations from the ideal are reflected in their responses to their patients. Pressure to conform, medication, institutionalization, even surgery, comprise a virtual index to their level of discomfort.

In clinical training, order was certainly held to be superior to chaos. But some of us suspected that disorder was disparaged simply because it was too intimidating. We began to wonder if disorder was truly as maladaptive as was thought. When we discovered Jung's assertion that chaotic dynamics are present in all psychological development, normal and abnormal, it rang true. Particularly appealing was the way in which

he combined scientific rigor (quantifying chaotic processes in search of their directionalitytheir meaning, in other words) with an openness to traditions of inquiry generally excluded from academic circles (the occult, alchemy, religion).

Unfortunately, many thought him a kook. Accused of being mystics and sometimes worse, Jung and his followers pretty much gave up the hope of ever convincing the world of mainstream science that their theories were tenable. Chaos just didn't allow science or the other branches of psychology much of a foothold in Jung's thought. Now, however, things are changing. With the development of the computer, which has initiated more than a few shifts in the metaphors of science, chaos theory is establishing itself as legitimate. Surprisingly, the patterns that are beginning to emerge from studies of chaotic dynamics bear an intriguing resemblance to those Jung described. Produced by complex dynamics, they are difficult to describe. They look a lot like symbols.

Seeking to describe complex dynamic systems previously beyond the scope of classical mathematics and physics, the hard sciences are beginning to speak a language remarkably similar to Jung's. For example, there is a tension between simplicity and complexity. Very simple equations can describe radical transformations that, when charted as a graph, are extremely complex. Nevertheless, configurations that resemble one another can be found throughout the patterns. And no matter how much one magnifies the area where patterns merge, a boundary (or line) between them never emerges. Again, they look a lot like symbols.

Not surprisingly, this challenges the ways in which science conceives of itself. Reduction, for example, cannot boil complex dynamics down to simpler systems. Even the view that order is healthier than chaos is being seriously challenged.28 Thus, the assumption that psychological development is linear and unfolds according to some script inherent in the organism is being revised to include some of the principles of chaos theory.29 A truly profound shift in paradigms is occurring across the psychological landscape. What is this shift all about? What is chaos theory?

28 For an elaboration of these two points, see my "Archetypes: The Strange Attractors of the Psyche."

29 See Thelen. "Development As a Dynamic System."

Chaos Theory

Imagine for a moment what it would be like to watch a ten-kilometer race in a stadium enshrouded by fog. Realizing that it is impossible to view the race from an overall perspective, you decide to stand near the start/finish line to view the contestants at the start, at the finish, and as they emerge from the fog on each lap. Two contestants, known to be virtually evenly matched, shake off their nervousness as they anticipate dogging .one another's heels throughout the race.

At the start, all seems normal. By the end of the first lap, however, events have taken a decidedly bizarre turn. Each time the pack makes its way past your vantage point, some marathoners are inexplicably absent. At other times the absent ones reappear, while others formerly present are missing. Most incredibly, some contestants emerge from the fog running in the opposite direction! Even the two evenly-matched contestants, who began the race side by side, are now nowhere near one another.

If this is confusing for the observer, consider the poor runners! The two evenly-matched marathoners, who began the race side-by-side, are shocked to discover that their lanes do not continue side-by-side, but diverge soon after the start. Furthermore, runners are prevented from leaving their lanes and moving to the inside track, so the ones on the inside lanes quickly outdistance the others. But that is not all that is bizarre about this race. The path each runner takes depends on what all the other runners are doing at that moment. What you the spectator cannot see due to the fog is that the paths themselves meander off periodically in strange and convoluted configurations. This explains the apparently haphazard behavior of the contestants, for they are trapped on paths that keep them running in all directions. What began as an orderly event has deteriorated into chaos.

"Chaos," as used in the term "chaos theory," refers to *deterministic* chaos, which is a form of chaos within which patterns periodically appear and disappear. Most of us are familiar with *entropic* chaos, which never resolves into patterns. It simply deteriorates into total disorder, never to return. But much of what was once defined as entropic chaos is turning out to be deterministic. As our ability to analyze complex dynamics improves, we discover that what we thought to be entropic chaos is

actually deterministic. Perhaps one day we may discover that all chaos is deterministic. For now, what do we understand?

Mixing

Chaotic systems continuously stretch and fold back on themselves in self-reinforcing loops, like the feedback in a microphone/speaker system. When sound enters the microphone it is amplified and broadcast by the speakers, whereupon it enters the microphone again, is reamplified and rebroadcast, thence to reenter the microphone in a loop that speedily builds upon itself. When the volume reaches an ear-splitting screech, everyone jumps up to turn down the amplifier.

In this simple geometric progression both the volume and its rate of increase accelerate to infinity. The equations that describe such behavior recycle their dynamics, so that the result of each computation becomes the basis for the next. Like feedback, whatever comes out of the equation is fed back in to be computed again.

Another way to look at chaotic systems is to see them as made up of oscillators. Essentially, these oscillators move back and forth, stretching and folding back on themselves. As their interactions become increasingly mixed up with each other, attempts to predict their outcome become progressively futile. Nevertheless, much of their unique fascination comes from the fact that their unpredictability is not random. Robert Pool writes:

> Chaos is a mathematical concept that is somewhat difficult to define precisely, but it is probably best described as "deterministic randomness." A chaotic system is deterministicit obeys certain equations that can seem quite simplebut the behavior of the system is so complicated that it looks random. It is impossible to predict the long-term behavior of a chaotic system because any uncertainty in the initial conditions of the system increases exponentially with time. Chaos is order disguised as disorder, a sheep in wolf's clothing.30

In other words, the dynamics of chaos are so complex they are virtually indecipherable. Nevertheless, they are not disordered. We simply do not have the enormous computing power necessary to keep track of all

30 "Is It Chaos, Or Is It Just Noise?" p. 25.

their outcomes. There is also some question as to whether we shall ever attain sufficient precision of measurement to make reliable predictions.

While the quest to discover order in disorder has occupied science for centuries, chaos theory renders that quest decidedly more ambiguous. On the one hand, the effects of stretching and folding undermine the La Placian notion that to determine the origin is to predict the outcome. On the other hand, "since much of the complicated, seemingly random behavior in the world may actually be simple in origin, it may be much easier to analyze this complexity than was previously thought."31

While some may be intimidated by mathematics, it is the best and easiest way to grasp the essential characteristics of deterministic chaos. Only dust off your basic algebra skills and the fascinating world of iteration, sensitive dependence on initial conditions, bifurcations, and fractal attractors opens up to you. The equations in the next section may look complicated, but they are actually pretty simple. In fact, the paradox of chaotic dynamics is precisely that they are simultaneously extremely complicated and extremely simple.

Iteration

Chaotic systems are perhaps bestcertainly most enjoyablyanalyzed through the use of models. Because chaotic systems stretch and fold, they are basically feedback loops that build upon themselves. This process can be expressed in the language of mathematics and represented on a graph. Graphs of chaotic systems bear little resemblance to the familiar graphs of linear equations, however.

Graphing the equation $y = ax + b,$ for example, which is the equation of a line that intersects the y axis at $b,$ is relatively straightforward: simply substitute numbers for the x values to discover the corresponding y values, and plot the resulting points: a series of (x, y) values on a graph. This kind of equationwhich always yields a lineis known as a *linear* equation, in that values are matched: for every x value, there is a corresponding y value. Like putting one foot in front of another, linear equations proceed step by step, with little interaction among their parts.

The equation $y = ax2 + c,$ on the other hand, is different. That x is

31 Ibid., p. 26.

squared introduces a new dimension of activity. Values of *y* vary widely as the value of *x* varies. For example, if *x* = 2, *x*2 = 4. But if *x* = 4, *x*2 = 16. Fitting this all on a graph requires that we draw a curve between different values of *x*. Thus, we call these equations *nonlinear*. The configurations that can be graphed from these equations are almost limitless: parabolas, hyperbolas, circles, ellipses and so on.

To reach chaotic dynamics, we need to introduce another element into nonlinear equations. We want them to work on themselves, to become feedback loops. Thus, we want them to "iterate." To do this, we must write the equation so that the results of one computation are fed back into the equation to be computed again. So, we must set it up as:

$y^i + 1 = ay^i2 + c$

or the shorter form:

y 279D *ay*2 + c

which simply means that the next value of *y* to be computed is the product of a (constant) rate of increase times the square of the value of *y* currently being computed, combined with the value of the constant *c*. The letter *i* refers to the initial value of *y,* and *i* + 1 means the next value of *y*. In this equation, a value is computed for the constants and variables on the right side of the equation, which is then substituted back into the original equation as the new *y* to be computed. The result of the next computation becomes the next *y* value to be computed, ad infinitum.

The word "iterative" comes from the Latin *iter,* or journey. In Roman times, travel was not like it is today. We tend to think of travel as linear: we go to the airport or get into the car and move directly to our destination. Any detours, delays or changes of destination are considered aberrations. The Romans, however, rarely knew how their journeys would turn out. While they may have had the same idea of destination that we do, they more or less expected interruptions in their plans. But they had faith that things would somehow turn out all right. The journeys that chaotic dynamics take resemble travel in Roman times. So does life, actually. Just as life is unpredictable, so are nonlinear iterative equations.

Unlike linear equations, which proceed in an orderly fashion to a predictable outcome, iterative equations determine their own destiny. Their outcome is rarely predictable, for the quantities involved in their compu-

tations rapidly become so large as to be incomprehensible. In fact, iterative equations are so unpredictable that the slightest difference in starting point takes them, like our marathoners, to vastly different places. This extreme divergence of dynamics that begin in similar placesone of the defining characteristics of chaotic dynamicsis called *sensitive dependence on initial conditions,* or SDIC for short.

Sensitive Dependence on Initial Conditions

One of the most widely known examples of SDIC is Edward Lorenz's weather machine, which used a computer model to simulate weather patterns. The remarkable thing about his programs was their unpredictability: like actual weather, the patterns slowly evolved in apparently random ways.

One day Lorenz tried to replicate an earlier run of the program. After setting the program to begin where it had left off, he went to get a cup of coffee. To his surprise, when he returned the new run had so diverged from the old that it bore virtually no resemblance. James Gleick recounts:

> This new run should have exactly duplicated the old. Lorenz had copied the numbers into the machine himself. The program had not changed. Yet, as he stared at the new printout, Lorenz saw his weather diverging so rapidly from the last run that, within just a few months, all resemblance had disappeared. He looked at one set of numbers, then back at the other. He might as well have chosen two random weathers out of a hat. His first thought was that another vacuum tube had gone bad.32

That was not the case. What had happened was this: the computer computed its results to six decimal places, but reported them on its printout to only three. When Lorenz fed the printout numbers back into the computer, the differences in the decimal places (differing only by ten-thousandths) compounded geometrically as the program iterated. Thus, a minuscule difference in the starting point led to completely different results; ergo, SDIC.

SDIC is sometimes described as the "butterfly effect." A particularly dramatic image, it proposes that the effects of a butterfly fluttering its wings in, say, Beijing will compound so dramatically that it will influ-

32 "New Images of Chaos That Are Stirring a Scientific Revolution," p. 16.

ence the weather in Chicago a week later. Consequently, SDIC "imposes fundamental limits on predictability. . . . Science will never know certain things."33 On the other hand, while minute changes can produce enormous differences over time, the underlying equations that determine their results are usually very simple.34

Iteration and SDIC are phenomena that go well beyond the realm of the physical and biological sciences, however, for among the most familiar examples are those that apply to human behavior. For example, "once bitten, twice shy" and "Oh, what a tangled web we weave, when first we practice to deceive," both express the psychological insight that differences multiply over time. Even the very subtle differences between an affectionate embrace and a sexual one can lead to markedly different behavioral outcomes. But perhaps nowhere is SDIC more convincing than in the fact that children raised in virtually identical environments develop very different personalities. Think of your sisters and brothers, or your friends in grade school. Where are they now? What are they doing?

SDIC enters human development as perception and experience condition one another, comprising feedback loops that iterate over time. Sometimes these loops become so chaotic that they seem to be out of control. Bateson and Haley, for example, used the term "double-bind" for experiences in which the relationship between perception and experience becomes either so complex or so ambiguous that responses appear inconceivable.35 Imagine a young man who is hospitalized because he no longer knows who he is or what he is doing. As his condition improves, his family visits him. When he sees his mother he walks up to her and begins to give her a hug. She stiffens and he backs off, whereupon she says: "Oh, you must never be afraid to hug your mother!"

What is he to do? Whatever he does, he's wrong. He is essentially perceiving two messages, one verbal and the other nonverbal, opposites of each other. With no reliable message from his perception, his behavior becomes paralyzed and withdrawn. Those around him think he is still in need of hospitalization. So does he. His behavior now conditions his per-

33 Robert Pool, "Is It Healthy To Be Chaotic?" p. 1290.

34 See below, appendix 1.

35 See "Toward a Theory of Schizophrenia," pp. 251264.

ception of himself. No matter how bizarre the behavior that develops out of such chaotic perception/experience feedback loops, said Bateson, analyzing the situations that lead to such behavior can render it not only understandable, but even appropriate. Observing this young man's interaction with his mother explains a great deal about why he is how he is.

Bifurcations

The double-bind reflects a basic characteristic of chaotic systems. That is, expressed in technical language, chaos enters a dynamic system when its iterations bifurcate. This simply means that as the process unfolds, the effect of a particular iteration is two results instead of one. In effect, one computation yields two outcomes. As the equation continues to iterate, these two results themselves become iterating systems, each of which continues to divide (bifurcate) into more sets of iterating dynamics: four sets, then eight, then sixteen, and so on. In very short order bifurcations occur so rapidly and generate so many new iterating/bifurcating systems that the dynamics defy analysis. In a double-bind, the feedback between perception and experience becomes so convoluted that it feels paralyzing, like in the example of the young man in the hospital,

Thus, the double-bind can be defined as the chaotic version of a fairly common experience. Virtually everyone knows what it's like to be besieged by alternatives. Whether trying to choose an entrée at one's favorite restaurant or immersed in a moral dilemma, the conflict between competing alternatives is so representative of human experience that it is a popular theme in literature, film, drama, sports and so on. "Sophie's Choice," the lady or the tiger, to be or not to be, whether or not to eat the appleall attest to the dilemma of choice. The problem, of course, is that alternatives beget alternatives. Trying to figure out the long-term consequences of choosing among alternatives can rapidly become mind-boggling. Not only that, sometimes the choices themselves are so complex that they provoke chaotic responses.

Mutual Inhibition Equations

Fundamental to all scientific enterprise is the generation of simple mathematical constructs to describe complex situations. When I was a boy I loved playing with the (for then) sophisticated calculating machines in

my father's office. Particularly exciting was the division of one by zero, which would send the machine into an endless search for the answer. The frantic whirring of the cylinders and the sweet smell of ozone would eventually alert my father, who would walk over and push the STOP button, thereby saving the machine from self-destruction. It was an exciting lesson in how a very simple equation could account for infinitely complicated behavior. There are, of course, many others.

While the equation that governed my calculating machine experiment was very simple (one divided by zero), the dynamic it described was obviously very complex. With regard to deterministic chaos, the same is also true. These equations, however, concern elements that moderate one another, that fold in on themselves through describing the dynamics of two or more competing influences. Imagine an equation that describes how a taffy puller works. Taffy pullers constantly stretch the taffy and fold it back on itself, mixing it up over and over again. Equations that describe these mixing dynamics are sometimes called *mutual inhibition equations*.

In terms of human behavior, think of the young man in the hospital who was torn between two opposing perceptions of his mother. As these perceptions fought it out in his mind, the complexity of the situation in which he was finding himself was increasing enormously. A mutual inhibition equation describes how these competing influences work themselves out. They look simple, but are stupifyingly complex.36 While some computations are so simple they can be done with a hand calculator, others require high-powered computers. Either way, computers can do much more than simply calculate the results of a chaotic equation. They can also show us what it looks like. As the computer does its work, we can watch its discoveries on a video monitor. We can actually see what iteration and sensitive dependence on initial conditions look like.

Computer graphs of mutual inhibition equations reveal groups of patterns that change shape as the equation iterates. They demonstrate self-similarity, scale-invariance and fractal dimension. These aspects of complex dynamics, which are present in a surprising number of dynamic

36 See below, appendix 2.

systems, pose some very interesting implications for understanding the functioning of the brainitself a dynamic system. Do they also corroborate Jung's theories? Before we can address that question, we must familiarize ourselves with attractors.

Strange Attractors

"Attractor" is a general term used by mathematicians and physicists for any pattern that defines the repetitive motion of a system. For example, a pendulum that is subject to friction eventually stops swinging. The point directly underneath it when it stops is called a *single-point attractor,* for it appears to attract the pendulum's motion on each successive swing, eventually bringing it to rest over that point. A pendulum not subject to friction swings back and forth in a continuous manner, constantly tracing out the same pattern of motion. This is called a *limit-cycle attractor*.

There are other kinds of attractors (for example, those that rotate on an axis whirs revolving around a center, tracing a doughnut shape called a *torus*) that settle into discernible patterns, which consistently recapitulate themselves as they retrace their paths (circle, ellipse, torus, etc.).

Complexor chaoticdynamics, while they do settle down into patterns that are recognizable, never retrace the same path. Because chaotic systems can be analyzed mathematically, they can be represented on a graph. These bear little resemblance to the familiar graphs of lines, planes and solids, however. Instead, they contain multiple bifurcations that double back upon themselves in bizarrely repetitious fashion. Expressed in the language of geometry, chaotic dynamics are simply spectacular. The images produced portray complex patterns, or attractors, of chaotic movement captured in time and space. These patterns are called *strange attractors,* for they reflect the bizarre configurations into which complex dynamics settle.

The word "attractor" here is somewhat of a euphemism, suggesting that the patterns into which the iterations of mathematical functions settle themselves have actually attracted the iterations of those functions. But "strange" accurately describes these patterns, for while discernible as such, they are so complicated that they transcend the usual categories associated with patterns.

While these patterns share a generic similarity with simple attractors, their obvious peculiaritiesprimarily that their repetition does not guarantee predictabilitylead them to be called strange attractors. Unlike regular attractors, which settle into repetitive cycles of limited size, strange attractors contain "isolated orbits . . . [that display] no orbital stability . . . the future behavior [of which] has a sensitive dependence on initial conditions."37 Never repeatingyet always resemblingthemselves, they are the epitome of contradiction: infinitely recognizable, ultimately unpredictable.

Graphing them is a fascinating enterprise that requires what one investigator describes as "a protective coating of physical intuition,"38 for unlike limit-cycle attractors, their orbits are so complex as hardly to make sense. For example, when Edward Lorenz programmed his computer to map the attractor that underlay his "weather machine," it turned out like the figure opposite.

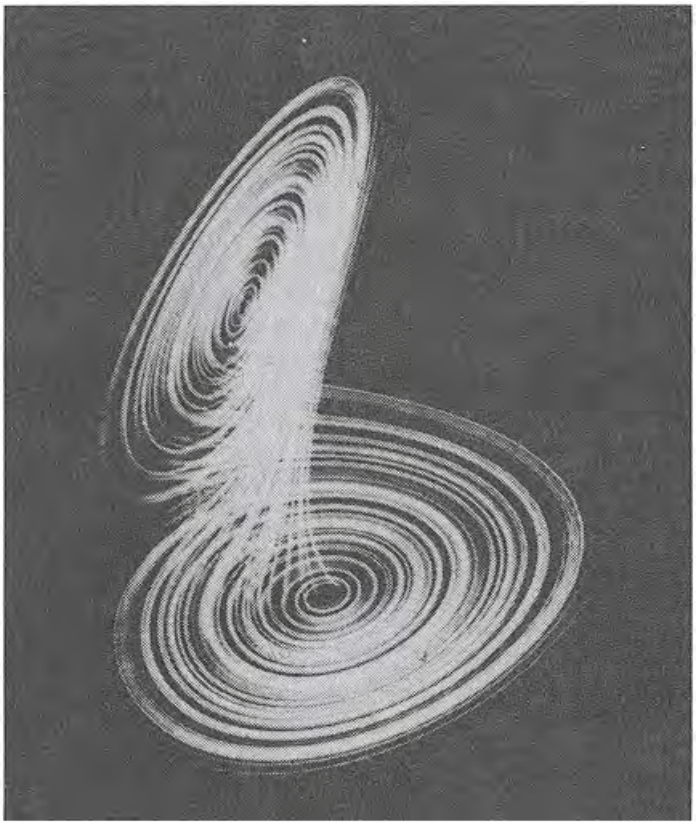
While very complex and essentially unpredictable, the Lorenz attractor nevertheless displays a visible pattern. Furthermore, the patterns generated by its stretching and folding dynamics, which reflect the outcome of repetitive bifurcations, are self-similar and scale-invariant. That is, no matter what scale we use to look at themfrom the largest overview to the minutest scrutinythey always look the same. Thus, different perspectives reveal identical patterns. Like a picture on the cover of a book that shows two children reading a book, on the cover of which is a picture of two children reading a book, on the cover of which is a picture of two children reading a book . . ., the pattern is preserved even though the scale is changed. This can give the impression that elements of the attractor "seem to 'know' about each other over distances far in excess of the range of the forces between them."39

Self-similarity and scale-invariance are common in nature. They can be seen in coastlines, mountains, clouds, ferns, trees, rivers, frost patterns

37 K. Tomita, "Periodically Forced Non-Linear Oscillators," in A.V. Holden, ed., *Chaos,* p. 218.

38 A.K. Dewdney, "Computer Recreations: Probing the Strange Attractor of Chaos," p. 108.

39 Ibid., p. 789.



Lorez attractor

on a windowin anything, in fact, that is based on a constantly repeating pattern that is invariant as it changes size. Notice how the patterns in figure three contain repeating patterns that make up a larger pattern. Magnifying any of the smaller patterns reveals how they are components of the larger patterns. Again, due to the bifurcations and subsequent stretching and folding of the dynamic, such scale-invariant self-similarity repeats itself ad infinitum.

Fractal Dimension

Strange attractors are also *fractal,* a term coined by Benoit Mandelbrot to denote configurations that transcend traditional numerical categories.40 Like optical illusions, they show us things that don't coincide with our assumptions.

For example, consider the task of measuring the length of a coastline. Begin by looking at the coast of a country or state on a map. Notice the many indentations and protuberances that signify bays and peninsulas. Next, using a scale of inches to miles, measure the length of the coastline. Now try a map with a larger view of the same coast, and using that map' s scale of inches to miles, measure the coastline again.

Two things become apparent immediately. First, while the second map shows more detail than the first, the new details bear an uncanny resemblance to the old. Although the peninsulas and bays on the first map appear on the second to be larger and more smoothed out, more peninsulas and bays appear on their boundaries. They have emerged from the greater detail of the larger scale. Secondly, because what once looked like a smooth boundary is now made up of many peninsulas and bays, when the length of the new coastline on the second map is measured it tums out to be longer than the coastline on the first. Greater detail yields greater length.

If we are sufficiently obsessive-compulsive, we might decide to go to the coast itself and measure it with a one-meter role. Then maybe an extremely accurate measure of each peninsula and bay would be possible. But when we arrive at the beach, the boundary that looked so smooth under the scale of the map now seems quite the contrary. Each peninsula

40*The Fractal Geometry of Nature,* p. 10.

and bay on the map is actually made up of smaller peninsulas and bays that become visible only on personal inspection. Furthermore, as our one-meter role cannot fit every small indentation and protuberance of the coastline, much cannot be measured at all.

Using smaller measuring devices just compounds the problem, for the smaller the measuring scale the more peninsulas and bays emerge, until the scale reaches the size of the actual molecules that make up the infinitely small grains of sand that in turn make up the pebbles that make up the little peninsulas and bays that make up the larger peninsulas and bays, and so on. Thus, while each smaller measuring scale yields a more accurate measure, each also yields a longer coastline! Every smaller scale finds a correspondingly smaller entity to be measured. So, varying the scale simply reveals further elaborations of self-similarity and scale-invariance.

If this sounds confusing, try comparing two different coastlines of unequal ruggedness! Measuring them runs into all the complications mentioned above, for as the measure of each varies according to scale, the length of each is essentially the same: infinite. Mandelbrot solved this dilemma by suggesting a comparison based on their complexity. That is, by ascertaining the degree to which the self-similarity of each varies according to scale, they can be compared on the basis of their dimension.

For example, a line has a dimension of one (length), and a plane two (length and width). But if we were to draw a line that never intersects itself around and around on a sheet of paper, the one-dimensional line will eventually fill the entire two-dimension plane of the sheet, excluding the very small spaces between the lines. So do we have a line or a plane? Is its dimension one or two? It's still a line because it can be traced all the way back to its origin. But it fills in almost all of the planar surface of the paper. So at what point does it become a plane?

Mandelbrot proposed that such an arbitrary choice is unnecessary. Depending on how much of the plane is covered by the line, we can choose a dimension somewhere in between. The less it covers, the closer its dimension would be to one. The more it covers, the closer its dimension would be to two. Thus, a very rugged coastline would have a dimension of, say, 1.7; a very smooth one, 1.3. Such dimensions, which transcend

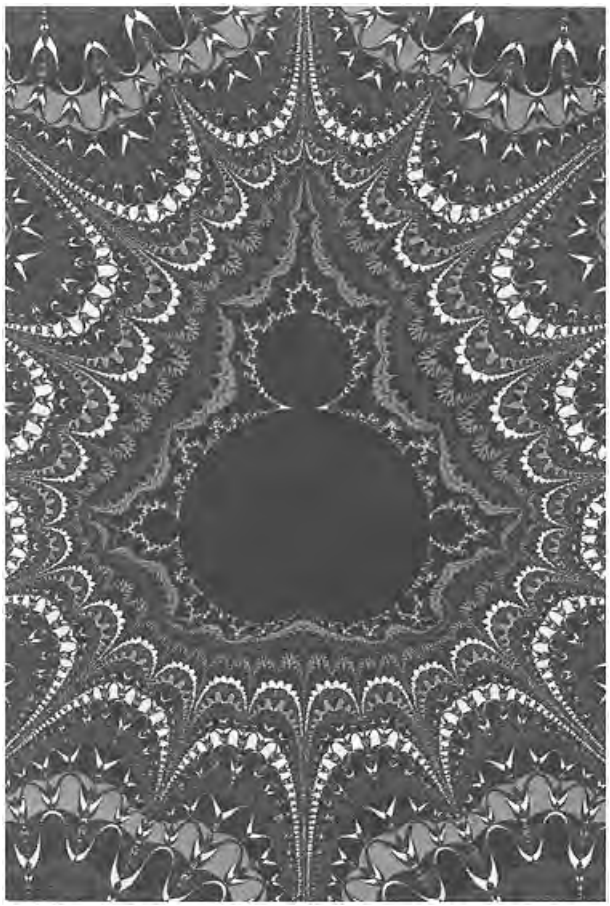
categories, are fractal. The same principle can be applied to clouds, rivers, trees, broccoli, alveolae, brains and so on.

If this is all sounds even more confusing, step back a bit and look at what chaos researchers are trying to describe. Essentially, they are working with mechanical systemswhich come into being and continue on their way without any assistance from humankind's ability to reflect, decide and actthat are not limited by the categories traditionally used to understand them. They seem to have minds of their own. We can see this most profoundly in the images produced by computers. The patterns that emerge from graphs of chaotic dynamics defy description. While they look like patterns we can recognize, they don't have clear boundaries between them. And they repeat themselves at different scales of observation. They are fractal.

Mandelbrot considers all strange attractors to be fractal. Thus, their dimensions transcend categories. This can be seen in the figure opposite, which pictures cross sections of three-dimensional multi-orbiting systems. Remember the racers in the fog? If we were to stand at the end of a straight-away just before a curve, we would see them appearing and disappearing out of the fog, some approaching and some receding. If they were to wear colors commensurate with their direction and velocity, the result would be much like the picture on the cover of this book. Capturing the traces of complex dynamics on a planar surface reveals the same kinds of patterns.

It's like raindrops on a windshield. If we had the means to assign a velocity and an angle of incidence to each droplet that hits the windshield, we could subtract the direction and velocity of the car from the information we had gathered, and the result would tell us a great deal about the dynamics of the raindrops. Or consider a television screen. As electrons are emitted from the cathode ray tube, they interact with the chemicals on the television screen in a manner that reflects their dynamics. These reflections form the image that we view when we look at the screen. In both cases, planar surfaces form a surface on which can be displayed the dynamics of a complex system.

Thus, two-dimensional images of fractal attractors are cross sections of iterating dynamics. Like the racers, orbits periodically disappear from



Mandelbort Set (courtesy Art Matrix)

the graphs of attractors, reappearing in different places at other times. Simply by noticing where and how each orbit crosses the plane of the cross section, we can discover the secrets of their dynamics: where, when and how they deviate from their previous configuration. In that way, a two-dimensional plot can represent all the characteristics of a three (and four) dimensional orbiting system. An amazing amount of information is contained in such images.

Cross sections of fractal attractors even share some characteristics with holograms. For example, the entire image of a hologram can be reconstructed from even the minutest of its details. Likewise, each orbit of a fractal attractor can be traced back through the bifurcations that spawned it. Thus, it is possible (at least theoretically) to trace all of the orbits from any given point on the attractor. While the entire attractor can be reconstructed from any given point, the dynamics of fractal attractors are so complex that any effort to do so rapidly becomes very frustrating.

So far we have been looking at those aspects of chaotic dynamics that can be pinned down and grasped: comprehended, so to speak. Now we must consider what is perhaps the most fascinatingand frustratingquality of chaotic dynamics: the transition from order to chaos and back. This will require us to dwell in the presence of the phenomenon until we become sufficiently acclimatized to its dynamics to understand itthat is, to withstand the pressure of our not-knowing. Rather than being able to quantify everything (with its promise of control), we must use our intuition to gain access to that which, try as we might to pin it down, remains ultimately elusive.

Homoclinic and Saddle Points

Scientists need not understand a particular activity in order to coin a term for it. Such is the case with the following three terms. Each describes something that happens. Exactly how or why it happens is not necessarily well understood, however.

Chaotic dynamics begin when a bifurcation allows a dynamic to go one way or another, that is, to oscillate. As bifurcations in turn bifurcate into period-doubling cascades, a transition from order to chaos becomes increasingly likely. The three most common mathematical descriptions

of such transitions are *Hopf bifurcations, saddle points* and *homoclinic points* (which generate homoclinic orbits).

A Hopf bifurcation occurs when a bifurcation (or transition from one motion to two) fails to stabilize itself, leading to a cascade of bifurcations. The boundary between regular, ordered behavior and behavior leading to chaos, it occurs at a point of instability, where some influence acts upon a dynamic to change its behavior.41 Most often this happens when "an otherwise well-behaved physical system . . . is 'pushed'when a certain parameter of the system is increased so high that irregular motion sets in."42 Hopf bifurcations represent the point at which the system becomes headed for the brink: into chaos.

Hopf bifurcations occur at saddle points. Essentially, saddle points are like intersections on the highway of chaotic dynamics. When a Hopf bifurcation occurs at a saddle point, a homoclinic orbit is created. This is simply a term that describes a physical system (orbits) mathematically. For example, when saddle points are represented on a graph, the dynamic of the equation either approaches it or is repelled by it.43 A hyperbolic point is a particular kind of saddle point, toward which one branch of a hyperbola approaches along one axis, and veers away along another.

But why would a dynamic go from stability to instabilityor vice versaat a saddle point? The answer lies with our old friend SDIC: sensitive dependence on initial conditions. Where the dynamic is pushed into or out of chaos depends on where it started out. That SDIC is involved with the dynamic makes prediction pretty unlikely.44

So, what is it like for a stable orbit to approach a saddle point? If it comes under the influence of the saddle, it becomes a homoclinic orbit. In chaotic dynamics, homoclinic orbits are dynamics that occur when a Hopf bifurcation appears at a saddle point. The saddle point denotes the transition from order to chaos and, eventually, back to order again.

The process looks something like this: as a result of a Hopf bifurca-

41 See C. Sparrow, "The Lorenz Equations," in A.V. Holden, ed., *Chaos,* p. 114.

42 Pool, "Is It Chaos, Or Is It Just Noise," p. 27.

43 See H.A. Lauwerier, "Two-Dimensional Iterative Maps," in A.V. Holden, ed., *Chaos,* p. 60.

44 For further elaboration of these terms, see below, appendix 3.

tion, bifurcations multiply and the dynamic is pushed toward chaos. Torn between order and chaos, the behavior of the dynamic is thrown into confusion by conflicting influences, represented geometrically by a saddle point. As the saddle point both attracts and repels the dynamic, it is thrown into increasing bifurcations that oscillate between stability and instability. The actual transition between chaos and order is expressed as a homoclinic point, which connects the stable and unstable dynamics of the system.

So, fractal attractors are dynamic in the fullest sense of the word. As chaotic dynamics stretch and fold in on themselves, leading to closed curves that both loop around in unpredictable ways and connect every point on the attractor with every other, it is no wonder that domains repeat themselves at various levels of magnification. What takes place between the areas of similarity is, of course, chaotic. The chaos itself is virtually unspecifiable, for such is the behavior of unstable manifolds: they cannot be reduced (simplified) to anything else. Nevertheless, like the mutual inhibition equations mentioned above, specifying a mathematical description (an equation) for the generation of chaos and the recapitulation of order is often quite simple.

Self-Organizing Chaos

All of this is science's attempt to come up with a precise and specifiable theory to describe how chaos occurs. To be valid, theory must be stripped of every ounce of speculative intuition, every extraneous adjective that stops to admire the spectacular beauty of the phenomenon, anything at all that transcends the simplicity of mathematics. This can lead to some pretty dry discourse. Even so, the phenomenon of chaos is itself so complex that scientific precision periodically finds itself waxing rather rhapsodically in its description. Consider, for example, the idea of "selforganization."

Deterministic chaos refers to dynamics that oscillate between chaos and order. When order reemerges from chaos, the dynamic is said to be experiencing "self-organizing criticality." Mathematically, this self-organization takes place at a homoclinic point, which designates not only where a dynamic becomes unstable, but where it becomes stable as well.

"What goes round, comes round," as the saying goes. Consequently, the conflict between order and disorder that rages at a Hopf bifurcation does not disappear from the system when it becomes chaotic. Rather, it remains as a latent potential in the dynamic. When it reappears, it manifests itself as the opposite of the chaos, that is, order. Like flowers in the spring, order reemerges without an advance notice of its presence.

But that's not all. Recently it has been discovered that when chaotic dynamics generate more than one attractor, the symmetry of the total system can actually increase. Called "symmetry building," this phenomenon is an elaboration of a dynamic's ability to self-organize. Selforganization is simply the clustering of random events, like the patterns that emerge in rash hour traffic.45 Symmetry building occurs when "two chaotic attractors spawned by the period-doubling cascades merge to form one attractor with greater symmetry."46

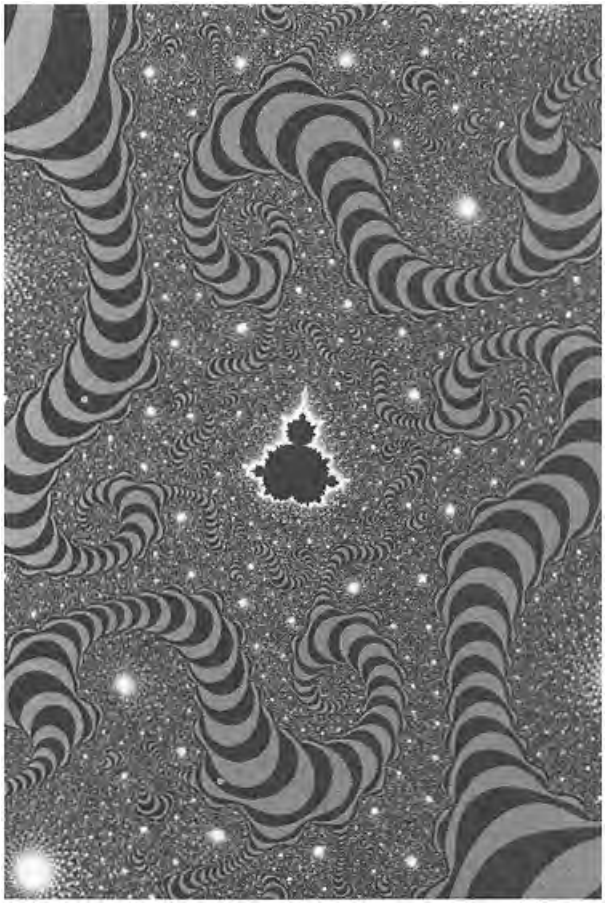
"Symmetry" refers to patterns that preserve their character through changes in their orientation. For example, a square that is either rotated about its center or turned over still looks the same. In the first case, it demonstrates rotational symmetry; in the second, "flip" symmetry. If, when two or more attractors merge, patterns emerge that are more symmetrical than either of the original attractors, the result is considered to be a function of the original bifurcations, which are then called "symmetry-building bifurcations."

For example, note how when each arm of the initial bifurcation in the diagram on the next page generates a cascade, even though everything tums to chaos, recapitulations of the original patterns of order eventually return. Moreover, the symmetry of the patterns that are generated where the cascades overlap exceeds that of either of the original cascades.

This brings us to perhaps the most important discovery about deterministic chaos: that it can actually lead to higher levels of order than existed prior to its onset. In other words, chaos can generate greater complexity within a dynamic. Higher levels of sophistication, as we shall see in chapter eight, improve adaptive capacities. Consequently, however

45 See John Briggs and F. David Peat, *Turbulent Mirror*.

46 Michael Field and Martin Golubitsky, *Symmetry in Chaos: A Search for Pattern in Mathematics, Art and Nature,* p. 111.



Emerald Pearl (courtesy Art Matrix)

astonishing it may seem, chaos seems to be essential not only for the survival of the organism, but for its development as well.

Archetypal Attractors of Neuronal Firings

The similarity between chaos theory and Jung's metapsychology should now be a bit easier to see. The symmetry-building ability of chaotic dynamics; the self-similarity, scale invariance, and fractal dimension of fractal attractors; the stable and unstable branches of a manifold as portrayed by Hopf bifurcations, saddle points and homoclinic orbitsthese all resemble Jung's descriptions of the activity of archetypes, complexes and symbols. If archetypes describe the dynamics, complexes the psychic structures and symbols the mechanisms of psychological growth, where might chaotic dynamics enter the picture?

In what is arguably the most conclusive of the research devoted to the relationship between chaos theory and psychology, Walter J. Freeman has described the patterns that emerge in olfactory neurons when they come into contact with different odors. His highly readable account in *Scientific American* describes how

> the olfactory bulb and cortex maintain many chaotic attractors, one for each odorant an animal or human being can discriminate. Whenever an odorant becomes meaningful in some way, another attractor is added, and all the others undergo a slight modification.47

Freeman's description of the neurological dynamics of recognizing odors utilizes a combination of new inputs from sensory (in this case, olfactory) neurons with expectations created by previous experience. Examining electroencephalograms (EEGs) of the olfactory bulbs of rabbits who had been conditioned to respond in certain ways to certain odors, he concluded that recognition of odors utilizes chaotic dynamics. Among these are that the EEGs demonstrate oscillatory behavior, that the activity of the olfactory bulb self-organizes between states of excitation, and that very weak inputs could cause very dramatic changes in the state of the "neural collectives in the bulb and [the cerebral] cortex."48 Furthermore,

47 "The Physiology of Perception," p. 85.

48 Ibid., p. 83.

when the responses of the olfactory bulb were graphed by a computer, they revealed patterns that were recognizable as fractal attractors.

All this leads Freeman to state:

> Perception cannot be understood solely by examining properties of individual neurons, a microscopic approach that currently dominates neuroscience research. We have found that perception depends on the simultaneous, cooperative activity of millions of neurons spread throughout expanses of the cortex.49

In other words, rather than there being a separate neuron for each odor, which automatically alerts the cortex to the presence of its signature smell, neurons cooperate together to generate a pattern which itself comprises the recognition factor of the olfactory apparatus.

This means that brains are not hard-wired into neural pathways, each of which handles a specific function. If that were true, one would need only to find a specific neural pathway to explain the brain's activity with regard to any particular function. But "an act of perception is not the copying of an incoming stimulus," says Freeman. Rather, "it is a step in a trajectory by which brains grow, reorganize themselves and reach into their environment to change it to their own advantage."50 All of which is accomplished through fractal attractors, "the behavior the system settles into when it is held under the influence of a particular input."51

Is consciousness tantamount to the overlapping of fractal attractors? Freeman thinks it is. Based on his research, he feels that the "subjective experience" of adjusting to new experiences is what builds consciousness.52 Certainly symmetry building seems consistent with the buildingup of patterns over time. For not only are the patterns in fractal attractors self-similar across scale, so too are the attractors themselves. If that were not so, we couldn't lump them together under a definition. Consequently, fractal attractors are themselves informed by patterns of organization. They are like complexes, whose feeling-tones create self-similarity

49 Ibid., p. 78.

50 Ibid., p. 85.

51 Ibid., p. 84.

52 Ibid., p. 85; see also my essay, "Chaotic Dynamics and the Development of Consciousness."

among associations. The patterns of organization that inform the processes by which attractors are generated resemble the archetypes in their self-organized self-similarity across scale.

One last reference to Freeman. In his work he tries to understand "how the brain moves beyond the mere extraction of featureshow it combines sensory messages with past experience and with expectation to identify both the stimulus and its particular meaning to the individual."53 Now, clearly, sensory messages and past experience are products of our environment. But just what is meant by "expectation?" Isn't this exactly what Jung meant by proposing the idea of archetypes? Whether this function of the mind is called "expectation" or "archetype" really doesn't matter. What is important is that at the most basic mechanics of biochemical processes the mind brings something to experience that is not necessarily derived from experience. It self-organizes, as it were.

Jung believed that symbols are the mechanisms by which the mind is stimulated to greater self-organization. As the means by which archetypes influence the ego, they express the inner workings of the psyche. Symbols embody archetypal dynamics. Their images reflect how the psyche, in Freeman's words, "combines sensory messages with past experience. . . to identify . . . meaning." It is an organic process that deconstructs the categories of consciousness in the service of generating more complex self-organization. Just how this occurs is the subject of our next two chapters.

53 "The Physiology of Perception," p. 78.

3
Symbols

I call all conscious contents images, since they are reflections of processes in the brain.
C.G. Jung.

Archetypes and Attractors

Like equations that are graphed on a computer screen, the activity of the psyche also leaves its traces. From cave drawings to religious images to folk tales and myths, we humans have been moved to represent graphically what we believe to be the essence of the world we inhabit. This process can be quite straightforward when we are portraying things that are easily viewed and commonly understood, like trees, rocks, horses, the moon, or the sun. What is not so clear are those things that we cannot see, cannot point to, or cannot define. God's grace, human love, the eternal mysteries . . . how do we represent those?

Usually we try to combine images of that which is familiar in ways that we hope can approximate that which is not. We place colorful windows high in church walls to direct our gaze to the beauty that comes from above, pose figures entwined in ways that suggest passion, or draw horizontal figure-eights to indicate infinity. We hope to communicate through images that recreate our experience.

By trying to express that which transcends the concrete, we enter the world of symbols. Symbols are images whose meaning vastly transcends their content. If I draw a picture of a tree, everyone recognizes what I am portraying. But if I draw a picture of a tree whose roots are in a cavernous underground of tunnels and dwarfs, whose limbs are in the airy heights of the highest clouds, and from whose branches spring waterfalls, animals, rainbows and humans, then it is going to require a little stretch of the imagination to articulate the feeling evoked by my picture. Even if we call my picture "the world tree" and are familiar with the mythological idea to which it refers, we shall still have difficulty specifying the precise meaning the image expresses.

Drawing on the language of chaos theory, this is because symbols resemble manifolds.54 That is, they take us from the known to the unknown and back again. We often experience this as does an orbit that passes through a manifold and back. We go from stability to instability and hopefullyback again. In this case, stability refers to consciousness and the ordering capacities of the ego. Instability refers to the unconscious and its crazy-making jumbling up of conscious categories. Thus, the ego feels stable when reduction, definition, and rationality can accurately describe a situation. When these cannot, as when the ego becomes enmeshed in unconscious dynamics, the ego experiences instability.

According to analytical psychology, a symbol's ability to take the ego from consciousness to the unconscious and back again is its most important function. By doing so, said Jung, "Symbols act as *transformers,* their function being to convert libido from a 'lower' into a 'higher' form."55 Chaotic dynamics do the same thing. In fact, chaos theory itself functions like a symbol in the domain of science: it transforms perspectives and unlocks domains of inquiry previously thought to be inaccessible. Does that mean that chaos theory can describe symbolic processes? Jung's descriptions of the tensions and conflicts of the synchronic dynamics of the unconscious certainly sound a lot like descriptions of oscillators.

If chaos theory can be applied to the activity of symbols, we shall have gained an invaluable aid in understanding how symbols work. The problem for psychology has always been that the processes by which the mechanics of the brain are converted into psychic structures are notoriously difficult to examine. Like memories, dreams, fantasies and thoughts, it is impossibleso far, at leastto excise them from the mind for scrutiny.

In the last chapter we saw how Walter Freeman partially solved this dilemma by using electroencephalograms. Psychoanalysis, however, has traditionally preferred to look at either the impact psyches have on one another (projection and transference), or the images they produce when consciousness is absent (primarily in psychosis and dreams).

Throughout the history of humankind, the psyche has constructed and

54 See appendix 3.

55*Symbols of Transformation,* CW 5, par. 344.

reconstructed expressions of itself that attempt to represent, or to embody, images of itself. By examining and comparing images that attempt to represent cosmologies, whether "inner" or "outer" or whatever, it is possible to perceive not only a history of the development of the psyche, but also a sense of the essence of whatever it is that the term "psyche" attempts to capture.

Jung knew that projection and transference can often be a matter of some dispute.56 Symbols, however, manifest themselves in substance. Their objective presentation, at least, can usually be agreed upon. We may not know exactly what a symbol of a tree means, but we can at least agree that it is a tree, and thus its meaning may have something to do with the nature of trees.

But here things get even more complicated, for our attempts to understand what is going on within ourselves is itself a form of psychic functioning. The structure and dynamics of the psyche are both the means and the end of our attempts to understand ourselves. Consequently, trying to analyze the functioning of the psyche by means of the functioning of the psyche is like riding a roller coaster built on a moebius strip. It is full of paradox. It's chaotic.

It may appear that in the face of such a conundrum we have only two choices: to throw up our hands in defeat or pick it apart and hope that we can learn something by scrutinizing the pieces. Picking it apart is so laborious, and the results can seem so minimal, that the game often seems not worth the candle. Many do choose to throw up their hands.

We could, however, consider a third alternative, one embraced by many philosophers and theologians. From their perspective, paradox is seen to be the essence of the symbolic, without which the transformative power of symbols and metaphors simply could not occur. Rather than getting stuck in trying to analyze the paradox, we should simply let it open us up.

General Introduction to Symbols

Cutting across theology, religion and philosophy is a school of thought based on the principle that symbols point beyond themselves. They are

56 See "The Psychology of the Transference," *The Practice of Psychotherapy,* CW 16.

like star-gates that give us access to other universes. Thus, symbols are not so much entities to be interpreted as they are dynamics to be experienced. As transition makers, they have their roots in both the transformer and the transformed. They connect us with our essence. Among some of the most well-known proponents of this view are Paul Tillich, Martin Heidegger, Thomas Merton and Paul Ricoeur.

Each maintains that the proper response to symbols is to allow ourselves to become involved in them, to engage with them without demanding to know ahead of time where they will lead. Because symbols transcend categories, they inevitably take us into those areas that are difficult to define. Consequently, we must make a leap of faith if we hope to expand our understanding of our essence. If we succeed, we find ourselves closer to our own humanity, and to God.

As symbols are essential to theology and philosophy, their study has become a major focus. Tillich described what symbols do. Merton showed us how important they are in religious practice. Heidegger analyzed our encounters with symbols. Ricoeur (and Jouette Bassler, who discusses the parables) shows us how discourse is itself symbolic. We shall pay particular attention to their analyses of the relationship between symbol and interpreter, for that will be the point of departure for our analysis of the psychodynamics of symbols.

Paul Tillich: access to transcendence

Paul Tillich described six essential elements of symbols. They

1) point beyond themselves

2) participate in that toward which they point

3) open up levels of reality which otherwise are closed to us

4) unlock dimensions and elements of our soul which correspond to the dimensions and elements of reality

5) cannot be produced intentionally

6) grow and die (when they can no longer produce a response)57

In other words, symbols are active. They function as agents of change in our lives. Without their mediation, we find it difficult to make contact with essential dimensions of our being. In Tillich's language, symbols

57*The Dynamics of Faith,* pp. 41f. (modified).

"point," "participate," "open up," "unlock," "produce," "grow," "die." They are even relatively autonomous: they "cannot be produced intentionally," and operate on "levels of reality which otherwise are closed to us." That their images "point beyond themselves" is essential to their meaning. In fact, it *is* their meaning.

The autonomy of symbols, coupled with their ability to suggest things that we can understand only up to a point, more or less demands that we interact with them. When we try to figure them out, we stretch beyond what we know for sure toward that which the symbol suggests. Yet, not everyone responds to symbols. There has to be an interest on the part of the interpreter for the symbol to have an effect. Especially for Tillich, those of us who have little interest in that which exists beyond our immediate comprehension, be it God or aspects of ourselves, are unlikely to be much interested in the symbolic aspects of life.

Consequently, symbols are catalysts. As Tillich said, symbols "unlock dimensions and elements of our soul which correspond to the dimensions and elements of reality."58 They bring us together with reality in ways that would be impossible without them. For example, dreams confront us every night with aspects of ourselves that correspond with the world around us. They provide vivid, ongoing, explicit experiences of that which is often missing from our everyday lives.

Jung would have agreed with most of what Tillich said. Of course, where Tillich spoke of God, Jung would have limited his discourse to referring to God as a psychic content, that is, as something in our minds. From the standpoint of psychology, the existence of God can be neither proven nor disproven. God as a symbol, however, is quite another matter. Here Jung recognized how powerful are symbolic images of God. In fact, he believed that they portrayed most accurately the power of the archetypes. Consequently, Jung also emphasized how easily aspects of our own psychology could become equated with God. From Jung's perspective, that we can go to war with one another and threaten the world with annihilation in the name of God illustrates the degree to which we confuse God with our own unconscious.

58 Ibid., p. 43.

Thomas Merton: transcendence as chaotic

Tillich's viewpoint referred to our personal experiences of God. Thomas Merton wrote about one group of believers who centered their lives on this relationship. Beginning in the third century, the Desert Fathers removed themselves from Christian culture because they could not accept its division into oppressors and oppressed ("those who were successful, and imposed their will on others, and those who had to give in and be imposed upon").59 Believing that a life in the spirit was linked to individuality and freedom, they fled into the wilderness. They ate simply, lived in rudimentary dwellings, and accepted whatever life brought them. But they never followed a rule of monastic life, for that would have imposed a common definition on something that varied from individual to individual. Relationship with God, they believed, was deeply personal.

Their goal was *quies,* or rest (quiescence). To that end, they refused even to discuss quiescence, as that would tempt them to objectify something that was by its very nature a subjective experience. Merton describes the Desert Fathers as

> quiet, sensible people, with a deep knowledge of human nature and enough understanding of the things of God to realize that they knew very little about Him. Hence, they were not much disposed to make long speeches about the divine essence, or even to declaim on the mystical meaning of Scripture. If these men say little about God, it is because they know that when one has been somewhere close to his dwelling, silence makes more sense than a lot of words.60

In Tillich's sense, the monks allowed themselves to be drawn into the symbolic life. Wherever symbols might take them was where they wanted to go. Consequently, the essence of the symbolic life was to utilize the images of symbolsas found in Scripture, for exampleto transcend the content and merge with the form. Merton emphasized that quiescence, or rest,

> was a kind of simple nowhereness and no-mindedness that had lost all preoccupation with a false or limited "self." At peace in the possession of a

59 Menon, *The Wisdom of the Desert,* p. 4.

60 Ibid., p. 14.

sublime "Nothing" the spirit laid hold, in secret, upon the "All"without trying to know what it possessed.61

At first sight, Merton's description of the pursuit of a closer relationship with God conforms to views of transcendence that see it as essentially rising above the chaos of the times. Quiescence certainly has a pastoral appeal. But when Merton speaks of nothingness and conscious ignorance of object, he is well aware of the turbulence that characterizes such an experience.

Like the synchronic dynamics of individuation, as well as the Hopf bifurcations of a complex dynamic, the Desert Fathers entered a realm of unpredictability that they believed would lead eventually to a greater sense of order in their lives. And, as with the synchronic dynamics of individuation and chaotic dynamics, their initial break with the previous sense of order felt decidedly disorderly. To follow in the footsteps of the Desert Fathers, said Merton, one must make "a clean break with a conventional, accepted context in order to swim for one's life into an apparently irrational void."62

The experience of transcendence is, for Merton, deeply unsettling and requires a great deal of commitment to the goal. For in between committing to the journey and arriving at the destination lies a period of trial that demands we divest ourselves of the desire to objectify our experience. That is, we must forego our attempts to make something tangible out of our experience, for that only dilutes its meaning. But then what are we left with? If we can't pin it down, how do we know what it is? That, said Merton, is the essence of the void. Being wrested from our points of view is sufficiently disturbing as to make the attemptfor many of us, at leastimpossible. Yet, in the void is more than meets the eye. Consider parables, for example.

Jouette Bassler: metaphor as discourse

Religious symbols can feel pretty chaotic. So can religious metaphors. Jouette Bassler writes that religious metaphors destabilize us, shake us from our preconceptions, and connect us with those possibilities that are

61 Ibid., p. 8.

62 Ibid., p. 9.

the essence of the Divine itself. In "The Parable of the Loaves," she states that "a metaphor communicates by juxtaposing two not entirely comparable elements, thereby inducing the hearer to extract from the somewhat discordant image a new vision of the primary element."63 In other words, metaphors in a written text draw us into the text by establishing a tension between the known and unknown, a tension that compels our involvement.

Recall that the Biblical parable of the loaves concerns Jesus' feeding of a crowd when he and his disciples have only a few loaves of bread. As these are distributed, somehow all (four thousand in the first account, five thousand in the second) are fed, with bread left over. Bassler refers to C.H. Dodd's view of "parable-as-metaphor" to illustrate how parables are "drawn from nature or common life, arresting the hearer by [their] vividness or strangeness, and leaving the mind in sufficient doubt about [their] precise application to tease it into active thought."64 She elaborates on this suggestion concerning the mechanics of parables through Wolfgang Iser's theory that interactions between text and reader are generated where there are "gaps" or "blanks" in the narrative, as when

1) information is temporarily withheld from the reader

2) there is an interruption in the expected stream of thought

3) there is a negation of the reader's expectations

4) connecting links are omitted

5) links are established between things the reader finds difficult to connect

6) there is a clash of perspectives between the text's views and the reader's, or between various views presented within the text

7) an inference must be drawn.65

Iser could not be more descriptive: "withheld," "interruption," "negation," "omitted," "difficult" and "clash" all suggest rifts in the fabric of consciousness. When we are confronted by discontinuities in a text, says Bassler, we are driven to "create consistency and resolve the tension by supplying the missing links."66 Rather than being passive recipients of the wisdom of the text, we are forced to wrestle with it. Religious meta-

63 "The Parable of the Loaves," p. 158.

64 Ibid.

65 Ibid., p. 160.

66 Ibid.

phors establish a condition much like Merton's void, except, whereas the latter is a function of religious experience, the former is a function of religious language.

Consider the Biblical account of the "yeast of the Pharisees":

> Now the disciples had forgotten to bring any bread; and they had only one loaf with them in the boat. And Jesus cautioned them, saying, "Watch outbeware of the yeast of the Pharisees and the yeast of Herod." They said to one another, "It is because we have no bread." And, becoming aware of it, Jesus said to them, "Why are you talking about having no bread? Do you still not perceive or understand? Are your hearts hardened? Do you have eyes, and fail to see? Do you have ears, and fail to hear? And do you not remember? When I broke the five loaves for the five thousand, how many baskets full of broken pieces did you collect?" They said to him, "Twelve." "And the seven for the four thousand, how many baskets full of broken pieces did you collect?" And they said to him, "Seven." Then he said to them, "Do you not yet understand?" (Mark 8:1421)67

This account follows the two accounts of feeding the thousands. Like the disciples who engaged in this dialogue with Jesus, we the readers also find ourselves mystified by Jesus' response. What does he mean? How are we to understand? In Jung's terms, the encounter with religious thought puts us in conflict, until our consciousness becomes sufficiently expanded to enable us to grasp a higher level of meaning. In the language of chaos theory, Hopf bifurcations occur when discontinuities within a text interrupt our harmony with the text, forcing us to search for consistency. This bifurcation sets off a cascade within us as we oscillate among the various possibilities for completing the text. As new attractors (consistency) form in our understanding, new attractors appear in the text too.

Bassler's sense of the interactions between symbols and interpreters recalls Merton's sense of religious chaos. She notes:

> Something happens to the text when the reader "climbs aboard" and completes it, but something likewise happens to the reader: "through this entanglement the reader is bound to open himself up to the workings of the text and so leave behind his own preconceptions."68

67 New Revised Standard Version.

68 "The Parable of the Loaves," pp. 160f.

The chaos generated in the relationship between reader and text leads to the discovery of new patterns in both. In short, conflict between reader and text establishes new symmetries between the two.

Paul Ricoeur: language as symbol

Ricoeur describes the mechanics of the kind of process Bassler is describing. True metaphors, he says, are alive. They create meaning and reveal something about reality. According to his phenomenology of discourse, words (or language) express both "sense" and "reference." The sense of a word is its definition (what is meant when the word is used). When words are combined into a sentence, a reference emerges that points in a synergetic manner beyond the meaning of each individual word to a meaning comprised of the sentence as a whole. Words combine in ways that point beyond themselves, "toward different kinds of extralinguistic entities such as objects, states of affairs, things, facts, etc."69 This ability of words and sentences to point beyond themselves Ricoeur calls "movement," through which "language transcends itself."70

Like symbols and metaphors, language also transcends itself. In so doing, it expands our awareness by moving us beyond the meaning of each individual word. This gives language its compelling effect. In discourse, which "refers back to its speaker at the same time that it refers to the world," symbols and metaphors come to life on the interface between individual and world.71 The act of interpretation forces us to encounter the same ambiguities between meaning and expression that confronted those who originally used particular words and sentences to express ideas. In a sense, language grants us access to the relationship between "speaker" and "world" that generated meaning to begin with. Consequently, the interface between speaker and world is recapitulated in the interface between symbol and interpreter. Interpretation gives access to hermeneutics, that is, to the original situation wherein meaning was generated.

Suppose I am reading the stories of the Creation in the Bible. Those who wrote those stories had an idea of what they were trying to get

69*Interpretation Theory: Discourse and the Surplus of Meaning,* p. 34.

70 Ibid., p. 20.

71 Ibid., p. 22.

across. To be sure, they frequently found the words available to them inadequate to express what they wanted to say. So they used ideas like the knowledge of good and evil, apples, nakedness, serpents and the like to put together an image that said far more than the words could convey.

Now, when we read that story, we must somehow get back to the original meanings that the original writers were trying to communicate. We face the same dilemma they did, but in reverse. We have to figure out how the words were combined into images to embody a meaning. The interface between writer and reader is now the interface between reader and writer. Thus do we experience the same thing that the writers experienced. We become one with them in trying to discern the meaning that transcends the language. This is the essence of hermeneutics, which is the study of what texts meant to the ones who put them together.

Bassler agrees with Ricoeur. She says that the value of parables is their ability to put us in the same position as the disciples: confused, searching for meaning, attempting to understand. Every parable implies a reader (or hearer) who is essential for completing the text. The meaning of a parable is not something that is prepackaged and available. Rather, it comes about only as a result of the interaction between reader and text. "The parable does not impart information to the hearer as much as it creates meaning within the hearer."72 Meaning cannot occur in a vacuum. It cannot stand on its own. It has existence only where an interaction between symbol and interpreter occurs. Such meaning is, of course, fluid, individualistic and difficult to predict.

In Tillich's words, parables "unlock dimensions and elements of our soul which correspond to the dimensions and elements of reality."73 And like Merton's account of the Desert Fathers, meaning resides neither in the symbol nor in us, as if it were ready to emerge when called upon to appear. Instead, meaning is a dynamic that is generated on the interface between individual and symbol. There is no such thing as a symbol without an interpreter.

Nevertheless, like the magnet and the metal filings, and like the archetypes and the perceptions and experiences they arrange, the appear-

72 "The Parable of the Loaves," p. 158.

73*Dynamics of Faith,* p. 43.

ance of meaning on the interface between symbol and interpreter is not a random event. Interpreter and symbol must share a character in order to have access to each other. Ortega y Gasset said it very well:

> To ignore the fact that each thing has a character of its own and not what we wish to demand of it, is in my opinion the real capital sin, which I call a sin of the heart because it derives its nature from lack of love. There is nothing so illicit as to dwarf the world by means of our manias and blindness, to minimize reality, to suppress mentally fragments of what exists. This happens when one demands that what is deep should appear in the same way as that which is superficial. No, there are things which present only that part of themselves which is strictly necessary to enable us to realize that they lie concealed behind it.74

The Desert Fathers knew this. They tried to make themselves as close to nothing as possible, in order to purge themselves of a demand for something that would be little more than a variant of the known.

Tillich, Merton, Bassler and Ortega y Gasset agree that the encounter with meaning is not something that can be controlled by the seekernot there for the taking, so to speak. It comes about only as a result of a courtship, a relationship, an openness and trust. What kind of relationship is courted? This is difficult to specify. It seems to resemble, however, a chaotic mixing, in which both experiencer and experienced become so intertwined that a new symmetry comes into being. With regard to religion, this theme is fundamental and ubiquitous. Yet, many find it a particularly difficult concept to grasp. Is there something about human consciousness that runs counter to it? Are we too inclined to think of understanding as grasping, taking hold of something that we can then use for our own ends?

Martin Heidegger: the mystery of symbols

Heidegger certainly thought so. He proposed that, even though we have the capacity to think, we are growing increasingly thoughtless, to the degree that "man today [1955] is in *flight from thinking*."75

To explain this typically Heideggerian paradox, he posited two categories of thinking: calculative and meditative. The former is computa-

74*Meditations on Quixote,* p. 62.

75*Discourse on Thinking,* p. 45.

tional and intended to make conditions of life serve the needs of humankind. It is directionalif not unidirectionaland races from one prospect to the next. It never stops, never recollects itself. The latter limits itself to the here and now, meditating on what is closest. Unconcerned with far-off goals, it "contemplates the meaning which reigns in everything that is."76

Calculative thinking, which is based on what is given and seeks "definite results," undermines our origins in mystery. Confined in its grasp, we lose touch with who and what we are. When in the clutches of planning and calculation, of organization and automation, we cannot be concerned with "thinking which contemplates the meaning which reigns in everything that is."77 Without meditative thinking to balance us, we are in danger of "clinging one-sidedly to a single idea" or "running down a one-track course of ideas."78

Unipolar views of life, says Heidegger, lead to the kind of thinking that devalues ambiguity and conflict. Jung felt the same, for calculative thinking has little use for tensions of opposites. In terms of chaos theory, it seeks to avoid Hopf bifurcations. Either way, says Heidegger, we fail to acknowledge a fundamental truth about existence: that we are

> meditative being[s] . . . [who] stand at once within the realm of that which hides itself from us, and hides itself just in approaching us. That which shows itself and at the same time withdraws is the essential trait of what we call mystery.79

This "mystery" is a dynamic inherent in life itself that brings us into contact with that which is largely irrepresentable.

Meditative thinking, therefore, "demands of us that we engage ourselves with what at first sight does not go together at all."80 To do that, we need to practice releasement-toward-things and openness-to-the-mystery. We must "willingly . . . renounce willing," release ourselves to "the inconspicuous guide that takes us by the hand," and open ourselves to

76 Ibid., p. 46.

77 Ibid.

78 Ibid., p. 53.

79 Ibid., pp. 55f.

80 Ibid., p. 53.

"an abiding expanse which, gathering all, opens itself, so that in it openness is halted and held, letting everything merge in its own resting."81 This is about as succinct a summary of Merton's description of the Desert Fathers as a philosopher could write.

Meditative thinking eschews the temptation either to discern images or to seek representations ("re-presentations") of objects. Both are acts of will that lead to calculative thinking, which demands, in Ortega y Gasset's words, that what is deep should appear in the same way as that which is superficial. This demand is born of the desire to control existence, to wipe away uncertainty, to see clearly the essence of all things. Unfortunately, life does not cooperate. The closest humankind can come to such clarity lies in the symbolic. But simply to apprehendlet alone to comprehendthe symbolic, we must submit ourselves to a process the outcome of which cannot be known prior to submission.

That which is dimly perceived ("as through a glass darkly")able to be sensed but not delineatedoften has a mystical flavor, a vitality that transcends that through which it is experienced. While many images contain dimensions that approach the inexpressible, this dimension is central to the character of a symbolic image. Thus, symbols express, to one degree or another, that which Heidegger called the "mystery." They have a compelling effect. They grab us.

The Province of Symbols

All the above authors, from Tillich to Ricoeur, from religion to theology and philosophy, accept that symbols connect us with something beyond everyday awareness. Whether it be "dimensions and elements of our soul" (Tillich), the "All" (Merton), the "Mystery" (Heidegger), or something suggested by a text (as Bassler's "meaning" or Ricoeur's "reference"), there is something beyond consciousness to which symbols, metaphors and language point. The exact nature of this something, however, is a matter of some dispute. Is it part of, or does it transcend, oneself? Why do some individuals and groups find some images very compelling while others barely respond?

People generally agree on the difference between the effect an every-

81 Ibid., pp. 59f., 60, 66.

day object has before and after it becomes a symbol. In animistic religions, for example, certain objects or actions can begin to participate in meanings that place them beyond the domain of other, more ordinary, objects and actions. Moreover, such meanings become their essential characteristics to the degree that they begin to stand out from others of their kind.

Thus, a rock that is like any other rock may become invested with a unique meaning when it is seen in the context of an occasion of great importance. Perhaps it caught the eye of a hunter who, upon moving closer to see it more clearly, suddenly noticed an animal that he managed to kill just as a famine threatened to destroy his tribe. Due to the rock's involvement with the event, it might then have become identified as sacred. Even though it is virtually indistinguishable from other rocks, its participation in a meaningful event becomes its essential definition, to the exclusion of those characteristics (color, hardness, shape, mass) that it shares with other rocks. While there may be idiosyncrasies of this particular rock that lend themselves to inclusion in the meaningful event (its location, for example), the essence of its ability to generate and to direct the energies of the tribe lies in the fact that for a particular time and place the expectations of the participants and the idiosyncrasies of the image coalesced in such a way as to create *meaning*. And perhaps most importantly, that meaning is a function of relationship, in this case between hunter and rock.

Sometimes, the power of the symbolic image seems to derive more from the expectations of the participants than from the particularities of the imagehowever well suited they are for interpretation in the context of the event. But what about images that influence so many people in so many different contexts that their power seems to lie less with the expectations of those involved than with some essential trait of the symbolic image itself? Rainbows, eclipses of the sun and moon, the wind, breath; while each has a compelling effect, the exact reason for that effect is not always easy to specify. Furthermore, being drawn toward something that resists definition feels like being the object of an intention other than one's own. Inevitably, we feel that the phenomenon's compelling effect is due to some agency of the phenomenon itself. It feels like it's alive,

like there's "somebody home" in it. The question is, is there really something there, or is it just our imagination?

Science and religion tend to answer that question differently. Science looks to the individual. Even that branch of science that is loosely descended from religion, namely, the science of psychology, usually locates the agency within the individual, in some unconscious aspect of ourselves that we project onto people and things around us. Religion, on the other hand, locates agency in the suprapersonal, in that which transcends the individual. Religion says there really is something there. Rainbows signify God's promise not to send any more floods. Wind is God's spirit. The moon is a goddess.

Attempts to integrate these two points of view through such ideas as "God speaks through the unconscious" are only marginally successful. As far as religion is concerned, God participates in history. God cannot be solely a function of humankind's imagination, for God is present in historical events and appears at specific times. The Exodus, the Crucifixion, Mohammed's dream and Buddha's birth did not take place in man's unconscious. They were events in the flow of history that occurred whether or not their importance was noted at the moment. Haile Selassie, who had an enormous influence on those who considered him to be God, was a man who lived in history.

Ricoeur takes the debate a step further. He is willing to accord symbols a life of their own. If language is symbolic, he maintains, then symbols are dynamic mechanisms. They are more than the images that express them. Trying to explain them solely in terms of their content simply boils them down to some arbitrary definition, producing a sterile result. They lose their mystery. Their compelling effect is reduced to a "nothing but," an "only" such-and-such. Consequently, he focuses not on what they mean, but on how they function. (Perhaps he has absorbed architect Louis Sullivan's credo that "form follows function"!)

The transition from event to meaning, says Ricoeur, depends on language. "The symbol . . . only gives rise to thought if it first gives rise to speech."[82] And while "metaphor is the appropriate reagent to bring to

82*Interpretation Theory,* p. 55.

light this aspect of symbols that has an affinity for language," nevertheless, "real metaphors are not translatable."83 What are we to do with that? If language points beyond itself even when it describes events other than the religious, how much more so is it in describing matters religious. Without language, religious events can be neither described nor communicated. But this still doesn't help us to decide where the meaning of language comes from.

Perhaps, if language is a function of the mind, it points to something that has to do with the language-making part of the brain. Unfortunately, the relationship between brain and language is not definitively known, beyond the relatively obvious fact that language "determines . . . the structure of our consciousness."84 Furthermore, language is the means by which that which is expressed through language is itself studied. Like the psyche, it is both the object and the subject of investigation. So we are back to our familiar conundrum: if language is the primary means by which we study language, we are once again confined to the same kind of Moebius strip that describes the psyche trying to understand itself.

We don't seem to be much closer to an answer to our basic question: If symbols point beyond themselves, to what do they point? Is there really something out there? Or if that something is actually inside oneself, does it show itself in language? And if it does, are we any closer to knowing what "it" is?

Back to Chaos

We might as well search for the Holy Grail. But what if we reframe our questions in terms of chaos theory? If symbols are analogous with manifolds, their function may be simply to shift us around, to get us off one track and onto another. In that case, the track is less important than the shift. If symbols as manifolds participate in fractal attractors, we should expect to see evidence of fractal dimension and self-similarity across scale. And, in fact, we do. Psyche trying to decipher psyche, language trying to decipher language, language as both product and producer of psyche: these are fractal dynamics that create self-similarity (the instru-

83 Ibid., p. 52.

84 S.I. Hayakawa, in Gyorgy Kepes, *Language of Vision,* introduction.

ment trying to measure itself) across scale (from mechanics of the psyche to its expressions in language).

Moreover, the result is clearly fractal in dimension: it doesn't fit our categories. For example, if symbols are products of the psyche, how is it that the psyche can both create and be confused by symbols? Or how about dreams? How can the psyche that creates them also be the psyche that finds them so difficult to decipher?

Jung approached the problem much as did Freud. He postulated that consciousness is simply one among many functioning centers within the psyche, each of which has a measure of autonomy from the others. Consistent with his theory of archetypes and complexes, however, Jung enumerated many more of these functioning centers than did Freud. Furthermore, Jung maintained, that which generates the functioning aspects of the psyche (the archetypes) also generates symbols, which exist primarily to assist in the creation and development of the various functioning centers of the psyche. Thus, symbols help the psyche to form itself by drawing it to perspectives and experiences that promote growth.

If symbols exist to assist the psyche in its development, then we may have an answer to our question concerning that toward which symbols point. That is, the something toward which symbols point is simply the activity of searching for the something toward which symbols point. The meaning of symbols is essentially the pursuit of the meaning of symbols. Thus, the goal of the quest is the quest itself. Destination and journey are synonymous.

This is the view of symbols Jung embraced. He believed symbols give us contact with what is absent from our lives: the other side of anything that receives inadequate emphasis because it contradicts what we hold in consciousness. Yet, exposure to these other sides is hardly an easy event. It involves a descent into the unconscious, a "dark night of the soul" on the course of the "hero's journey." In short, it is an encounter with the shadow.

If the brain is not hard-wired, with specific neurons to control specific perceptions, but an organic entity whose functioning depends on multiple interactions, then we ought to learn to recognize and understand processes rather than entities. According to Jung, this takes us beyond the

light of consciousness into the darkness of the unconscious. We encounter the shadow, both in ourselves and in our environment.

What is Jung's view of the shadow? How does the symbolic life lead inexorably to it? For our investigation of these questions in the next chapter, let us ground ourselves in the words of Ortega y Gasset, who affirms the deep respect for otherness that must accompany our efforts to connect with the world around us, with others, and with ourselves.

> How unimportant a thing would be if it were only what it is in isolation? How poor, how barren, how blurred! One might say that there is in each thing a certain latent potentiality to be many other things, which is set free and expands when other things come into contact with it. One might say that each thing is fertilized by the others; that they desire each other as male and female; that they love each other and aspire to unite, to collect in communities, in organisms, in structures, in worlds. What we call "nature" is only the maximum structure into which all material elements have entered, and nature is a work of love because it means the generation or creation of some things inside others, the birth of one from another in which it was preconceived, preformed, virtually contained.85

If, in the world of symbols, destination and journey are synonymous, to be faithful to Ortega we should expand the above to include the idea that a symbol's meaning is synonymous with its capacity to generate a relationship, for instance, between the one who interprets and that which is discovered.

85*Meditations on Quixote,* p. 88.

4
The Shadow Side of Symbols

The mind sees only what it looks for, and looks only for what it has in mind.
Anonymous.

Jung's View of Symbols

How do we see beyond what's in our minds? For that matter, how do we see what's *in* our minds? For Jung, of course, the answer lay in symbols, those puzzling images that routinely transcend our expectations. We have seen how Tillich, Merton, Heidegger, Ricoeur and Bassler share the belief that certain categories of experienceparticularly those that defeat our efforts to objectify and classify themare essential to spiritual growth, because they demand that we stretch ourselves beyond the known. Through working with them, we become part of them, and they become part of us. Interpretation must not be imperialism. It can only be an encounter in which symbol and interpreter share a "reciprocal assimilation"86 through which they participate in meanings that transcend them both. This is what Jung meant by integration of the meaning of a symbol: both symbol and interpreter are transformed.

The problem, said Jung, is that integration is a function of the unconscious. Consciousness analyzes; it breaks things down into their component parts. It's like making pea soup. Consciousness is like the hand that wields the knife, chopping up the carrots and onions, sifting through the peas to pick out the stones, and throwing it all into the pot together. The unconscious is like the pot itself, where everything gets mixed together to produce the soup's unique flavor. Consciousness is the differentiator that makes distinctions in the name of definition.

The unconscious, on the other hand, synthesizes components into new combinations that are synergetic: they exceed the sum of the parts. These synergetic combinations are not necessarily predictable from the sum of

86 Jean Piaget, *Main Trends in Interdisciplinary Research,* p. 11.

the parts, so they challenge the limitations of consciousness. They are essential for psychological development.

While consciousness is a necessary component of this process, the initiative lies with the unconscious. For this reason, the process is anything but smooth. In one of his last writings, Jung described it like this:

> [When] the conscious assumptions have become unworkable . . . [and] neurotic symptoms appear, then the attitude of consciousness, its ruling idea, is contradicted, and in the unconscious there is a stirring up of those archetypes that were the most suppressed by the conscious attitude.87

In other words, when the diachronic aspect of individuation becomes stalled, the unconscious addresses the one-sidedness of the conscious attitude by establishing a tension of opposites. This activates the synchronic aspect of individuation, which confronts consciousness with alternatives to its viewpoint.

At its most extreme, this can feel very overpowering. Jung describes what happens next:

> The unworkable conscious dominant disappears in menacing fashion among the contents rising up from the unconscious, thus bringing up a darkening of the light. The warring elements of primeval chaos are unleashed, as though they had never been subjugated. The battle is fought out between the dominant and the contents of the unconscious so violently that reason would like to clamp down on unreason. But these attempts fail, and go on failing until the ego acknowledges its impotence and lets the furious battle of psychic powers go its own way. If the ego does not interfere with its irritating rationality, the opposites, just *because* they are in conflict, will gradually draw together, and what looked like death and destruction will settle down into a latent state of concord.88

The similarity between this description of psychodynamics and descriptions of chaotic dynamics is striking, indeed.

While the eruption of synchronic dynamics may feel to the precarious control of consciousness like the battle Jung mentions, it is also the basis for resolution and wholenessfor symmetry-building, if you will. Synchronic dynamics influence diachronic dynamics through the activity of symbols. Thus, symbols are interfaces not only between synchronic and

87*Mysterium Coniunctionis,* CW 14, par. 505.

88 Ibid., par. 506.

diachronic dynamics, but between psychic structure and personal experience, between past and present, order and chaos. All this is possible because symbols function as transformers. In fact, the symbol is "the psychological mechanism that transforms energy."89

Symbolic images are not stored in the psyche somewhere to be released when the needs arises. They occur on the interface between individual and environment, through the interaction of archetypes with perceptions and experiences. But the archetype "is a vessel which we can never empty, and never fill. It has a potential existence only, and when it takes shape in matter it is no longer what it was."90 Thus, archetypes are neither symbols nor images but only the organizers and valencers of perceptions and experiences. What does this mean for us?

The Birth of Symbols: Psyche Recognizing Itself

For Jung, consciousness comes under the influence of symbols through a multilayered process. We saw in chapter one how archetypes arrange perceptions and experiences into complexes, thereby building the basic structures of the psyche. By creating fields that attract perceptions and experiences, archetypes weave networks of associations that are identifiable through their feeling-tones. They also play a role in psychodynamics by exerting an influence on our psychic energy, which largely determines who we are. Remember, the various aspects of our personalities are collections of psychic energy.

We can now begin to look at the actual mechanics of how this all happens.91 When a predisposition to experience certain things in certain ways (the hallmark of the activity of the archetypes) attaches itself to some aspect of everyday life, psychic energy is either attracted or repelled. As Jung put it, psychic energy becomes connected with a *value,* that is, with something that attracts or repels our attention and activity. If I value something, I'll be inclined to direct my energies toward it. If I don't, I won't.

89 "On Psychic Energy," *The Structure and Dynamics of the Psyche,* CW 8, par. 88.

90 "The Psychology of the Child Archetype," *The Archetypes and the Collective Unconscious,* CW 9i, par. 301.

91 For a "mathematical" explanation, see below, appendix 4.

Values influence perceptions and behaviors. Furthermore, Jung was interested in values simply for their effect. He was less interested in measuring their relative power vis-à-vis one another. As far as he was concerned, the important thing is whether a value is present or absent. When our energy is mobilized, we take note. Sometimes we experience this as a vague pressure in the direction of something we can barely discern. At other times, the value attaches itself to an image, whereupon we find ourselves either pursuing or avoiding that image. The important point is that something is happening to us. We are not selecting these images consciously. It is being done for us by the archetypes.

Thus, symbolic images gain their compelling influence through their ability to mobilize our psychic energy. This accounts for the differences in intensity we feel in our interactions with the people and events of our daily lives. It also explains why we often feel hard-pressed to come up with reasons for our intense emotional attractions and repulsions.

This is what gives symbols their power. Our values originate in the unconscious. Certainly we can exercise our conscious faculties to reflect on them, modify them and limit how they are expressed. But that happens after we feel them, not before. In the beginning, they attach themselves to images that then function as symbols for our consciousness. They mobilize our energies in ways that attract or repel our attention.

This is a crucial aspect of Jung's psychology. He said that "a symbol is the best possible expression for an unconscious content whose nature can only be guessed, because it is still unknown."92 The "unconscious content" is, in fact, the mobilization of psychic energy through a value. It is not something we consciously construct. Nevertheless, "the vision of the symbol is a pointer to the onward course of life, beckoning the libido towards a still distant goal."93 Symbols lead us through life. To use a religious metaphor: we may choose what to do with the creation, but we are not the creator.

By establishing creative tensions between what actually exists, or is perceived to exist, and new potentials, symbols generate synchronic dy-

92 "Archetypes of the Collective Unconscious," *The Archetypes and the Collective Unconscious,* CW 9i, par. 7, note 10.

93*Psychological Types,* CW 6, par. 202.

namics. They push us into life. When archetypes generate gradients through symbols that incline our energy in new directions, diachronic dynamics come into play. I may be perfectly happy in my job until a better one comes along. The tension between what I have and what I could have inevitably leads my life onward in its course. But this is not as easy as it sounds. Jung discovered that archetypes are bipolar, having both "a positive, favorable, bright side that points upward [and a] partly negative and unfavorable, partly chthonic" side.94 Thus, the gradients that archetypes establish through symbols incline energy either toward more complex and more highly developed psychological pursuits, or toward exaggerated, powerful and generally destructive instinctive behavior.

This brings us back for a moment to our discussion of the transcendent function in chapter one. Jung defined this function as the archetypal dynamics by which gradients incline energy from lower to higher functioning. It is the bipolar nature of archetypes that makes it possible to supplement one aspect of reality with another. That is, if we focus our consciousness solely on, say, the higher, more spiritual aspects of our love toward the downtrodden, the opposite pole of the archetype will become activated to remind us that there may be another side to our altruism. We may need the downtrodden in order to feel spiritual. We may actually even cause the conditions by which they become downtrodden.

Once we recognize the potential duality of our motives, however, the transcendent function can produce uniting symbols that bring together the mutually contradictory elements of our spirituality. Thus, they make it possible for "either-or" situations to become more symmetrical, "bothand" ones. An essential part of the diachronic dynamics of individuation, uniting symbols reunite the tensions of opposites that are generated by the unconscious to balance the one-sidedness of consciousness.

The bipolarity of archetypes moves us beyond the concrete dimensions of our existence into the realm of the yet-to-be-realized. Unlike the past, which resists recovery, or the future, which exists only in projection, the present that confronts us in symbols recreates the kind of wilderness that Merton described in his account of the Desert Fathers. As he pointed out,

94 "The Phenomenology of the Spirit in Fairytales," *The Archetypes and the Collective Unconscious,* CW 9i, par. 413.

we survive such an experience only through insight, by seeing through the assumptions that organize our perceptions. Likewise, with regard to symbols, we must see beyond their contents in order to participate in their dynamics. To do so, we must sacrifice our desire to know the exact outcome of our participation. We must confront the unknown. For Jung, this meant that we must come to terms with the shadow.

The Shadow

In the synchronic dynamics of tensions and resolutions, symbols activate and direct the flow of psychic energy. But they are also key figures in the diachronic dynamics of individuation, for they point the psyche toward new opportunities for growth. Sometimes the meaning of a symbol is closely allied with its content. The knife as a symbol most often refers to the characteristics of a knife: it can penetrate, cut, divide, open up and so on. At other times, a symbol's meaning lies less in its content than in its power. The Great Devouring Mother, for example, instills fear far beyond its actual content. Jung called these latter symbols archetypal because they originate in the *collective unconscious*. The collective unconscious is the deepest layer of the psyche. It includes the mysteries of life itself, the power of chemical reactions, the wisdom of genetic influence, and most particularly, everything that identifies our psyches as human.

The collective unconscious is characterized by homogeneity, uniformity and collectivity, whereas consciousness is oriented toward distinction, individuality and separation. Archetypal symbols emerge from a realm of the psyche that is alien to the ego. While contact with this realm can destabilize the ego, it can also shake us loose from our propensity to calcify the known. It takes the ingredients of our everyday lives and tums them into something that can help us to grow.

During the transition from synchronic to diachronic dynamics of individuation, the ego finds itself under the influence of what Jung called the shadow, which may be considered on three levels: personal, collective and archetypal.

The personal shadow is comprised of perceptions and experiences that we don't consider to be us. They are the Mr. Hyde to our Dr. Jekyll. The collective shadow is the same thing when it occurs at the level of groups

of people. For years the Soviets symbolized the American collective shadow. We could accuse them of all that which we didn't recognize in ourselves. Even in the face of such obvious parallels as the McCarthy hearings, we maintained that we were more open minded and tolerant of ideas that diverged from the party line. The archetypal shadow is the drive toward otherness that characterizes the bipolarity of the archetypes. It balances consciousness through an automatic, reflexive establishment of the other point of view.

Definitions of the shadow too often refer solely to substance, to the content through which it is expressed. During the McCarthy era, for example, we couldn't see that our actions were identical to the worst of communism because we didn't see ourselves as communist. We only saw the name that we identified with, and not the dynamics. According to Jung, this is understandable, for "as in its collective, mythological form, so also the individual shadow contains within it the seed of an enantiodromia, of a conversion into its opposite."95

Because the shadow compensates consciousness, whenever we think we know what the shadow is, its opposite automatically begins to emerge from the unconscious. It is an aspect of the psyche that can never be conscious. Just when we think we grasp it, it eludes us. Thus, the shadow is ever-shifting, counterbalancing consciousness with its ineffability. How, then, can we say anything about it at all? The answer is, simply, by its effect on consciousness.

Personal shadow

Shadow contents, which range from the horrific through the fairly negligible to the desirable, are remarkably fluid and organic. Among the aspects of the personality that could be referred to as the "negative" shadow would be murderous tendencies. These are usually quite recognizable and, when recognized, suppressed. This does not mean that they disappear, however. They express themselves in ways that we usually don't recognize. We may not actually kill anyone, but our murderous tendencies may appear in less overt form through character assassination, rumor mongering, back stabbing and so on. We are usually quite sur-

95 "On the Psychology of the Trickster-Figure," Ibid., par. 488.

prised to hear ourselves described in these terms.

The same is true of the "positive" shadow. Some of the positive traits that we often suppress are athletic talent, leadership potential, emotional awareness, intellectual ability and so on. Sometimes we suppress them because we fear they may burden us with responsibility or lead to exposure. In that case, perfectly useful adaptive abilities may be discarded due to their negative valence. But here as well, recognition of the content causes the shadow to move to other contents. For example, some who have found academic achievement to be distasteful may become possessed by the desire to gamble, to con others, even to evangelize. Each of these preserves (however perverted) an aspect of academics: pure science, applied science and teaching.

Access to the shadow is blocked by its inconsistency with the ego's view of itself. Thus Jung described the negative shadow as "the sum of all those unpleasant qualities we like to hide."96 When the ego cannot perceive the shadow internally, in its own dreams and fantasies, it inevitably sees it as something external, outside itself. This occurs through a spontaneous process called projection, whereby we perceive in others our own disowned characteristics.

Projections are not consciously created. Rather, we encounter them in the world around us. As Jung said, "One meets with projections, one does not make them."97 Our projections "change the world into the replica of [our] unknown face," which then isolates us from our surroundings in "an autoerotic or autistic condition in which [we] dream a world whose reality remains forever unattainable."98 The more the world is identified with our projections, the less we see it for what it is. Like Narcissus at the pool, we fall in love with our own reflections and miss the voice of Echo calling to us in the background.

Like the contents of any complex, the contents of the shadow are emotionally charged. Like projections, emotions simply happen. They are not created. When we notice in others what we cannot accept in ourselves, we become gripped by the feeling-tone of the shadow complex. Because

96*Two Essays,* CW 7, par. 103, note 5.

97*Aion,* CW 9ii, par. 17.

98 Ibid.

the source of the emotion is connected to our own shadow, which is projected onto the other, our connection with the other becomes very disconcerting. As well, when another becomes contaminated with our shadow, the temptation to suppress the other is as strong as the temptation to suppress our own shadow.

Those who carry our projections hit us in our blind spots, where our adaptation is weakest. We don't want to see our shadow, and we certainly don't want to interact with it. So it remains undeveloped. Alienated from the ego due to its inscrutability and distastefulness, the shadow is experienced as irrational. Those who carry projections of the shadow are perceived likewise, as useless, helpless, irrational and threatening.

Collective shadow

However difficult it may be to see our personal shadow, it is far worse at the level of the collective. (Here "collective" is used not in the sense of the collective unconscious, but rather collections of individuals, groups.) Collective shadow consists of commonly held assumptions, reflecting unintegrated collective traits, that one group projects onto another.

"As soon as people get together in masses and submerge the individual," Jung writes, "the shadow is mobilized, and, as history shows, may even be personified and incarnated."99 As with the personal shadow, groups rarely understand how much their emotional responses to others may be based on their own unconsciousness, rather than on objective appraisals of others.

Nowhere is this more troublesome than in the violence of oppression. Hanna Arendt observed that "the chief obsession of the totalitarian mind lies in its need for the world to be clear-cut and orderly. Any subtlety, contradiction, or complexity upsets and confuses this nature and becomes intolerable."100 Alternate points of view, not to mention the attitudes of flexibility and openness that tolerate their expression, are simply intolerable to the totalitarian mentality. Possessed by their own fear of destabilization, oppressors seek to impose their will on others. Unfortunately,

99 "On the Psychology of the Trickster-Figure," *The Archetypes and the Collective Unconscious,* CW 9i, par. 478.

100*Crises of the Republic,* p. 95.

this activates others' resistance, which further exacerbates the oppressor's fear: a vicious circle.

The cycle of oppression is a good example of how entropic chaos infects the psychology of a group. It begins with a refusal to bifurcate and to oscillate between and among various points of view. Unable to tolerate the creative tension of differences of opinion, totalitarians side with one pole of the tension. Through slogans and intimidation they reinforce their chosen identity and suppress all others. Many in the group see their single-mindedness as a value. Jung understood the subtlety of their mistake: "A *conscious* capacity for one-sidedness," he said, "is a sign of the highest culture, but *involuntary* one-sidedness, i.e., the inability to be anything but one-sided, is a sign of barbarism."101 The problem with the totalitarian attitude is that it cannot stand ambiguity. Increasingly trapped in its one-sided attitude, it becomes increasingly unable to be anything but one-sided. All other attitudes appear equally one-sided, and must be suppressed.

Jacobo Timmerman was a newspaper reporter who lived through the days of the Pinochet terror in Chile. He witnessed the impoverishment that occurs in the arts when "subtlety, contradiction, or complexity"in Arendt's wordsare no longer acceptable. He writes:

> While there are statistics in Chile that measure everything that can be measured, it has proved impossible to explain in figures what is meant by the term "cultural blackout." There has been growth in literature and art with themes of everyday life. But there is a scarcity of literature and art that probes beneath the surface in search of what is permanent. There is much artistic combativeness without creative depth. That, indeed, is what constitutes a cultural blackout.102

The problem, he says, is that "the intellectuals are suffering from the one neurosis that is unacceptable in an artist: they are disguising what is going on around them before they have even tried to understand it."103 When the totalitarian mentality seizes hold, even the arts attempt to avoid conflict.

101*Psychological Types,* CW 6, par. 346.

102*Chile: Death in the South,* p. 53.

103 Ibid., p. 65.

Deeply fearful of any inclinations toward flexibility and adaptability, totalitarians suppress such traits in themselves and project them onto others. Then, when these others have become identified with the totalitarian's shadow qualities, they, too, must be suppressed. Any form of openness and acceptance, whether internal or external, must be eradicated. Again, Hanna Arendt writes:

> It has often been noticed that the effectiveness of terror depends almost entirely on the degree of social atomization. Every kind of organized opposition must disappear before the full force of terror can be let loose, This atomizationan outrageously pale, academic word for the horror it impliesis maintained and intensified through the ubiquity of the informer, who can be literally omnipresent because he no longer is merely a professional agent in the pay of the police but potentially every person one comes into contact with.104

As oppression spreads, fear of conflict and change turns everyone into a potential agent of the state. Fear and mistrust increase geometrically, like the feedback in the microphone. The only antidote to this entropic chaos is to create bifurcations and oscillations, by bringing the fear and mistrust into consciousness and discussing it. Unfortunately, by the time oppression reaches this level things are already out of control. Timmerman describes what it is like to try to survive such mass hysteria:

> The daily effort to overcome the tension caused by living constantly under threat, to avoid being arrested or kidnapped, to keep up with events is only part of the nightmare that opposition leaders must live with. They must also watch over their children, who are possible targets for reprisals. It is best to keep them out of politics and to keep them from being noticed as they go about their daily routine.105

"To keep them from being noticed . . ." is a formidable challenge, for those who are pursued by their shadows become hypervigilant, leading them to pursue fanatically the eradication of those upon whom their shadows become projected. When the collective shadow is let loose, catastrophic damage to the social fabric can occur very rapidly, for here individuals reinforce their mutual paranoia with the power of the mob.

104*Crises of the Republic,* p. 154.

105*Chile: Death in the South,* p. 89.

Archetypal shadow

Archetypal shadow consists of the psyche's ability to counterbalance consciousness through positing its opposite. Personal and collective shadow are generated by the archetypal shadow and refer to contents that are projected. In these cases "shadow" is used as a noun. But archetypal shadow refers to a dynamic, so here "shadow" is used as a verb.

Although the archetypal shadow has the potential to balance the onesidedness of the conscious attitude, all is not perfect. Contaminated, wrote Jung, with "that hidden, repressed, for the most part inferior and guilt-laden personality whose ultimate ramifications reach back into the realm of our animal ancestors and so comprise the whole historical aspect of the unconscious,"106 the archetypal shadow can lead to behavior that is clearly destructive. Its activity may be symbolized by such images as the devil incarnate, the snake in the Garden of Eden, the fly in the ointment, the threat of chaos, or the Crucifixion. Whenever events seem to conspire against us, we tend to see malevolent forces at work.

The archetypal shadow is a creative force within the unconscious that alternately destabilizes and balances consciousness in order for psychological growth to occur. Without tensions of opposites, growth is simply not possible: "The shadow and the opposing will are the necessary conditions for all actualization," said Jung.107 He cited the example of Lucifer (the "Light-Bringer") in relation to the Will of God. Lucifer brings up possibilities other than God's, and by so doing preserves the Creation from being "just a piece of clockwork which the Creator has to wind up to make it function."108 However naive theologically, this statement is true to Jung's belief that creativity is a function of the chaos that ensues when opposites pull at one another, fragmenting whatever becomes caught in their conflict.

The figure of the trickster in folk tale and myth is one of the most important and ubiquitous personifications of the archetypal shadow. It symbolizes the shadow side of ideals and beliefs about the nature of real-

106*Aion,* CW 9ii, par. 422.

107 "A Psychological Approach to the Dogma of the Trinity," *Psychology and Religion,* CW 11, par. 290.

108 Ibid.

ity. As a counterpoint to one-sided perceptions and behaviors, the trickster takes on the sacred cows of a civilization, usually by portraying whatever a group cannot accept about its relationship to ultimate principles and idealized notions. Then it is often perceived as primitive, immature, and worthy of little more than contempt. During the Middle Ages, for example, times were set aside when people could gather around the altar dressed in repulsive costumes and parody the actions of the Celebrant. Even today, the celebration of Mardi Gras allows one last fling before Lent. Embodying the opposite of the solemnity and piety of the ritual, these events and their trickster figures embody the sacrilege and worldliness that is the shadow of organized religion.

In the Middle Ages, this seemingly bizarre behavior provided an opportunity for the shadow sides of collective values to be lived out in ways that were contained by ritualistic expression. But "the so-called civilised man has forgotten the trickster," said Jung:

> He remembers him only figuratively and metaphorically, when, irritated by his own ineptitude, he speaks of fate playing tricks on him or of things being bewitched. He never suspects that his own hidden and apparently harmless shadow has qualities whose dangerousness exceeds his wildest dreams.109

Clearly, to forget the role of the trickster is to court chaos.

As a relatively automatic dynamic in the unconscious, archetypal shadow is morally neutral. Rarely is its influence experienced as such, however. More often we perceive it as a threat. In many ways it is, for archetypal shadow destabilizes the psyche in the name of future growth. Such a force has to be watched carefully, for it has no intrinsic ethic of its own, save the relentless charge forward to transformation. Because the consequences of such a process can be devastating to individuals and groups, the archetypal shadow must be moderated by consciousness. "Change for change's sake" could well be its motto. During those times when change is not desirable and stability demands that the archetypal shadow be reined in, the ego must restrict it while continuing to respect its function as a balancing mechanism.

109 "On the Psychology of the Trickster-Figure," *The Archetypes and the Collective Unconscious,* CW 9i, par. 478.

Integrating the Shadow: Withdrawing Projections

Since psychological growth is a function of the polarity of the psyche, conflict is inevitable. Archetypes, as Jung said, are bipolar. Before we can gain access to higher functioning, consciousness must open itself to the unconscious, which often feels chaotic and threatening. Resisting the chaos of the unconscious, however, effectively increases its influence. There is nothing worse than refusing to consider the possibility that something we find disturbing in the environment may actually be a projection of something in ourselves. When the unconscious cannot get our attention by speaking quietly, it shouts. We have nightmares, our children become unmanageable, our spouse unreasonable, our job boring. Then we feel even more threatened.

For both individuals and groups, our response to the power of the unconscious determines whether we achieve higher levels of development or fall into rigid reinforcements of prior perceptions and experience. But not all chaos is entropic. Could it be that by submitting to the chaos of the unconscious it can become deterministic, progressing from order through chaos to higher levels of order? If so, whatif anythingis the difference between a response to symbols that leads to entropic chaos, and one that leads to deterministic chaos and growth?

Jung believed that the answer is consciousness. He maintained that crossing our fingers and hoping for the best is not the extent of our available responses. As far as we know, we are the only life form that can knowingly reflect upon experience and choose to intervene in the dynamics of our environment. If psychological growth occurs through the activity of symbols, the more we understand their mechanics the more we can cooperate with them. This is not simply an academic exercise. Because the shadow is identified with that which is maladaptive and worthless, seeing through the projection of the shadow constitutes "a moral problem," for "to become conscious of it involves recognizing the dark aspects of the personality as present and real."110 We must make some very unsettling discoveries about ourselves. However do we do that? How do we become aware of our shadow?

110*Aion,* CW 9ii, par. 14.

The first step is to acknowledge the emotions that accompany projections. As Jung said, "Emotion is the chief source of consciousness. There is no change from darkness to light or from inertia to movement without emotion."111 With regard to projections, emotions are the alarm system that warns of their presence. Recognizing the emotions that accompany projections begins the process by which they can be withdrawn from others. To withdraw projections is to own up to who we are. In pursuing the recognition and withdrawal of projections, our motto must be, "It takes one to know one."

Once our emotions alert us to the presence of the shadow, we must face the possibility that our definition of ourselves may not reflect the totality of our personality. This inevitably generates a tension that is, in turn, essential to individuation. Consequently, learning how to negotiate tensions of opposites is the goal of integrating the shadow. We must neither suppress it nor capitulate to its demands.

We must admit that the shadow can be both destructive and constructive. The problem lies not with the shadow itself, but rather in how we allow it into our behavior. For example, with regard to the expression of aggression, Anthony Stevens says:

> Aggression is a fundamental and ineradicable characteristic of all social mammals including man: without aggression survival would be impossible; but survival also demands that aggression be constrained. . . . In other words, in man aggression becomes a moral problemthe problem of dealing with the Shadow without becoming possessed by it.112

As with totalitarianism and oppression, when we can no longer dwell within the tension between ego and shadow, we risk being possessed by the shadow in the very behavior we use to suppress it.

Interpretations: Reductive versus Constructive

Symbols utilize images from everyday life, be they objects, persons, or experiences. When such images become suffused with the power of an archetype, they attain the status of symbols. Thus, a symbol is a valenced

111 "Psychological Aspects of the Mother Archetype," *The Archetypes and the Collective Unconscious,* CW 9i, par. 179.

112*Archetypes,* p. 227.

image that is defined by the power of an archetype. When an image from everyday life combines with an archetype, it becomes loosened from its connections with other images with which it previously shared a context and becomes connected to a new context: one that is defined by the power and structure of the archetype.

The developmental role of archetypes is reflected in the meaning of symbols. By establishing a tension between that which exists and that to which the symbol points, our awareness is alerted to new meanings in what we encounter. Furthermore, the means by which we encounterthe criteria by which we perceivecome under review, for perceiving something that transcends the criteria by which we perceive creates a tension that challenges the criteria (or assumptions) upon which our perceptions are based. Thus, symbols transform the process of perception itself.

Artists realize this. Joseph Conrad said in his introduction to *The Nigger of the Narcissus:* "My task which I am trying to achieve is, by the power of the written word, to make you hear, to make you feelit is, before all, to make you *see*. "113 The artist's goal is to stretch us beyond our assumptions. Through their transformation into symbols, images become more than something we experience. For a tribe in the Southwest, the morning star, a species of coyote, and a particular variety of cactus can all become related to the east. Each thus becomes a way of referring to the east. They all become categories of thought.

While symbols abound in all cultures, in postmodern Western culture we often resist imagining ourselves as living in a world whose meaning is substantially a function of our own projections. All that surrounds uspeople, events, actions, and thingsinvite an investment of meaning that relates directly to the psyche. Thus, to the degree that the world around us carries our projections, we inhabit our own psyches. No experience of images occurs in a vacuum. What we see is to some degree a function of who we are. Virtually everything carries some kind of meaning, whether we are aware of it or not.

When meaning doesn't square with our assumptions, we tend not to notice it. Besides, it's much more difficult to adopt Heidegger's idea of

113 Preface to *The Nigger of the Narcissus,* p. 13.

"openness-to-the-mystery." While that may bring us closer to the actuality of symbols, it doesn't necessarily foster the self-confidence and expediency that calculative thinking demands. And so, instead of dwelling within the mystery, we try to reduce symbols to some essential element that seems to define the whole.

Jung opposed defining symbols solely in terms of their content; he believed that to be symptomatic of the desire to manipulate the psyche. For one who predicated his theories on the premise that "the psyche is not in me, I am in the psyche," trying to control the psyche was not so much wrong as futile. In accord with the self-regulation of the psyche through tensions of opposites, trying to control the psyche would inevitably provoke the unconscious to balance that with a control of its own. Thus, essential to Jung's interpretation of symbols is the premise that understanding requires a relationship with symbols wherein one neither controls nor is controlled by them. Rather, symbol and interpreter interact in ways that lead to the transformation of both.

Reduction, on the other hand, is a process wherein phenomena are boiled down to one or two salient points that define them. As William James wrote, "The first thing that the intellect does with an object is to classify it along with something else."114 To do so, something must be divided into its component parts, presumably to discover the pure crystal of its essence. But thinking tends to be categorical, and categories are generally exclusive, relying for their validity on definitions that isolate events in space and time. Consequently, while reduction can sometimes reveal the essentials of a phenomenon, it can also leave one with little more than the lowest common denominator. With regard to the interpretation of symbols, Jung believed that the quest to eliminate complexity reduces symbols to mere signs.

Remember that archetypes must not be confused with symbols in general or with images in particular. They are solely the animators behind the images. Consequently, writes Jung:

> The symbol is not a sign that disguises something generally known. Its meaning resides in the fact that it is an attempt to elucidate, by a more or

114*Varieties of Religious Experience,* p. 10.

> less apt analogy, something that is still entirely unknown or still in the process of formation. If we reduce this by analysis to something that is generally known, we destroy the true value of the symbol; but to attribute hermeneutic significance to it is consistent with its value and meaning.115

Like graphs of fractal attractors, symbols embody dynamics. Trying to reduce those dynamics to some *thing* "that is generally known" is simply impossible. Like the attempt to discern through magnification the boundaries between solution sets of a fractal attractor, reducing symbols simply reveals more of the same. Dynamics are never static, and cannot be reduced to stillness.

Thus, Jung felt it is necessary to view symbols in as many of their manifestations as possible. Utilizing a constructivist approach, he said:

> An archetypal content expresses itself, first and foremost, in metaphors. If such a content should speak of the sun and identify it with the lion, the king, the hoard of gold guarded by the dragon, or the power that makes for the life and health of man, it is neither the one thing nor the other, but the unknown third thing that finds more or less adequate expression in all these similes, yetto the perpetual vexation of the intellectremains unknown and not to be fitted into a formula.116

Elaborations, supplements, and even contradictions that occur in symbols do more to define their essence than do simplistic definitions.

Only through a morphology of symbolssurveying their appearances in differing contextscan we gain an understanding of how particular contents lend themselves to the expression of particular meanings. Remember the example of the knife? A simplistic reduction of its meaning might define it as a weapon, an instrument of healing, an analytic tool, or even a phallic symbol. Or perhaps it can be equated with masculinity, phallic in its ability to probe, cut through, and augment personal power. But to choose any of these meanings is ultimately to disregard the others. The symbolism of knives derives as much from that in which they participate as from any character inherent in their essence. Thus, how a knife is used reflects not only the character of the knife itself, but also a dynamic

115*Two Essays,* CW 7, par. 492.

116 "The Psychology of the Child Archetype," *The Archetypes and the Collective Unconscious,* CW 9i, par. 267.

potential that brings the static entity alive. It animates it, thereby bestowing on it meaning.

It may be helpful to think of animation as the result of congruent patterns. On the one hand, activity often has a pattern, as in sports, dancing or music. So does structure: rectangles, circles, triangles. Combining the pattern of a structure with the pattern of an activity results in animation: baseball, waves, clouds, traffic, screen savers on our computers. But the animation will have meaning only if the two patterns coalesce, that is, when they share an interface between structure and activity. A knife rotating on its axis has little meaning. A knife moving rapidly in the direction of its axis has profound meaning. A train chugging through a bowl of pudding means virtually nothing. A train entering a tunnel may suggest something more resonant with our experience.

Jung was especially careful not to limit the meaning of a symbol to a particular aspect of its structure or activity. He felt that labeling a knife a phallic symbol restricts its definition. Certain patterns of activity that involve knives may be phallic, but others may not. Suppose a knife is used to write a message in the sand. Is that phallic? Hardly. Thus, we can truly understand the symbolic meaning of an image only when we have conducted an exhaustive search for every way in which that image is used as a symbol. As symbols, knives appear in many different contexts and activities. Only when we are familiar with the vast majority of them can we begin to determine what there is about a knife that lends itself to making it a symbol.

That kind of knowledge is generally impossible. No matter how much we know about an image, there is always more that we do not know. But there is hope. Some images tend to be used in remarkably similar ways across cultures. Mythology and folklore provide numerous examples of what particular images have meant to groups of people over time. Ants, for example, tend routinely to be cast into the role of busy workers' collectives. Mythology and folklore do some of the work for us. They are virtual dictionaries of symbols. Nevertheless, while we can learn a great deal about the multiplicity of meanings of certain images, we can never embrace the totality of all their possible meanings. Symbols are bigger than we are. Their meanings outstrip our ability to understand them.

Jung's approach to interpreting symbolsviewing them in as many of their manifestations as possiblehonors their complexity. He called his approach "constructive," because the meaning of a symbol is constructed from all of its appearances. This is different from Freud's reductive approach, where a symbol is seen to have only one meaning; all other potential meanings are eliminated, leading us to feel we have captured the essence of a symbol and achieved a certainty about its meaning.

The constructive approach creates the opposite effect. As long as there are examples of the phenomenon unknown to uslocated elsewhere in space and/or timecertainty is never possible. In effect, the constructive approach is asymptotic: it approaches certainty, but never achieves it. The mystery of meaning is eternally preserved.

The problem with reductive interpretation is that it allows us to believe that we know what we are talking about. Armed with our own assurance, we presume to tell others what meaning is. If they have an idea that is different from ours, we invariably see them as mistaken at best, dangerous at worst. Because we don't like being reminded of our own inadequacies, we generally prefer to believe we know whereof we speak.

But if, as Gyorgy Kepes states, "every experience of a visual image is a forming, a dynamic process of integration, a 'plastic' experience" (where "plastic" refers to "the shaping of sensory impressions into unified, organic wholes"),117 then symbols are in a constant state of flux. They are organic and alive. Constructive interpretation is likewise a "dynamic process of integration" that involves the shaping of sensory impressions. Consequently, constructive interpretation opens us to the power of the symbol, a power derived from the influence of archetypes.

A symbol's power"charged" by the archetypes behind itcreates an emotional experience that challenges the assumptions and experieces that influence how we see things. Ambiguous, cryptic, enigmatic, paradoxical, contrapuntalsymbols are, above all, compelling. Dreams, for instance, are "a spontaneous self-portrayal, in symbolic form, of the actual situation in the unconscious."118 They thus connect us with our in-

117*The Language of Vision,* introduction.

118 "General Aspects of Dream Psychology," *The Structure and Dynamics of the Psyche,* CW 8, par. 505.

ner life. By pointing beyond themselves, they mobilize the inertia of the psyche in the direction of more complex behavior. They lead us from where we are to where we could be. But before we can arrive there, we must first experience the chaos of the unconscious.

We have already seen how projection serves to spare us pain by displacing it onto others. That feedback loop never serves to advance our understanding. Consequently, a conscious withdrawal of projections is essential to the negotiation of symbolic encounters. Reductive interpretation, which gives us an air of certainty, fails to serve this process:

Constructive interpretation, on the other hand, is uncomfortably imprecise. It forces us to open ourselves to the chaos of the unconscious. Like bifurcations, saddle points, unstable manifolds, and homoclinic orbits, archetypes break up the orderly/linear flow of consciousness and replace it with a chaotic/nonlinear dynamic. Obviously, this can be rather upsetting. Fortunately, there are rituals and narratives that offer such experiences shielded from the full force of unbridled archetypal power. Rituals make it possible to encounter the symbolic through established procedures. Narratives present an account of symbolic dynamics at one remove. Both prepare us for the inevitable direct encounters that characterize psychological growth.

Individuation is chaotic. Humankind has realized this for a very long time. Stories, mnemonic devices such as the caves at Lascaux,119 theater and rituals help us to experience the transforming power of synchronic dynamics in a manner that provides sufficient structure for us to allow them to become diachronic. Through constantly repeated themes they move us beyond where we are. And now these early discoveries are being reconfirmed by modern science's insight into chaos theory. If we compare chaos theory with Jung's theory of individuation, we can receive an even clearer picture of how to approach symbols. For if we wish to grow, to work our way out of the dilemmas in which we find ourselves, to develop as a species, we would do well to learn to listen to languages other than the ones we already know.

119 See John Pfeiffer's account of this in *The Creative Explosion*.

Evil Q (courtesy Art Matrix)

5
The Chaotic Dynamics of Symbols

All true things must change and only that which changes remains true.
C.G. Jung.

The Psychodynamics of Symbols

Getting dynamics to hold still long enough to analyze them is no easy task. Generally our best hope is to assess them when they pass through some point here and again when they pass through another point there, and hope that we're gaining an accurate picture of what happens in between. It is even more difficult when the dynamics are those of the psyche, where there is no external Archimedean point of observation. For example, if archetypes form the basis for our perceptions, whether at the spontaneous level of the instincts or the more reflective level of ego consciousness, then they must also inform the categories through which perceptions are defined and recognized. And if that is the case, then archetypes have a great deal of influence on whatever we perceive, including the archetypes themselves. Any analysis of archetypes will be conditioned by archetypes. We're back on the Moebius strip.

Jung believed there was a solution to this problem. Like analyzing the workings of a camera by taking as many pictures as possible, and then comparing them with the original images to see how the camera functions under a variety of conditions, Jung's research focused on the images the psyche produces, primarily in dreams, fantasies and projections. He could just as well have looked at theories, constructs and equations, for anything the psyche produces reflects its dynamics. But since he was interested in the unconscious, he preferred to investigate images that had little connection with consciousness.

His goal was to understand the compelling qualities of those images that become symbols. Knowing how symbols work allows us to decide how we would like to participate, if at all, in our own development. Ego and unconscious can then share a collaborative relationship that facili-

tates the development of the individual.

While Jung's theories contain rich and elaborate analyses of the images that reflect unconscious processes, attention is rarely given to the mechanics of the symbols themselves. Sometimes it seems that the Jungian interpretation of symbols can be boiled down to a simple formula, namely: image is meaning is explanation. While there is an aesthetic appeal to such a deep respect for the symbol as "thing-in-itself," one cannot help but wonder about its mechanics: how it works, in other words. Unfortunately, this seems to be a rather large gray area that defies definition. Most descriptions of the dynamics of symbols mention some point at which something new springs from the old. Exactly how this happens, however, is rarely specified. So we find words like "miracles," "spontaneous processes," "happens," filling in for what we don't yet understand.

But if the mechanics of symbols are produced by the activity of the unconscious, how could it be otherwise? The unconscious is, after all, not conscious. However, if that which we call the unconscious is the product of basic dynamics (which it must certainly be) and if chaos theory accurately describes basic dynamics (which it seems to do) then perhaps chaos theory can provide insight into the spontaneous processes that are the result of the activity of the unconscious. As Jung said," 'At bottom' the psyche is simply 'world.' "120 There certainly are some interesting similarities between fractal attractors and symbols.

Consider mandalas. They occur in virtually all cultures and express far more than we realize at first glance. They usually refer to the way things are, a description of life itself. Jung said:

> All that can be ascertained at present about the symbolism of the mandala is that it portrays an autonomous psychic fact, characterized by a phenomenology that is always repeating itself and is everywhere the same. It seems to be a sort of atomic nucleus about whose innermost structure and ultimate meaning we know nothing.121

Now, "always repeating itself" and "everywhere the same" are pretty

120 "The Psychology of the Child Archetype," *The Archetypes and the Collective Unconscious,* CW 9i, par. 291.

121 Quoted in Elie Humbert, *C.G. Jung: The Fundamentals of Theory and Practice,* p. 40.

good descriptions of self-similarity and scale invariance. Furthermore, that a mandala's "innermost structure" and "ultimate meaning" defy specification suggests the presence of fractal dimension and sensitive dependence on initial conditions. Could mandalas and fractal attractors be two versions of the same reality?

Mandalas are like snapshots of motion. Their images, which are believed to be able to transform consciousness, are representations of their dynamics. C. A. Meier, for example, says of mandalas:

> It should never be forgotten that almost all Eastern mandalas, in their graphic representations, make it very clear that they are ever vividly rotating, thus indicating the dynamics, the process, the character of the ever repeated night-sea-journey during the "dark night of the soul."122

If the same is true for all symbols, how might the process work? Let us begin with this supposition:

> At this stage in the evolution of science, it appears highly probable that psychological processes are in fact processes of the physical brain, not, as Descartes concluded, processes of a non-physical soul or mind.123

Jung would have agreed:

> Since psyche and matter are contained in one and the same world, and moreover are in continuous contact with one another and ultimately rest on irrepresentable, transcendental factors, it is not only possible but fairly probable, even, that psyche and matter are two different aspects of one and the same thing.124

Is this the Jungian counterpart to Einstein's energy-matter continuum? Perhaps. Needless to say, how mind is a function of brain is a question that has yet to be answered. For the purposes of our inquiry, however, it is sufficient to recognize that whatever the relationship between psyche and matter, symbols seem somehow to function in both.

Symbols are essentially interfaces. They mediate between consciousness and the unconscious by participating in both. Generated by the psy-

122 "Psychological Types and Individuation," p. 287.

123 Patricia S. Churchland and Terrence J. Sejnowski, *The Computational Brain,* p. 1.

124 "On the Nature of the Psyche," *The Structure and Dynamics of the Psyche,* CW 8, par. 418.

che to serve its own needs, symbols facilitate communication among its various dimensions. When the ego comes into contact with the unconscious through a symbolic image, it experiences a tension of opposites. Behaving like manifolds, symbols provide departures from and entrances back into the more familiar, and usually more stable, ego dynamics. Whichever occurs at any given moment will depend on the state of affairs at the time the dynamics are generated. Thus, initial conditions govern both the generation of symbols and one's response to them. Accordingly, predicting their influencefrom the profound to the virtually nonexistentis close to impossible. Yet when they do have an effect, the mechanism involved is that of tensions of opposites.

Remember that "the shadow and the opposing will are the necessary conditions for all actualization."125 Tension between opposites is the precondition for psychological growth, for it provides an alternative to the status quo. Just what direction the psyche will take when it encounters this tension, however, is rarely predictable, for it depends on what the individual chooses to do. Sometimes one "oscillates" into a new course of action. At other times, one stays where one is. If the latter, one remains suspended between opposites, oscillating between the new and the old for quite some time before a new pattern is established. The word generally used to describe this state of affairs is "suffering."

The oscillatory nature of the tension of opposites leads to chaos when the oscillations themselves begin to oscillate, creating a cascade of oscillations. Jung was familiar with this phenomenon and considered it to be an integral part of the individuation process. He cited precedents in alchemy, shamanism, and mystical experience, all of which contain references to fragmentation, dismemberment, even "the return to chaos."126 Furthermore, we know that when a cascade continues to intensify, patterns that were once part of the original tension of opposites may again appear amid the chaos. Jung described this aspect of psychodynamics as a descent into the chaos of the unconscious that could lead to increased psychological functioning.

125 See above, p. 98.

126 *Mysterium Coniunctionis,* CW 14, par. 253.

Iteration

Jung grounded his theories in research, most of which focused on the analysis of symbols. If his and chaos theory are describing the same thing, it should be possible to find examples of chaotic dynamics in folk tales and myths. In fact, this appears to be the case. Iteration, sensitive dependence on initial conditions, fractal dimension and self-similarity across scale are all present in symbols. With regard to iteration, for example, if "the backbone of fractals" is "feedback and the iterator,"127 this may be at the heart of what Mircea Eliade called "the myth of the eternal return."128 Could iteration and the eternal return be referring to the same thing?

During particular times of the yearat the New Year or at some point in the lunar cycle, for exampleall cultures engage in rituals that, however modernized, were originally intended to reconnect the profane with the sacred. These rituals reenacted the culture's creation myth, which gave participants access to the original time frame wherein the act of creation occurred. Such a re-encounter was possible because time was thought to be cyclical, unlike modem concepts of time as linear. "The transformation of chaos into cosmos by the divine act of Creation," wrote Eliade, "repeat[s] the act of the gods, who organized chaos by giving it forms and norms."129 Thus, through regularly repeated rituals the creative acts at the Creation could be reconstituted, allowing humankind to rejuvenate itself and to reverse the slow dissolution of order into chaos.

Like initiation rites, which utilize chaos for personality change, the eternal return revitalizes history by freeing it from predetermination. History need not plod inexorably forward. It can be revitalized through contact with the events that gave it birth. When the present is reconnected with the creativity of beginnings, the profane can once again be made sacred. The eternal return begins in tensions of opposites (present and future, actual and potential, sacred and profane), manifests itself in fractal imagery (transcending categories and demonstrating self-similarity

127 Heinz Otto Peitgen, Hartmut Jurgens and Dietmar Saupe, *Chaos and Fractals: New Frontiers of Science,* p. 15.

128 See *The Myth of the Eternal Return, or Cosmos and History,* esp. pp. 73ff.

129 "The Eternal Return," p. 7.

across scale through recapitulations of the original act of creation), is sensitive to initial conditions (demonstrated by the wide variety of myths and rituals of different cultures), and iterates (the eternal return). The oscillatory dynamics (tensions of opposites) that generate myths and rituals enliven them as well, by bringing up new possibilities. Thus, creation occurs over and over again.

So, the eternal return is an iterative dynamic: it allows the present to be fed back into the original equation. While all archetypal processes generate feedback dynamics, the eternal return is the epitome of all such aspects of archetypal processes. It is the archetype of archetypal dynamics, so to speak. While the myth of the eternal return symbolizes creation and rejuvenation, creation and rejuvenation are themselves symbolic of a basic characteristic of dynamic systems. In the new mythology of chaos theory, this is imagined as recurring cycles of chaos and order.

Symbols are the means by which the ego is repeatedly opened to and integrates this dynamic. They create iterations in the relationship between the ego and the unconscious, through which both are transformed. Continually bringing the ego into contact with the unconscious, from which it evolves and which it senses but rarely apprehends, symbols provide images through which the ego can differentiate and analyze its experience. Differentiation and analysis are the first steps in the ego's integration of the unconscious. Thus, symbols first generate chaos, then build symmetry.

Like the ego, the unconscious is altered by its interaction with consciousness. So the ground for future interactions shifts with every encounter between ego and unconscious. As the dynamic iterates, it becomes increasingly difficult to predict where any particular encounter will end up. That the iterations of the conscious/unconscious interaction manifest sensitive dependence on initial conditions is reflected in such things as the diversity of various people's accounts of the eternal return. How the experience turns out depends on where it begins. Every experience of the chaos that ensues from an encounter with a symbol has the potential to lead to a different outcome.

Sensitive Dependence on Initial Conditions

Sensitive dependence on initial conditions may be the most consistent factor of life. It certainly characterizes our encounters with symbols. We rarely know beforehand where such encounters will lead. This is due to the peculiar nature of the symbols themselves, namely, that they are essentially interfaces. When the ego gains access to the unconscious through a symbol, the unconscious correspondingly gains access to the ego. Thus begins the process of fragmentation, dismemberment and chaos mentioned above.

So common is sensitive dependence on initial conditions that it is a ubiquitous theme of literature, poetry, folk tale, and myth. Consider Cassius's words to Brutus in Shakespeare's *Julius Caesar* ("There is a tide in the affairs of men . . .") and Robert Frost's "The Road Not Taken." We shall have more to say about folk tale and myth later, when we look at the Iroquois tale "The Stone-Coat Woman" and the Greek myth "Eros and Psyche."

Lack of predictability is more common than predictability. Especially in human affairs, predictability is the exception. Yet the significance of sensitive dependence on initial conditions has less to do with its lack of predictability than with its role as a gateway to chaos. This, too, is a theme reflected in folk tale and myth. Consider the consequences of Psyche's lighting the lamp to view Eros, Pandora's opening the box, Algoric's loss of the ring, Paris's choice of Helen, the sale of Jacob to the Ishmaelites, and Eve's eating of the fruit.

The importance of initial conditions is not limited to the mythic. Each of us has had a particular beginning, in a particular family, living in particular circumstances. Our birth order, economic status, racevirtually everythinginfluence the lives we lead. Astrology is based on this idea. Whether or not we believe that the positions of celestial bodies influence our destinies, we cannot deny the importance of our origins. And like the eternal return, the events we experience and the people we meet create new beginnings that alter our course through life. All create bifurcations. All lead to chaos.

Fractal Dimension

Symbols are an integral part of change. But like fractal attractors, symbolic images usually appear as snapshots, or "slices" of dynamics: what seems to be a recognizable image is actually a configuration of motions frozen in time and space. By expressing the inexpressible, they can often be hodgepodge affairs as their everyday contents combine with archetypal forms to create unique entities. Dwarfs, giants, witches, wizards, monsters, and fairies all utilize everyday images, however exaggerated, to express the inconceivable. While exaggeration is certainly a hallmark of the unconscious, it is not the only kind of transcendence of categories that occurs when everyday structures are arranged by archetypal forms.

Symbols also routinely combine elements of everyday life not commonly found together into unique conglomerates, like sphinxes, centaurs, mermaids, andas we shall see laterthe Stone Coat Woman. Sometimes depictions of the gods rely on combinations of common elements: Hathor (cow and human), Quetzalcoatl (winged serpent), Anubis (jackal and human), and Aion (lion and human). Some symbols draw upon the horrific, as does Rangda, the thief of children in Balinese mythology, with her enormous mouth and razor-sharp teeth, her penetrating eyes, and her hideous smile. All consist of elaborations of the commonplace that become, by virtue of their combinations, anything but common. Their meaning is synergetic, for it transcends the particulars that make up the image. Consequently, to discern the meaning of a symbolic image, we must read between the lines.

This comes pretty close to the concept of fractal dimension, which either fits in between or transcends the traditional boundaries of logic. And like fractal attractors, symbolic images are essentially irreducible. We cannot clarify their meaning isolating one of their aspects and defining it as representative of the whole. Jung emphasized:

> Contents of an archetypal character are manifestations of processes in the collective unconscious. Hence they do not refer to anything that is or has been conscious, but to something essentially unconscious. In the last analysis, therefore, it is impossible to say what they refer to. Every interpretation necessarily remains an "as-if."130

130 "The Psychology of the Child Archetype," CW 9i, par. 265.

Consequently, encounters with symbols force us to transcend our assumptions, to relinquish the comforting assurance of definition, and to surrender ourselves to their dynamics.

Self-Similarity and Scale-Invariance

Iteration, sensitive dependence on initial conditions, and fractal dimension are not all that symbols demonstrate. Anything that reflects archetypal themes demonstrates self-similarity and scale-invariance as well. Jung believed that the psyche has an "inborn disposition to produce parallel thought-formations, or rather . . identical psychic structures common to all."131 Archetypes, as "the deposits of the constantly repeated experiences of humanity . . . a kind of readiness to produce over and over again the same or similar mythical ideas . . . recurrent impressions made by subjective reactions,"132 produce symbolic images that are remarkable consistent across time and place. Virtually every culture has its version of Cinderella. The Golden Rule is found in all religions.

Even within folk tales, self-similarity across scale prevails. In the "Three Little Pigs," there are three pigs who build three houses, each of which is attackedone at a timeby the big bad wolf. Each time, he and the pigs exchange the very same words: He'll huff and puff and blow their houses in, but they disagree by the hair on their chins. His first two attacks are successful, but the last is not. Therein lies the moral of the tale: build your house of bricks, and it will withstand the wolf. The other houses may be easier to build, but those initial conditions will prove detrimental in the end.

Self-similarity across scale is so extensive in archetypal dynamics that when it occurs we can assume that an archetype is at work. Thisperhaps the primaryactivity of archetypes makes recognition possible. In fact, the "re-" part of words like recognition, representation, reaction, recapitulation and recollection is based on the Latin for the kind of movement that occurs in words like "again." If archetypes lead us to perceive what we need to know for survival, repetition makes it possible to recognize it and point it out (represent) it to others. For example, in the story

131*Symbols of Transformation,* CW 5, par. 224.

132*Two Essays,* CW 7, par. 109.

of the three little pigs, the archetypal motif of danger and protection is repeated three times.

The archetypal basis for myths and folk tales make them eternally relevant to our lives. For one thing, they derive from collective efforts that span many years, lending them a certain immunity from the vagaries of individual consciousness and its prejudices. While their language and imagery may be specific to a particular time and place, their messages are universal. Consequently, Jung considered them to be accounts of the activity of the archetypes, and thus of the workings of the psyche.

Curiously, folk tales and myths contain many of the features of chaotic dynamics. While the two tales that follow demonstrate iteration, sensitive dependence on initial conditions and fractal dimension, they are particularly good examples of scaling. In the first, things represent scaling. In the second, scaling permeates the structure of the narrative.

The Water-Nixie

A little brother and sister were once playing by a well, and while they were thus playing, they both fell in.

A water-nixie lived down below, who said: "Now I have got you, now you shall work hard for me!" and carried them off with her.

She gave the girl dirty tangled flax to spin, and she had to fetch water in a bucket with a hole in it, and the boy had to hew down a tree with a blunt axe, and they got nothing to eat but dumplings hard as stones.

Then at last the children became so impatient, that they waited until one Sunday, when the nixie was at church, and ran away. But when church was over, the nixie saw that the birds were flown, and followed them with great strides.

The children saw her from afar, and the girl threw a brush behind her which formed an immense hill of bristles, with thousands and thousands of spikes, over which the nixie was forced to scramble with great difficulty; at last, however, she got over.

When the children saw this, the boy threw behind him a comb which made a great ridge with a thousand times a thousand teeth, but the nixie managed to keep herself steady on them, and at last crossed over.

Then the girl threw behind her a looking-glass which formed a hill of mirrors, and was so slippery that it was impossible for the nixie to cross it. Then she thought: "I will go home quickly and fetch my axe, and cut the hill of glass in half."

Long before she returned, however, and had hewn through the glass,

the children had escaped to a great distance, and the water nixie was obliged to trundle back to her well again.133

Repetition occurs in many places in this tale. There is the repetition of threes: three characters, three tasks, three items thrown behind, even the nixie's solution to the last obstacle, which is to go home, fetch an ax and cut through the glass. But perhaps the best example of scaling occurs at the climax of the tale, when the three items that are thrown behind preserve their self-similarity across scale. The brush, comb and mirror all greatly increase in size, frustrating the attempts of the nixie to pursue the children. Indeed, a threefold transformation across scale is typical of folk tales. Goldilocks has her adventures in the world of three bears. Even what she experiencesthe three chairs, three bowls of soup and three bedsoccurs in a threefold schema. Thus, self-similarity occurs across a number of scales.

Scaling is also present in the next folk tale. While the repetition of threes again occurstwo sets of which occur in the very first linein this example we shall focus on the scaling that occurs in the structure of the narrative itself.

The Old Man and His Grandson

There was once a very old man, whose eyes had become dim, his ears dull of hearing, his knees trembled, and when he sat at table he could hardly hold the spoon, and spilt the broth upon the table-cloth or let it run out of his mouth. His son and his son's wife were disgusted at this, so the old grandfather at last had to sit in the corner behind the stove, and they gave him his food in an earthenware bowl, and not even enough of it. And he used to look towards the table with eyes full of tears. Once, too, his trembling hands could not hold the bowl, and it fell to the ground and broke. The young wife scolded him, but he said nothing and only sighed. Then they bought him a wooden bowl for a few half-pence, out of which he had to eat.

They were once sitting thus when the little grandson of four years old began to gather together some bits of wood upon the ground. "What are you doing there?" asked the father. "I am making a little trough," answered the child, "for father and mother to eat out of when I am big."

The man and his wife looked at each other for a while, and presently be-

133*The Complete Grimm's Fairy Tales,* pp. 364f.

gan to cry. Then they took the old grandfather to the table, and henceforth always let him eat with them, and likewise said nothing if he did spill a little of anything.134

The theme of this narrative is clearly fractal. The boy observes his parents' behavior, extrapolates to his own situation, integrating what he observes with what he understands to be his relations with his parents, and replicates their behavior. This is the beginning of a cascade in which the parents recapitulate the son's behavior: they observe his behavior, realize his observation of the relationship between them, and extrapolate to their relationship with the grandfather. They can "put two and two together," "add it all up," or even "draw their own conclusions" from their new awareness. As a result, they attain a new level of consciousness that leads them to change their behavior.

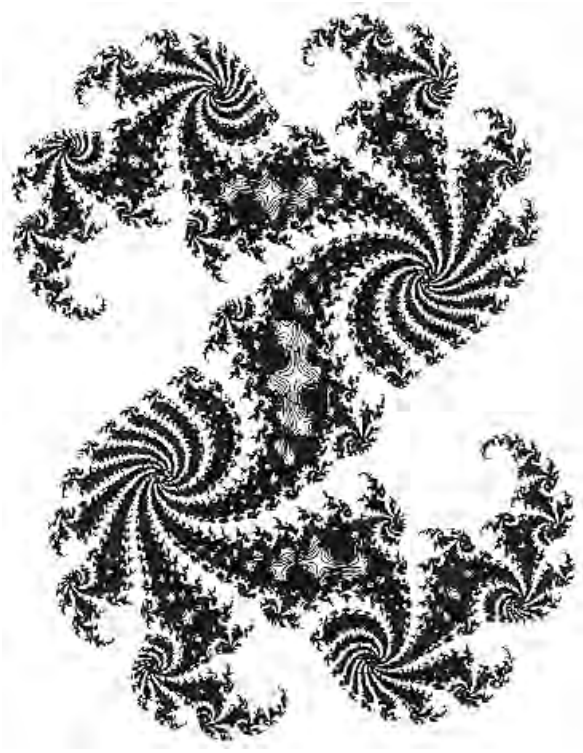
We could say that the chaotic situation that existed between the parents and the grandfather, which began with the counterpart of a Hopf bifurcationportrayed quite literally in the separation of the grandfather from the tablehas now led to the establishment of a new fractal attractor, namely, the parents' new awareness of the relationships between them and the grandfather, them and the son, and the son and the grandfather. This symmetry-building/new awareness leads first to an expansion of consciousness and then to new behavior. In this case, ego awareness leads to greater consciousness that can, in turn, facilitate action by the ego that may lead, at some future time, to a further expansion of consciousness. This feedback loop, which characterizes learning, is so repetitious that it must be archetypal. It is also chaotic. In both tales, interruptions in order generate dynamics that resemble deterministic chaos.

This is the heart of our analysis of the chaotic dynamics that characterize psychological development. We have seen how chaos theory and Jung's theory of individuation resemble one another. And we have seen that in humankind's oldest and most enduring accounts of how life is, both are at work

Now we shall look even further into folk tale and myth. We shall begin with "The Stone Coat Woman," a tale in which a young woman's

134 Ibid., pp. 363f.

willingness to welcome a strange intruder and to learn from her is the essential precondition for the narrative to progress to a higher level of consciousness, without which a fortuitous conclusion would be impossible. Then we shall look at the myth "Eros and Psyche." Both explain how we can extricate ourselves from seemingly hopeless situations. Both involve the growth of the ego, and bothsurprise!are chaotic.



Fractal image (courtesy Art Matrix)

6
The Stone Coat Woman

I am the Lord who made all things,
by myself I stretched out the skies,
alone I hammered out the floor of the earth.
I frustrate false prophets and their signs
and make fools of diviners;
I reverse what wise men say
and make nonsense of their wisdom.
Isaiah.

Introduction

We tell stories for many reasons, not the least of which is to try to make sense of our daily lives. What is our relationship with other people and events? When things go well, what was our contribution? When things go badly, were we at fault? These questions extend beyond current personal concerns. They have been asked in every time period. The stories we tell each other often become stories that others then tell each other. Over time, themes are reworked, amplified or dropped, so that eventually the stories reflect the interests and ideas of everyone who has told them. They become folklore.

The stories we hear influence the stories we tell. When I was a child growing up on the shores of Lake Ontario, I was surrounded by stories. Individually, we each had our stories. But families and towns also had their stories. We learned about our history through stories. And we learned there were other stories predating our own, for we lived in an area that had once been part of the Iroquois Confederacy. When we heard those stories, we understood a little better the nature of the land we had come to inhabit. Some of us became as enchanted with the spirit of the land as did the original tellers of the stories. Others were too busy exploiting the land to care about some foolish tall tales told by primitives.

"No Native American people was more important in the shaping of U.S. history than the Iroquois," writes Joseph Bruchac in his introduction

to a collection of Iroquois tales. 135 Not only had the Iroquois been present at the beginning of the European invasion, but their tales continued to be told in our schools, where we studied the Confederacy in New York State history. The land was still inhabited, albeit sparsely, by the last remnants of the tribes. Yet what is most interesting is this: the tales the Iroquois told, while they are pretty much the same as those told anywhere else, are full of symbols that show chaotic behavior. Whatever we have learned from mathematics and physics about chaos theory, the Iroquois seem to have known intuitively.

The Tale

"The Stone Coat Woman" demonstrates very well how themes of chaotic dynamics can be expressed in folk tales. It is a charming story, full of the adventure, magic, wisdom, humor and nature of upstate New York.

> Long ago four men went to hunt in a far part of the northern woods where they had never been before. One of the hunters brought his wife and child with him. Each day the four hunters went in different directions while the woman stayed behind to take care of the camp and her small baby.
>
> One morning, while her husband and the others were out seeking game, the wife went to the spring for water. When she came back, she thought she heard singing coming from their elm bark lodge.
>
> > "A-uwah
> > So good to eat.
> > A-uwah
> > So good to eat."
>
> The woman was very frightened for she had left her baby sleeping in the lodge. She crept closer and she could hear her baby's voice, first cooing happily and the screaming each time the song stopped.
>
> The mother looked into the lodge. There, next to the fire, sat a huge woman whose skin seemed to be made of stone. In her arms she rocked the small baby, singing her song. "So good to eat, so good to eat," she sang as she rocked it. Each time she stopped singing she would lean down and bite a piece of flesh from the baby's cheek. Then, as the baby screamed, she would rub the cheek with her finger, healing it completely, and begin the song once more.
>
> The mother was terrified. She thought of running away, but she could

135*Iroquois Stories: Heroes and Heroines, Monsters and Magic,* p. 3.

not leave her child. Even if she did find her husband, what could he do against a being whose very skin was flint. Her only hope was to use her wits. Boldly she walked into the lodge.

"Grandmother," she said, speaking to the Stone Giant Woman, "I am glad you have come to visit us. You are welcome to stay as long as you wish."

The Stone Coat Woman looked at her and smiled a smile that was wide enough to bite the head off a moose.

"Ah, Grand-daughter," said the Stone Coat Woman, her voice rumbling like great stones rolling down a hill, "I am glad that you welcome me this way. I have come to you because my husband does not treat me well. Now that you have welcomed me as a relative, I can stay with you and help."

She handed the baby back to its mother. Holding her child, the mother sat down across the fire from the Stone Coat Woman, waiting for her husband to come back, not at all certain what it meant to have this very special guest.

Meanwhile, in the woods to the north of the elm bark cabin, the woman's husband was having no success. Animals were very hard to find.

"Wah-ah," he said, "perhaps it is true that there are Stone Giants in these woods. It is as if something has eaten all the game."

Even as he spoke, he began hearing a sound which he thought at first to be thunder. But as the ground began to shake and the noise come closer and closer, he knew what it was. It was the sound of great stone feet pounding the earth as they walked. There was a hollow tree close by and he crawled into it, leaving his bow and arrows behind him. As he watched through a knot hole in the fallen tree, he saw two huge Stone Giants come into sight, pushing the trees aside with their shoulders as if they were reeds in a marsh.

"Ehh?" said one of the stone giants, "I thought you said you saw something good to eat, my brother."

The other stone giant looked slowly around. "It is so," he said. "I am sure it was here. Noh-KWEH! Look!" And with that exclamation of excitement, he reached down and picked up the hunter's bowwhich looked like a tiny twig in his hand. "You see, there is good food nearby."

Within the hollow log the hunter held his breath. He prayed that the punky wood of the log would cover his scent.

"I cannot smell him, Brother," said the first stone giant, sitting down on the log which creaked beneath his weight. "Perhaps the food has moved

"Let us be certain," the second stone giant said, sitting down on the hollow log beside his brother. It cracked ominously beneath his weight and

the hunter was sure he would soon be flatter than a leaf, but the log managed somehow to hold beneath them. "This," said the stone giant, "will tell us where the good food is." Then, as the hunter watched through the knothole, the second stone giant reached into the pouch which hung at his waist and pulled out a single finger. He placed it on his right palm and it stood upright, quivering like an arrow shot into a tree. "Pointing Finger," said the second stone giant, "show us where the good food is hiding."

With that the pointing finger bent to point at the hollow log. The stone giant reached for one end of the log, but before he could plunge his arm in the hunter ran out the other end and scooted into the trees. Putting the magic finger back into his pouch, the second stone giant gave chase and his brother followed.

The man was very swift of foot, but he knew he was no match for the long legs of his pursuers. Wherever he went, the magic finger would point out his hiding place. What could he do? Then an idea came to him. In front of him was a very tall tree with a thick branch which extended out over the trail. Quick as a red squirrel, he went up the tree, crawled out onto the branch and lay very still.

Soon the two stone giants reached the tree, but when they saw the trail ended there, they did not know what to do. Their necks were too stiff for them to look up and they were not smart enough to guess the reason why the human's trail ended so abruptly. Finally, after talking it over for some time, they remembered the magic finger. The second stone giant pulled it from his pouch. He placed it on his palm and it stood straight up, quivering like an arrow which has been shot into a tree.

"Pointing finger," he said, "show us where our food is." But since he was holding the finger directly under the branch where the man was hiding, the finger did not move.

Now the stone giants were very confused.

"Hunh-uh," the first one said, "I knew we should have gone to hunt for moose."

"Quiet!" said the second stone giant. "I cannot think while you talk."

"Ha-a-ah," said the first one, "you cannot think while you talk either."

"What do you mean by that?" asked the second stone giant.

"Perhaps if I am quiet you will understand," said the first one.

So they quarreled as the man watched from his hiding place. Soon the first stone giant began to beat the ground with his club. Not to be outdone, the second stone giant placed the magic finger on the ground and began to beat the earth with his club, too. They continued arguing. Realizing it was his chance, the hunter slid down the tree, grabbed the magic finger and ran.

"Little food," the second stone giant shouted, "come back with my finger." But the hunter did not stop.

The stone giants ran after the hunter, but with the pointing finger showing him their direction the hunter was able to fool them. At last he reached a stream. Holding the magic finger high above his head, he swam across. When he reached the other side of the stream, he looked back. There were the stone giants, standing on the other bank.

"Little Quick One Good To Eat," said the second stone giant, "bring me back my finger."

"Do you mean this?" the hunter said, holding it in his palm.

"Nyoh," said the second stone giant, "bring it back over here. Then we will be very happy before we eat you."

"You are very stupid, Brother," said the first stone giant. "He will not bring it back if you tell him that we're going to eat him."

"Nyoh," said the second stone giant, "Little One Who Looks So Tasty, bring back my magic finger and I will not tell you that we are going to eat you."

"Truly," said the first stone giant, "you cannot think when you talk, Brother."

"Neh," said the hunter from the other side of the stream, "I do not want to get wet again. I will lean over and hold the finger out to you. If you lean forward you can grasp it."

"Nyoh!" said the second stone giant, "that is very good. I can use the magic finger to find you and eat you later."

The stone giant leaned over, reaching for the magic finger which the hunter held out at arm's length. He had almost reached it, when the hunter drew it back a little. The stone giant stretched further, and again the hunter drew the finger back. Three times this happened and on the fourth time, just as the stone giant was about to grasp the magic finger, the hunter snatched it quickly away. Losing his balance completely, the stone giant gave a great yell and fell into the water headfirst straight down to the bottom, and was killed. Then, leaving the first stone giant raging in anger on the other shore, the hunter stuck the magic finger into his belt and headed back to the lodge.

"My wife," he began as he entered the door, "I have such a story to tell." His words failed him when he saw Stone Coat Woman sitting on the opposite side of the fire from his wife and their little baby.

"Dah-djoh, Husband," said the wife, "our grandmother has come to visit us. Bid her welcome."

"Ee-yah," said the man, coming into the lodge slowly and then sitting down beside his wife and child without taking his eyes off the huge

woman, "Grandmother, you are welcome indeed."

The Stone Coat Woman smiled. "I am glad that you welcome me," she rumbled, "for I can see you must be a strong warrior. That magic finger which you now carry belonged to the brother of my husband. If you have it, then you must have killed him. I have indeed come to the right lodge to ask for help."

Then the Stone Coat Woman told her story. Her husband had been cruel to her and beaten her. Since she no longer wished to live with him, she had searched for help. If they would allow her to stay, she would help them.

One by one the other three hunters returned and, heeding the words of the hunter's clever wife, they greeted Stone Coat Woman as a relative. She was very pleased and slept that night before their door to guard them from any danger.

The next day, Stone Coat Woman asked to go with them when they hunted. "Use the pointing finger to show the way to the game animals," she said. "I will do the rest."

So the hunter brought forth the magic finger. "Pointing finger," he said, placing it on his right palm where it stood quivering like an arrow shot into a tree, "where can we find many beavers?" The finger pointed towards the west and the hunters went in that direction.

After a time they came to a large pond covered with ice. All over the pond were many beaver lodges. With one blow of her fist, Stone Coat Woman made a hole in the ice.

"A-uwah, A-uwah
Beavers come out,"

she sang. One by one many beavers came out of the hole in the ice and, as the beavers came out, Stone Coat Woman killed each one. The hunters skinned them, keeping the pelts and the tails and some of the meat for themselves for stew. Stone Coat Woman ate the skinned carcasses raw and was very pleased.

The next day they hunted for raccoons. Pointing finger led them to a tall hollow tree. With one hand, Stone Coat Woman broke the tree. As it crashed down many raccoons scrambled off. Stone Coat Woman killed them all. The hunters skinned them out, keeping the pelts and some of the meat for themselves. All the rest Stone Coat Woman ate raw and was happy indeed.

Each day when they finished hunting, Stone Coat Woman would make four piles of the skins and the meat the hunters saved. Then she would rub each pile with her hands until it became small enough to put into a pouch.

"Now these will be easy to carry," said Stone Coat Woman. "Only throw each pile on the ground when you reach home and they will return to normal size." And so they did.

Thus it went for many days. Each morning the hunters went with Stone Coat Woman and caught many animals. Each night she slept in front of the door of their elm bark lodge to guard them.

One morning when they woke, the hunters found Stone Coat Woman standing in front of the door. "Be silent," she said to them. "I am listening." The hunters stood in silence, waiting.

"My husband is coming," she said at last. "I hear his footsteps off to the north. He knows I am here. He intends to kill me and eat you all. If you are brave, you may be able to save your lives. You must cut four long basswood poles and sharpen them. Harden them by placing the pointed ends into the fire. Then go hide behind the great stone. When my husband comes I will fight with him. If he throws me to the ground, you must come up behind him and thrust the poles into him."

The hunter's wife put her baby into a canoe. Then she rolled up four bundles of skins to look like her husband and friends, and then paddled out into the middle of the lake to watch. The four hunters made their basswood spears and hid behind the great stone. Before long, the ground began to shake as if there were an earthquake. Smashing the trees down before him, Stone Coat Woman's husband came rushing out of the forest. He saw the figures in the canoe far out on the lake and began to wade into the water. Then Stone Coat Woman came out to meet him and they fought.

The Stone Coat Woman's husband pulled a great pine tree out of the ground to use as a club. Stone Coat Woman uprooted a great hemlock tree for the same purpose. They struck each other terrible blows with their clubs until both of the huge trees were shattered. Then they threw rocks at each other which were larger than full-grown bears. Neither one seemed able to defeat the other. Then Stone Coat Woman caught her foot on a root and fell. Immediately her husband leaped on top of her to kill her, but before he could do so, the four men ran out from behind the great stone. They thrust the basswood spears deeply into the stone giant and he died.

"Nyah-weh," said Stone Coat Woman, rising to her feet, "you have saved my life and your own. Now there are no more stone giants here to trouble you. It is time for me to go on my own way again."

Before Stone Coat Woman left, she gave a present to the hunter's wife to thank her for her hospitality. It was a piece of animal skin which had on it the hairs of many animals.

"Pull out just one hair," said Stone Coat Woman, "and your hunter will catch that animal on that day."

With the magic finger and the piece of skin, they went back to their village, taking also the pelts of many animals and much meat. There they all lived well for many years. They used their possessions to help others, always remembering they owed their good fortune to the hospitality which the first hunter's wife showed that day to a Stone Coat Woman.136

Analysis of the Tale

"The Stone Coat Woman" begins with six characters: four men, a woman and a baby. To take care of a basic instinctive needeatingthey have gone "where they had never been before." That there are four hunters is significant, as four is a number that often denotes a structural whole (the four seasons, winds, points on the compass). In this case, each goes in a different direction. Thus, the stage is set at the beginning of the tale with a mandala-like image in which each hunter occupies the position of one of the four gates on the periphery, while the woman and her child inhabit the center. Symbolizing the potential for and nurturer of new life, the mother and child are the focus of the hunters' efforts. They are why the hunters are here. The future of the tribe depends on them.

All is not well at the center of this mandala, however, for an intrusive element suddenly appears. At the beginning of the narrative the mother is returning from fetching water and discovers the Stone Coat Woman in her lodge, alternately biting her baby's cheek and then healing the wound. As the mother watches, this action endlessly repeats itself. In effect, the dynamic at the center of the mandala is stuck in a simple bifurcation. The tension between the stone woman and the baby is not a creative one. It simply repeats itself over and over.

Like the four hunters, the stone woman's activity centers upon eating. Yet her behavior is more complex, for she oscillates between devouring the baby and healing it. We learn later in the tale that she is more highly evolved than her husband and his brother, who are simply devourers. Whether her behavior continues to oscillate, becomes stuck in either devouring or healing, or generates a cascade that leads to the potential for a new order (increased symmetry) to emerge from the ensuing chaos, depends on the response of the woman. Will she avoid the scenario, aggra-

136 Ibid., pp. 135ff.

vate it or oscillate with it? The answer will determine the course of the narrative.

Unable to leave her child, she enters the lodge and engages the stone woman. She neither flees nor summons the hunters. Rather, she bears the tension by sticking with her child. Knowing that this might lead to chaos, she accepts the risk and opens herself to the stone woman. Her integrity is intact. Moreover, she welcomes the stone woman "as a relative," calling her "grandmother." In so doing, she creates an identification between herself and the stone woman, who then hands the child over to her.

Clearly the course of the narrative is sensitive to the initial conditions of the mother's response. Any number of other responses most likely would have led to vastly different outcomes. Difficulty in predicting the outcome of the tale hints that chaotic dynamics may be at work in the narrative. Through openness to and engagement of the potential for chaos the mother allows the bifurcations to multiply beyond the original tension of opposites, that of devouring and healing. She contains herself, sits down and watches events unfold.

She has faith in events; not that they will work out in a particular way, but that she is a part of the flow of history and will end up participating in events whether she will or no. Her faith is almost an attitude beyond faith. It is part of her integrity, her willingness to submit to the inevitable, and it saves the day for her and her child. It is an attitude that is reflected throughout the narrative, that becomes fractal when the stone woman's attitude toward the tribe becomes self-similar with the mother's integrity. Openness to others, kindness and a willingness to help overcome aggression, anger and brutality.

Her behavior introduces an underlying tension that surfaces regularly in the narrative. The conflict between wit and instinct, or between more and less highly developed psychic functioning, repeats itself throughout the tale. Thus, the tale is constantly elaborating on themes of psychological development. Because of sensitive dependence on initial conditions, whether the story progresses or not depends on the mother's response to the stone woman. She chooses wisely: by welcoming the stone woman as a relative, she introduces a fractal dynamic into their relationship. They become self-similar through being related to one another. As soon as she

does so, the baby, which symbolizes the potential for development of the narrative, is returned to her.

At this point, of course, the narrative could once again diverge in a number of different directions. For example, now the mother must decide whether to stay or to flee with her baby. By deciding to stay"waiting for her husband to come back, not at all certain what it meant to have this very special guest"she reserves her options and waits for events to clarify themselves. She incubates her situation. This, too, turns out to be a wise decision.

Now, however, a new crisis enters the life of the tribe. The first was the scarcity of game, which the men were addressing. The second is the threat to the mother and child, which the woman is addressing. The ways they are handled embody traditionally masculine and feminine ways of dealing with crisis. Bear in mind that, while in this tale they are represented by males and females, masculine and feminine approaches are options for both genders. The masculine attitude, represented by the men, is yang: out and around, creative, probing into the environment for a solution to the problem of food. The feminine attitude, represented by the mother, is yin: she is receptive, waiting and embracing.

The masculine attitude, unfortunately, "was having no success." The woman's husband wonders if the stone giants rumored to be about are eating all the game. Now comes the third crisis, for as if on cue, his question is answered. This, the second encounter with stone giants, establishes another fractal elaboration of the narrative, for the stone giants are excellent examples of fractal dimension. That is, they transcend normal categories. Humans are not made of stone, although some folk sayings employ such an analogy ("stone-faced," "heart of stone," a "stony silence"). Stones, furthermore, have no human characteristics. Thus, combining the two and adding the extra dimension of enormous size truly stretches the imagination. The stone giants symbolize something that doesn't easily fit the usual categories of human thought.

The hunter hides from the stone giants in a huge fallen tree, hoping that "the punky wood of the log would cover his scent." It does, but in a lapse of attention he leaves his bow and arrows outside, which the giants find. The second giant, who is clearly less evolved than the first, pos-

sesses a "magic finger," which can point out the presence of food nearby: in this case, the hunter. The finger is another fractal image. Like an arrow that finds its mark, the finger quivers and points. This, too, is an example of fractal dimension, for while fingers cannot usually function when severed from the hand, this one can. This symbol of the stone giants' ability to sense and power of discernment, however, is unintegrated: the finger can function independently of them. Without access to it, they are lost. At this point in the narrative, it is in their possession. They discover the hunter and the chase is on.

The chase is another example of a tension of opposites stuck in a static bifurcation. Chaser and chased are doomed to continue their roles until one defeats the other. As the giants pursue the hunter, entropic chaos looms. All order could be destroyed, never to return, if he is destroyed by the giants. The hunter realizes that he cannot outrun the giants nor, because of the magic finger, hide from them for long. His strategy of avoiding the chaos only postpones the inevitable. Like his wife, he will have to engage it if he wishes to survive.

This he manages to achieve by climbing a tree where he will be directly above the pointing finger should it be employed by the giants. Smarter than the giants, he places himself in the path of the pointing finger at the ready. His strategy of establishing self-similarity across scale works. While a tension remains, the giants are not sufficiently evolved ("Their necks were too stiff . . . they were not smart enough . . .") to understand it. Unable to engage the situation, they continue in the entropic chaos by competing with one another ("not to be outdone," they hit the ground with their clubs). Absorbed in the endless repetition of a stuck bifurcation, their attention becomes secondary to their emotions. Their power of discernment is neglected. The hunter, however, has not forgotten it.

Saved by his wits, he actively engages the chaos by grabbing the finger and running away. With the giants' discerning consciousness now in his possession, he eludes them until he reaches a stream. This fluid boundary, soft and yielding, the universal solvent that follows the dictates of topography, is the exact opposite of stone. When the stone giants encounter it, they are stymied.

Here the tale expands on the humor of the first encounter between the stone giants and the hunter and reveals the second stone giant to be even less differentiated than the first. He simply cannot retrieve his wits sufficiently from his instinct to mobilize the guile the situation requires. His brother, the stone woman's husband, realizes this and points it out, but to no avail. They simply maintain the entropy, oscillating between one another with no progress.

The entropy continues until the hunter actively engages it. Tempting fate, he agrees to hand over the finger. Now comes a series of three oscillations between him and the second giant. The fourth oscillation ends with the death of the second stone giant as he falls into the water in an attempt to grasp the finger from the rapidly withdrawing hand of the hunter. Wit overcomes instinct. In the encounter between water and stone, water prevails. The oscillations between the two brothers have brought to a climax the entropic chaos that permeated their relationship.

Now the hunter can return to his wife. Imagine his shock ("words failed him . . .") when he finds another stone giant, this time in his own house! In an atmosphere fraught with sensitive dependence on initial conditions, the action in the narrative bifurcates between him and his wife as she tells him to welcome this stone giant. He wisely chooses to follow her lead and allows the bifurcations to multiply by engaging the potential for chaos (symbolized here by the Stone Coat Woman).

For the first time in the narrative, a new symmetry begins to emerge. The Stone Coat Woman explains the background of her appearance, a story replete with fruitless oscillations that have lead only to entropic chaos ("her husband had been cruel to her and beaten her"). Her frightening arrival at the hunting lodge was, in fact, a plea for help. The mother's integrity in her initial response to the threat of chaosan integrity that her husband was able to sharehas created the potential for deterministic chaos to replace the entropic: "If they would allow her to stay, she would help them." Correspondingly, the stone woman, who symbolizes a very powerful, though less highly developed, feminine attitude, can now function with greater sophistication.

Having contained the potential for chaos, the mother has provided an opportunity for bifurcations to multiply and for new possibilities to open

up through the generation of new tensions of opposites. The Stone Coat Woman is transformed (at least in the minds of the hunter and his wife) from an intimidating threat to one who is equally vulnerable. When the three other hunters return and also follow the mother's lead, the original wholeness is reconstellated around the integrity of "the hunter's clever wife." All now embrace the potential for chaos.

From this point on the narrative assumes a vastly different character. Nature obeys the Stone Coat Woman, perhaps due to her instinctive nature (she "ate the skinned carcasses raw"). Power is now on the side of the humans, as both wit (the magic finger) and instinct (the Stone Coat Woman) have become their allies. The crucial variable (welcoming) in the original equation (narrative) has iterated: the Stone Coat Woman welcomes the humans, which leads to alliance, leading in turn to food and plenty, for the Stone Coat Woman has a special relationship with nature. Welcoming has led to cooperation, interdependence and security.

It has also transformed entropic chaos into deterministic chaos, for new patterns emerge that resemble the old. Generosity begets generosity. Relatedness generates relatedness. In her efforts on behalf of the hunters, self-similarity across scale appears in the Stone Woman's ability to rub piles of skins to make them "small enough to put into a pouch," whereupon "only throw each pile on the ground when you reach home and they will return to normal size." The dynamic of the original mandala has expanded to embrace the intrusive element. Thus, sensitive dependence on initial conditions, iteration, and scaling in the dynamic of the narrative generate images that display self-similarity, scale invariance, and fractal dimension.

The narrative is not finished, however. There remains the unresolved question of the Stone Coat Woman's husband. And, sure enough, he soon appears on the scene. Before he arrives, the Stone Coat Woman tells the hunters what to do. She will fight her husband, but if he gets the upper hand and she is in imminent danger of death, they are to "come up behind him" and thrust their sharpened basswood poles into him. "If you are brave," she tells them, "you may be able to save your lives."

The choice of wood is very significant, for it symbolizes the kind of transformation that must occur for the hunters to be able to fight the gi-

ants. Basswood is a white wood that is quite soft. It is the wood of the linden tree. When I was a small boy, my friends and I used to love playing under the linden trees in our neighborhood. They gave forth beautiful little whitish flowers that became small clusters of berries attached to a "wing" mounted diagonally on the stem. Like maple seeds ("polynoses"), these seed pods would spin to earth as they fell, resembling little helicopters. We loved to watch them fall, and would throw them up into the air again and again to repeat the spectacle.

In the summer we would have picnics in their shade. The berries would become our foodnone of which we ate, of course, as we were suspicious of all berries as potentially poisonous. The leaves, technically called "cordate" leaves, reminded us of little hearts. Lindens are large trees, easily reaching a hundred feet tall. Their soft wood is good for carving, and their bark can be used to make, among other things, string. Obviously, lindens, or basswoods, are a very useful tree.

All that aside, however, their wood seems hardly suitable for spears. Like the soft wonder of our youth, basswood is a delight to the eye and soft to the touch. To become a weaponthe probing, penetrating insight of adulthoodit must be tested in the fire. Yin must become yang if it is to stand up to stone. In the tale of the Stone Coat Woman, the hunters must transform their soft acceptance into aggression. ("You must cut four long basswood poles and sharpen them. Harden them by placing the pointed ends into the fire.")

The hunter's wife, meanwhile, must act as a decoy. Her yin will become bait for the stone husband's yang. She puts the child (potential) and four bundles of skins (wholeness) into a canoe and heads out into the lake. There she sits, very much a symbol of the integrity of the group, when the stone husband arrives. Heedless of his brother's fate, the Stone Man wades into the lake intent on creating chaos. The Stone Coat Woman rushes to meet him, and they engage.

This reenactment of the original oscillation that generated the entropic chaos between the Stone Coat Woman and her husband takes place on an extraordinary scale. The action oscillates between the two as chaos reigns. Anyone who has seen the hemlocks of the Pacific Northwest can imagine the scale of this encounter (and lament the destruction of their

counterparts in the eastern United States). For those who have experienced the chaos of the psyche, however potentially transformational, this description of the battle between Stone Coat Woman and her husband describes very well how horrifyingly cataclysmic the experience can be.

It is the earth-bound part of the tree that leads to Stone Coat Woman's downfall (she "caught her foot on a root and fell"). Her end is assured as she crashes to the ground. Entropy once again threatens its inevitable chaos, when suddenly a bifurcation elaborates the narrative. The hunters leap from their hiding place "behind the great stone," engage the chaos, interact with it, and save the day. From the chaotic encounter emerges a new symmetry.

The drama is complete. Stone Coat Woman is free to go. The threat from stone giants is over. One thing is left, however. The deterministic chaos has generated a fractal attractor, which now resides with the tribe. This is the "piece of animal skin which had on it the hairs of many animals." The fractal dimension of this magic skin allows fruitfulness to endure even after the stone woman is gone. Each hair represents an animal: self-similarity across scale. That the skin can bring success to future hunts symbolizes the potential for symmetry in future chaotic times.

The tribe remembers to continue (to iterate) the self-similarity and scale-invariance of the original dynamic that saved their lives: "They used their possessions to help others, always remembering they owed their good fortune to the hospitality which the first hunter's wife showed that day to a Stone Coat Woman." All of the tensions of opposites of the narrativestone/water, soft/hard, wit/instinct, little/big, devouring/feeding, and perhaps the most important tension of all, hurting/healingremain entropic until hospitality introduces an openness and engagement that allows bifurcations to multiply, which, in turn, make it possible for new patterns to appear.

The Allure of Partially Answered Questions

The story of the Stone Coat Woman is full of symbols. Moreover, encounters between the humans and the symbols are chaotic. Does the tale confirm the findings of chaos theory? Does chaos theory prove that the tale is anything more than an entertaining fable? What did the Iroquois

understand about the relationship between symbols and chaos?

To attempt to answer these questions is to fall prey to reductionism, to try to validate one thing through its similarity with another. In fact, everyone knows about chaos. Likewise, everyone knows that chaos is not always destructive. Chaos theory and the Stone Coat Woman are metaphors for something that has preoccupied humankind from its beginning. But this is not to deny that something revolutionary may be occurring with the congruence of folk tale and physics. For what once was attributed to supra-human elementsgods, giants, spiritscan now be seen as a function of the relationship between energy and matter. That all life is a combination of the two means that symmetry building need not be a function solely of transcendence, but of immanence as well. Thus is the transition made from the gods without to the gods within.

If our encounters with symbols are chaotic, we should be able to find other examples. How about myths? Do they, like folk tales, portray chaotic encounters with symbols? Let us consider the tale of Eros and Psyche. We shall see how it suggests that perseverance and faith in forces beyond our control can mitigate the intimidating power of chaotic dynamics. It describes how chaos enters our lives, what changes as a result, and what we can do to survive it.

Eros and Psyche (antique sculpture; Capitoline Museum, Rome)

7
Eros and Psyche

Only that which can destroy itself is truly alive.
C.G. Jung.

Introduction

If, as Erich Neumann said, myths are "complete, self-contained action 'in archetypal space,' "137 they should portray chaotic dynamics as well as folk tales do. Folk tales, which frequently employ the fantastic (demons, spirits, talking animals, mysterious domains, and the like), are typically stories about everyday people. Myths, on the other hand, revolve around the activities of the gods. To the degree that ordinary people appear in myths, it is generally to elaborate the story of a god. Thus, the kind of chaos that appears in myths seems to explain a basic existential condition, as if myths recount the origins and evolution of chaotic dynamics. While folk tales are stories whose contents frequently touch upon chaotic dynamics, the form of myth is itself chaotic. Could it be that every myth is, among other things, an analysis of chaos?

Particularly in creation myths, chaos and order exist in a reciprocal relationship; they play off one another in a kind of competition, the one imposing itself upon the other. Chaos is often the original state over which order must triumph. The chaos that precedes creation in Genesis, and the Greek god Chaos from whom all other gods spring, are two familiar examples. Sometimes creation myths describe a potential for chaos that has become stuck in a sterile form of order, as when sky and earth are so entwined that there is no place for anything to occur. Here the challenge is to separate the world parentssky father and earth mother, for exampleso that there is room for something else to develop.138 Jung saw this as exemplifying the need for opposition, with its inherent tension, in the process of development.

137*Amor and Psyche,* p. 141.

138 See Marie-Louise von Franz, *Creation Myths,* chap. 9.

The interaction between chaos and order is not confined to creation myths, however. Initiation myths also describe the process of creation. In initiation myths, creation is ongoing and renewable. Moreover, in describing ongoing creation, they provide opportunities to participate in it. Thus, they are fractals of the creation they recount. That is, they recreate patterns of ongoing creativity.

Of course, whenever we pass from the familiar to the unknown we experience a disruption in our lives. Marriage is a good example. No matter how well we know our partners before we marry, nothing is assured afterward. Who knows what challenges we shall face within a year of marriage, let alone five, ten, twenty years beyond? Not only does initiation bring into sharp focus what we are doing and how it differs from what we have done in the past, but it provides an experience of the disruptions to our assumptions that our new life will inevitably bring. It may be bizarre to think of a wedding as a kind of vaccination against the disruptions of married life. But many of us would agree that if the relationship can survive the wedding preparations, it can survive anything!

Thus, the chaos of initiation intends to replace a lower-level order by a higher-level order. Initiation is an encapsulated form of what we shall face. By going through an initiation, we are better prepared to cope with the challenges of the future.

Chaos and order are so ubiquitous in myths that in many cases other themes seem to be clearly secondary. Such is the case with "Eros and Psyche," ostensibly a story of love gained and lost. In order to regain her husband's love, Psyche must endure four trials set by Aphrodite. She manages to negotiate them only through the intervention of extrahuman elements. Clearly an initiation myth, the narrative revolves around the forces that determine her destiny and her interactions with them. How she negotiates her trials is the essential ingredient in the outcome.

The Myth

While there are a number of accounts,139 the following, taken from the *Larousse World Mythology,* is succinct, yet sufficiently faithful to the full story to give an adequate picture of its dynamics.

139 See Neumann's *Amor and Psyche* and von Franz's *The Golden Ass of Apuleius*.

Psyche was the daughter of a king, and she had two sisters. All three were great beauties, but Psyche outshone her sisters; her radiant charms seemed more than human, and people came from far and wide to admire her, and then they began to worship her as though she were a new Aphrodite. Psyche's sisters had no difficulty finding husbands, but Psyche remained sadly in her father's house without suitors. The king despaired of ever finding a husband for her, and he consulted the oracle, which gave a sinister reply. It said to adorn the girl as though for her wedding and to lead her in a procession to the mountainside, where she was to be abandoned on top of a rock. There a monster would come for her and take her away with him. Psyche's parents were in despair. Yet they had to obey this decree, which was evidently the will of the gods.

Now what had happened was this: Aphrodite, jealous of the divine honors being paid to Psyche, had decided to have her revenge. She sought out her son Eros and commanded him to inspire in Psyche irrational love for some abject creature, the most humble, poor, and ugly of mortals. But Eros, when he saw the girl, fell in love with her and made plans to win her love. And so Psyche, abandoned by her parents and accompanying crown on top of the rocks, was spared the approach of the horrible monster with which she had been threatened. Instead, Zephyrus, the West Wind, lifted her gently and carried her to a valley, where, with infinite care, he put her down on a flowery bank. Emotionally exhausted by this time, the girl fell asleep, and when she awoke, she saw that she was in a wonderful garden, and in front of her rose a palace with walls decorated with gold. The gates of the palace were open; there was no one about, but curiosity made her go in. She was greeted not by creatures of flesh and blood, but by voices, which bade her welcome, invited her to take a bath, then to sit down at a table that was set with the most delicious dishes. Moreover, other voices were singing and instruments were playing in concert. The banquet over, she was led, still by disembodied voices, to a room where a bed was already prepared. Psyche lay down, and when the room was in complete darkness she sensed a presence beside her; it was the husband of whom the oracle had spoken, but he did not seem to Psyche either as monstrous or as terrible as she had feared, although she could not see him.

The next day, before dawn broke, the husband flew away, and when day came the miracle began again. Invisible servants saw to Psyche's needs, offered her endless distractions, and in the evening her husband returned. Several days passed in this way, and Psyche was gently becoming accustomed to the novelties that had so astonished her at first. She was happy. But then she began to miss her family, and especially her sisters whom she loved dearly. She told her husband, who began by warning her

of the danger into which this nostalgia might lead her. He foretold that the presence of her sisters would be fatal to her. But Psyche was so obstinate, her husband so tender, so desirous of pleasing her, that in the end he agreed. Zephyrus brought Psyche's two sisters to the wonderful palace, and they were immediately afflicted with the most bitter jealousy of their sister's happiness. Eros repeated his warnings: Psyche should not attempt to see him, she should be content with her happiness and not yield to curiosity, and then this happiness would last. If she did not pay heed, she could expect the most dire of catastrophes to befall her.

The sisters returned; they asked her endless questions, and finally pretended to have fears for her that they were unable to conceal from her any longer; this mysterious husband was none other than a frightful dragon, they said, who was fattening her up to prey on her later. So she must act while there was still time, and to this end, they gave her some terrible advice: the following night, before her husband arrived, she was to conceal a lamp in her room; she should also have a sharp blade ready, and when her mysterious husband was fast asleep, she was to take out the lamp and by its light kill the monster.

Psyche obeyed, but when she had the lamp in her hand, instead of a monster, she beheld the most perfectly beautiful adolescent with two folded wings of quivering down. She recognized Eros. Her hand began to tremble, so that a drop of boiling oil fell on the body of the sleeper. Eros awoke with a start, saw that he had been betrayed, and in a flash he flew away out of reach. "Psyche," he told her, "you wished to see me. You know who I am. Now I must leave you; you will never see me again." Poor Psyche wept and fainted, but her husband was already far away.

Psyche decided to seek her husband. But first of all she punished her two sisters by telling them that Eros was asking to see them, so they threw themselves headlong from the top of the rock where Zephyrus usually came to get them and were dashed to pieces in the ravine below. Then Psyche travelled the whole world, asking for Eros. But no deity was willing to brave the wrath of Aphrodite; none would agree to help her, so the poor girl had no alternative but to surrender herself to her enemy. Aphrodite began by torturing her, then she imposed different tasks on her, including that of descending to the underworld to ask Persephone for a small box containing a beauty ointment. Aphrodite specified that she was not, under any circumstances, to open it. But Psyche's curiosity prevailed, she opened the box, a vapour of sleep escaped and she lost consciousness.

However, Eros himself was desperate, for he loved Psyche. When he saw her deep in magic sleep, he flew towards her, wakened her, then went up to Olympus to ask Zeus for permission to marry this mortal. Zeus will-

ingly gave his consent, and Psyche and Aphrodite were reconciled. Eros and Psyche later had a child, who was called Voluptuousness.140

This account of the myth is fairly standard. Yet others offer additions and alterations that are significant. Neumann, for example, states that Eros tells Psyche that she is pregnant before the visit of her sisters. Thus, the unborn child is present with Psyche throughout the ordeals assigned by Aphrodite. Other accounts enumerate the ordeals as four tasks: sorting seeds, gathering fleece, fetching water, and descending to the underworld. Finally, most accounts name the child of Eros and Psyche's union "Pleasure," not "Voluptuousness."

The myth is basically about the transformation of a human into a god. The process of transformation begins with Psyche's successful completion of the tasks Aphrodite assigns her, but is not completed until Eros rescues her from her inability to heed Aphrodite's warning about not opening the box. Death is a recurrent theme throughout; first, when the oracle ordains her marriage to a monster; then, when she loses Eros and is cursed by Aphrodite with seemingly unachievable tasks (to both of which her response is essentially to roll over and die); and finally, when she opens the box. Either through a suicidal wish or by simply giving up, she seems to prefer death to continuing on without hope.

The way in which entropic chaos becomes deterministic in "The Stone Coat Woman" has to do with the survival of the characters. In "Eros and Psyche," however, it has to do with Psyche's transformation. Survival in "The Stone Coat Woman" is accomplished through the wife's hospitality, that is, her welcoming the stone woman. Her openness and acceptance are the capacities needed to save the day. But in "Eros and Psyche," Psyche lacks what she needs to resolve the conflict in which she finds herself. Her ultimate success occurs only as a result of the intervention of forces beyond her control. From the perspective of the myth, these forces transcend the human. But from a psychological perspective, they simply transcend the ego. They are those dimensions of her personality that are unconscious.

Jung often said that science may have exorcised the gods from our

140*Larousse Worm Mythology,* pp. 173ff.

world, but it failed to explain their presence in our psyches. That is, the gods, demons and spirits that we once believed shared our world are actually projections of aspects of our own personalities that we do not recognize. They are so foreign to us that we feel they are not a part of us. So they reside in the shadow. This is not to say that they are not forces to be reckoned with. To us, they feel as powerful as do the gods to Psyche and the stone giants to the Iroquois woman. Our interest in the myth of Eros and Psyche, therefore, focuses on how the ego is transformed by unconscious dynamics.

Neumann describes the tale of Eros and Psyche as a "rite of initiation."141 At the beginning everything seems to be stuck. Psyche's beauty intimidates her potential suitors, Aphrodite's shrines are being neglected, and no solutions suggest themselves. Psyche lacks a "connubial bifurcation." That is, she has no one with whom to oscillate, to establish a creative tension, to generate a dynamic. She needs a partner to challenge her particular perspectives on life. In frustration her parents consult an oracle in hopes of finding their daughter a husband. They desperately need a way out of the impasse. This the oracle gives them. But, unfortunately, it seems to portend Psyche's death. Entropic chaos begins to ramble within the narrative.

Marriage is the central motif around which the events unfold. It symbolizes a particular union of opposites, most basically that between male and female. Yet, it is also a vehicle for passing on values from generation to generation. As such, it is an essential part of the foundation upon which culture is built. It is what happens between the union of opposites and the continuation of culture that is problematic, for the consequences of the uniting of oppositesin this case, masculine and feminineare unpredictable. One has only to think of the anxieties created by interracial, inter-ethnic, or same-sex unions to understand how this is true.

Even when there is no compelling difference between the two partners, how profoundly do parents often experience the uncertainties of their children's marriages! The marriage of their children often feels to the parents like a kind of death. The specter of entropic chaos surfaces

141*Amor and Psyche,* p. 112.

with every argument, betrayal and disaffection that occurs in the new couple's life, tempting both families to rush in and save their children from disaster. Yet those who are wise recognize the potential for growth that exists in such chaotic times. To survive such turbulence is to learn how chaos that feels entropic can turn out to be deterministic. As new patterns appear in the confusion, the marriage is strengthened.

Even if we are fairly adept at recognizing and analyzing the various dimensions of our personalities, encounters with the deepest layers of our psyches are a primary source of the chaos in marriage. Whether such chaos becomes entropic or deterministic is the question addressed by Eros and Psyche. When we marry, we become caught up in a bifurcation that has an uncertain future. Nevertheless, this first bifurcation (between man and woman) has the potential to generate further bifurcations, both between the partners and among the various dimensions of each individual's personality. Thus, marriage is like a saddle point. It has stable and unstable aspects. Depending on which is active at the moment, the marriage feels either stable or unstable.

This is symbolized very well by Eros's dwelling, to which Psyche is carried by Zephyrus after being abandoned on the mountaintop. Here stability reigns. Disembodied voices attend her every need, wealth and riches surround her, and her husband spends every night with her. Instability, however, soon makes its presence felt in the form of Psyche's curiosity, which is stimulated into action by her sisters' envy. The saddle point that is represented by her dwelling with Eros takes the form of a choice. If she heeds Eros's warning and does not try to discover his identity, all will continue as it is. But if she succumbs to her curiosity, all will be lost.

Before her marriage, Psyche had no one with whom to oscillate. Even afterwards, although she has found her mate, potentials for oscillation and iteration appear to be slight. The order that exists is sterile. Events seem as static as before. If the plot is to undergo any development, a Hopf bifurcation needs to occur. Something must activate the unstable dimension of the saddle point.

This "something" occurs as an oscillation both within Psyche and from without. She begins to long for her family, and asks Eros if her sis-

ters might be allowed to visit. Heedless of his warnings that nothing good can come from such a visit, Psyche persists. This tension between things as they are and things as they could be erupts into conflict, which rapidly generates further oscillations. Psyche first feels the tension inside herself, longing for things to be different. When she shares her tension with Eros, conflict ensues.

Eros cannot tolerate the tension. Against his better judgment he agrees to Psyche's entreaty. Attempting to resolve her tension and their conflict, he chooses what seems to be a path to order. It doesn't work. When her sisters visit, they are so impressed by Psyche's circumstances, which make their own look drab in comparison, that they become serpents in her paradise. They raise doubts. They challenge her consciousness. They become fractals of her own curiosity. The saddle point has been reached. One direction promises stability, the other instability. Believing she is choosing the former, Psyche finds herself squarely in the latter.

Once her sisters articulate her curiosity, to continue with Eros as before would demand that Psyche choose between knowing and not knowing, seeing and not seeing, growing and not growing. Whichever pole she chooses, the tension will be dissolved. Yet, like most of us, she cannot see any other solution to her dilemma than to decide one way or the other. She tries to settle her doubts, hoping that then, perhaps, the conflict could be resolved, the oscillations dampened. With the illumination of the lamp and the incisiveness of the knife, she approaches the mystery to discern its reality and to determine its influence.

Unfortunately, throwing light on the situation only compounds the conflict. Like trying to focus on the boundary between basins of attraction in a fractal attractor, Psyche's desire for closure generates exactly the opposite. Not only is her husband a god, he is the god of love. One conflict has led to another, for in the encounters between mortals and gods, it is the mortals who are left to bear the burden of consciousness.

In virtually all myths, mortals are left to figure out and to repair the damage done by the gods. This is a psychological truth as well, for when the unconscious wells up in us, either as individual or in groups, rationality is crowded out. Whatever damage is done, those who are conscious must clean up. Consider the aftermath of war, or of any vociferous

conflict for that matter. After the two sides have fought it outunconscious behavior at its worstsomeone has to help those caught in the middle to repair their lives.

And so it is for Psyche. Awakened by a spark from the lamp, Eros vanishes. Psyche must repair the damage. Some accounts say that, once again without a husband, Psyche's first response is to try to end it all.142 Others leave this out.143 Either way, events rapidly approach entropic chaos, for pursued by Aphrodite and unable to find sanctuary even with the gods, she is forced to abandon her search for Eros, to give herself up.

According to Edith Hamilton, when Psyche surrenders Aphrodite says:

> "But really, you are so plain and ill-favored a girl that you will never be able to get you a lover except by the most diligent and painful service. I will therefore show my good will to you by training you in such ways." With that she took a great quantity of the smallest of the seeds, wheat and poppy and millet, and so on and mixed them all together in a heap. "By nightfall these must all be sorted," she said. "See to it for your own sake." And with that she departed.
>
> Psyche, left alone, sat still and stared at the heap. Her mind was all in a maze because of the cruelty of the command; and, indeed, it was of no use to start a task so manifestly impossible. But at this direful moment she who had awakened no compassion in mortals or immortals was pitied by the tiniest creatures of the field, the little ants, the swift-runners. They cried to each other, "Come, have mercy on this poor maid and help her diligently." At once they came, waves of them, one after another, and they labored separating and dividing, until what had been a confused mass lay all ordered, every seed with its kind. This was what [Aphrodite] found when she came back, and very angry she was to see it. . . .
>
> The next morning [Aphrodite] devised another task for Psyche, this time a dangerous one. "Down there near the riverbank," she said, "where bushes grow thick, are sheep with fleeces of gold. Go fetch me some of their shining wool." When the worn girl reached the gently flowing stream, a great longing seized her to throw herself into it and end all her pain and despair. But as she was bending over the water she heard a little voice from near her feet, and looking down saw that it came from a green

142 Neumann, for example; see also Michael Grant, *Myths of the Greeks and Romans*, 360.

143 Von Franz and Larousse, for example; see also Edith Hamilton, *Mythology,* p. 96.

reed. She must not drown herself, it said. Things were not as bad as that. The sheep were indeed very fierce, but if psyche would wait until they came out of the bushes toward evening to rest beside the river, she could go into the thicket and find plenty of the golden wool hanging on the sharp briars.

So spoke the kind and gentle reed, and Psyche, following the directions, was able to carry back to her cruel mistress a quantity of the shining fleece. [Aphrodite] received it with an evil smile. "Someone helped you," she said sharply. "Never did you do this by yourself. However, I will give you an opportunity to prove that you really have the stout heart and the singular prudence you make such a show of. Do you see that black water which falls from hill yonder? It is the source of the terrible river which is called hateful, the river Styx. You are to fill this flask from it." That was the worst task yet, as Psyche saw when she approached the waterfall. Only a winged creature could reach it, so steep and slimy were rocks on all sides, and so fearful was the onrush of the descending waters. But by this time it must be evident to all the readers of this story (as, perhaps, deep in her heart it had become evident to Psyche herself) that although each of her trials seemed impossibly hard, an excellent way out would always be provided for her. This time her savior was an eagle, who poised on his great wings beside her, seized the flask from her with his beak and brought it back to her full of the black water.

But [Aphrodite] kept on. One cannot but accuse her of some stupidity. The only effect of all that had happened was to make her try again. She gave Psyche a box which she was to carry to the underworld and ask Persephone to fill with some of her beauty. She was to tell her that [Aphrodite] really needed it, she was so worn-out from nursing her sick son. Obediently as always Psyche went forth to look for the road to Hades. She found her guide in a tower she passed.144 It gave her careful directions how to get to Persephone's palace.145

Thus begins the series of tasks assigned by the vengeful mother, Aphrodite. Each is a fractal elaboration, in terms both of dimension and self-similarity across scale, and of the encounter between the human and the nonhuman. Up to this point, the encounter has been limited to mortals

144 Michael Grant says of this point in the narrative that "Psyche was now desperate, and went up a high tower, resolving to throw herself from its top and reach the Underworld by killing herself. But the tower broke into speech, and dissuaded her." (*Myths of the Greeks and Romans,* p. 361)

145 Hamilton, *Mythology,* pp. 98f.

and gods. Now, in her four tasks, Psyche must deal with a pile of seeds, violent rams, the source of the river Styx, and the underworld. All pose dilemmas for which Psyche's logic and ability are inadequate. Only through the supernatural intervention of the natural order can they be successfully completed.

Analysis of the Myth

Psyche's first task involves confusion and contamination. Aphrodite presents her with an enormous pile of the smallest seeds, all mixed together. Her job is to sort them out. Like the prospect of bringing order to the turbulent mixing of chaos, the task seems overwhelming. This chaos, however, is deterministic: it is able to self-organize, as symbolized by the ants, who in their "mindless" manner, sort everything out. In psychological lingo, what consciousness cannot accomplish, instinct can. Sometimes, as when we step off the curb into the path of an oncoming automobile, instinctive reflexes handle the situation better than the reflection and deliberation of consciousness. In terms of chaos theory, the ability of seemingly random phenomena to self-organize makes success possible.

The second task involves the threat of violence. The rams whose fleece Psyche must gather are fierce and aggressive. To approach them is to risk annihilation. Clearly not able to meet this challenge, Psyche throws herself in despair onto a nearby river bank, where a reed in the water tells her the solution to her challenge. Like the reed itself, the answer lies in bending to the natural order, in being flexible enough to wait until the time is advantageous for the accomplishment of the task. What the will cannot accomplish, patience can. For the second task, sensitive dependence on initial conditions is the key to survival: were she to approach the rams at the wrong time, her fate would be imperiled.

The third task is physically impossible. The source of the river, from which Psyche must fill a small flask, is totally inaccessible to humansbut not to eagles. Born in an aerie, eagles thrive on the inaccessible. As with the first task, Psyche cannot accomplish this goal herself. The natural order must do it for her. A member of the hawk family, the eagle is a bird of prey. Its body is that of the predator, who simply takes what it needs. Able to soar above the constraints of an earth-bound existence, it

symbolizes spirit. What Psyche cannot do, the eagle accomplishes through boldness and flight. What the body cannot accomplish, the spirit can. For the third task, it is the ability to create transitionsfor example, from earth to sky and back, from order to chaos and backthat brings a new reality into being.

For the last task, Psyche must enter the nether-world, where little is as it seems. Ignorant of the location of the opening to the underworld, she considers suicide to gain access. Were it not for the helpful tower that addresses her spontaneously, she might have chosen that route. Fortunately, the tower knows the location of the entrance to Hades, the complicated procedures for entering and leaving, and the pitfalls of Psyche's current task. Like the ants, the reed, and the eagle, the tower is Psyche's helpmate. It sides with her in her struggle to accomplish the seemingly impossible. But Psyche must accomplish this task herself.

When Psyche enters the underworld, the transition to chaos is complete. The entropy threatened by the four tasks comes to a climax in this setting where all bets are off, where one slip leads to eternal imprisonment. By this point Psyche is fully aware of her impotence, as four times she has required the assistance of the natural order. Each of these has helped her to transcend her limits, as each is able to transcend the order that has held her captive. Chaos has taken her beyond her limitations, but can it bring her back to stability? In its capacity to bring together opposites, the tower holds the key. As a symbol, its design is of human origin, while its substance is taken from nature. Thus, the tower combines the natural order with the human. Its elevation offers protection and perspective. Aspiring to the heights, yet earth-bound, towers are like the soul. A combination of spirit and matter, the soul is like a saddle or a homoclinic point. Not only can it function in a number of different realms, it can transcend them.

Will Psyche be able to observe the dictates of the soul/tower during her sojourn in the nether-world? The answer to this question will determine if the chaotic realm into which Psyche is entering is entropic or deterministic. The realm of the dead is certainly the realm of entropic chaos. In entering this realm Psyche has been warned by the tower that she must make certain provisions (to bring "two pieces of barley-bread

soaked in honey water, one in each hand, and two coins in your mouth"),146 follow certain procedures (do not help the driver who needs assistance in tying a load onto his donkey; do not heed the entreaties of a floating corpse; do not assist the three women who are weaving), and, above all, not look into the box that contains some of Persephone's beauty, which Psyche is to bring back to Aphrodite.

By this time Psyche has learned to heed the advice of her natural and supernatural helpers and does as she is commanded. Nevertheless, on her return from Hades she cannot resist using some of the beauty in the box in the hope of attracting Eros back into her arms. To her surprise, when she lifts the lid there is nothing inside. Immediately, however, she falls into a deep sleep. And there she lies, potentially forever. Except for the intervention of Eros. His convalescence complete and longing for his wife, he finds her right outside his mother's palace. Wiping the sleep from her, he awakens her and sends her on her way to complete her task. Meanwhile, he consults Zeus, who ordains the happy ending of the tale.

The lessons of the myth seem clear enough. Curiosity courts chaos. As a pressure to challenge the order of the moment, curiosity inevitably leads us to choose between what is actual and what is potential, between what is and what might be. Either choice sets in motion a dynamic that could generate cascades of events whose outcome is unpredictable. In other words, curiosity is a fertile ground for Hopf bifurcations.

Furthermore, when chaos ensues, the threat of entropy is never far behind. For instance, Psyche never knows if her efforts will succeed, either in satisfying Aphrodite, or in winning back Eros. Finally, that which rescues deterministic chaos from entropy seems to transcend consciousness, for Psyche is constantly being assisted by powers of discernment and organization greater than hers. In the end, even what she has accomplished is for naught, for her disregard of Aphrodite's instructions (whether or not this was, as some commentators suggest, a trap laid by Aphrodite, who knew Psyche would be unable to resist temptation) leaves her unconsciousliterallyoutsideK Aphrodite's castle. No seeds of redemption are evident, so something transcendentin this case Eros himself

146 Grant, *Myths of the Greeks and Romans,* p. 361.

must rescue her from entropic chaos.

With regard to our study of chaotic dynamics, this is the heart of the tale. Eros is the basis for all the transcendent elements in the narrative. He rescues Psyche from Aphrodite's wrath, manifested not only as the horror of marriage to the "most humble, poor, and ugly" creature on earth, but also as the potential for death that exists in such a marriage. Aphrodite's wrath is entropic chaos. What saves Psyche is the transcendent element present in the tale from the beginning. This element responds to the chaos from its inception and continues to be present at every one of its elaborations. Had Eros never intervened in Aphrodite's plan to begin with, entropic chaos could not have been transformed into deterministic chaos.

Significantly, that which transforms entropic chaos into deterministic chaos is fractal both in dimension and in structural and dynamic self-similarity across scale. Like figments of the imagination that combine characteristics both human and non-human, the ants, reed, eagle, tower, and Eros all blur boundaries. In their ability to talk, communicate with humans and think rationally, they transcend conscious categories. Eros is both immortal and able to participate in mortal activities, perhaps the epitome of fractal dimension. While these combinations of characteristics give these entities a structural self-similarity, they are dynamically self-similar as wellsingle-minded in their devotion to helping Psyche out of her dilemma. In fact, Neumann considers the ants, reed, eagle and tower to be elaborations of Eros that appear between his rescues of Psyche from his mother's curses at the beginning and end of the tale. 147

The ants, reed, eagle, tower and Eros are fractal elaborations of order emerging from chaos. They embody the self-organizing capacity of the system. Nevertheless, while the nonhuman elements are clearly oriented toward bringing order out of chaos, Eros is more ambiguous. His abandonment of Psyche, after all, is what returns her to Aphrodite's curse. But this seems essential to her development, for the outcome of her ordeals is her elevation to the status of an immortal. Could ambiguity be essential for the conversion of entropic to deterministic chaos?

147*Amor and Psyche,* p. 102.

Curious Answers to Alluring Questions

We have come to the heart of our analysis of the psychodynamics of symbols. In many ways it seems too obvious to mention. The key is Eros. Whether referred to as Cupid, Amor or Eros, he is the god of love, of relatedness, of connection. Like a saddle point in the narrative, he combines a stable and an unstable manifold. Along one axis he attracts, along the other he repels. Psyche's attempt to view his face is the homoclinic orbit that belongs to both, for seeking him the first time throws her into chaos (Eros as repeller: the unstable manifold), while the second encounter re-establishes order (Eros as attractor: the stable manifold).

Eros represents a fractal theme in the conversion of entropic to deterministic chaos. That is, for the former to become converted into the latter, relationship must come into being. Consider Adolph Guggenbühl-Craig's observation:

> It is to Eros's credit that gods and goddesses, gods and mortals, come together as lovers, that new gods and demi-gods are born. Without him there would be no movement among the gods; in fact, there would be no gods at all. It is Eros who makes the godsthe archetypesloving, creative, and involved. Only through Eros can gods or archetypes be loving.148

Was not this also the case in "The Stone Coat Woman"? It was the wife's acceptance of the stone woman that made it possible for a relationship between the two. That relationship, in turn, made it possible for the entropic chaos of famine and hunger to be transformed into the deterministic chaos of plenty and survival. While Psyche is never in control of the outcome of her efforts, she does have the power to determine her responses to the conditions in which she finds herself. Consequently, the good that happens to her is due to her faithfulness to her relationship with Eros, rather than to the ability to order destiny according to her needs. While she may not be able, like the wife in "The Stone Coat Woman," to welcome the frightening enormity of chaotic dynamics into her life, she is willing to face its challenge. And as she does, the dynamic is able to bifurcate, with Psyche as one of its poles. When the tension increases, she herself bifurcates, which is symbolized in the tale by the ar

148*Eros on Crutches: Reflections on Amorality and Psychopathy,* p. 27.

rival of her sisters and their sowing the seeds of doubt in her mind.

The result certainly looks entropic. Eros is gone, Aphrodite is pursuing her, and none of the gods will give her shelter. She makes the right decision, however, in deciding to engage the chaos. When she surrenders to Aphrodite, the beginning of her trials is also the beginning of a cascade. Without that cascadehad she continued to run, had she given up her quest to recover Eros, or had she tried to avoid the chaosentropy would have ruled. That she didn't confirms that the difference between entropic chaos and deterministic chaos is relationship. Neumann says:

> Myth is always the unconscious representation of . . . crucial life situations, and one of the reasons why myths are so significant for us is that we can read the true experiences of mankind in these confessions unobscured by consciousness. 149

If fractal dynamics, represented by images that are fractal in form and dimension, characterize deterministic chaos, then fractal dynamics may also characterize relationship. And, in fact, they do. Self-similarity across scale is the epitome of relationship, for it captures the essence of the devotion and loyalty that must persevere across changing conditions in order for a connection to be maintained.

Fractal dimension also characterizes relationship. "Love is blind" (Shakespeare). "The heart has its reasons which reason knows nothing of" (Pascal). Relationship certainly iterates. The result of one interaction strongly influences the next. And what does "love at first sight" mean, if not sensitive dependence on initial conditions?

For all folk tales and myths, engagement and relationship must occur before anything new appears. It is the same for symbols. Without someone with whom to engage, symbols simply do not exist. For Jung, growth is impossible without interactions among the various dimensions of the psyche. For chaos theory, symmetry is impossible without bifurcations and cascades. For Bassler and Ricoeur, without a reader to engage a text, discourse is pointless. Were you not reading this now, it, likewise, would have no meaning.

Without relationship, deterministic chaos cannot occur, for self-simi-

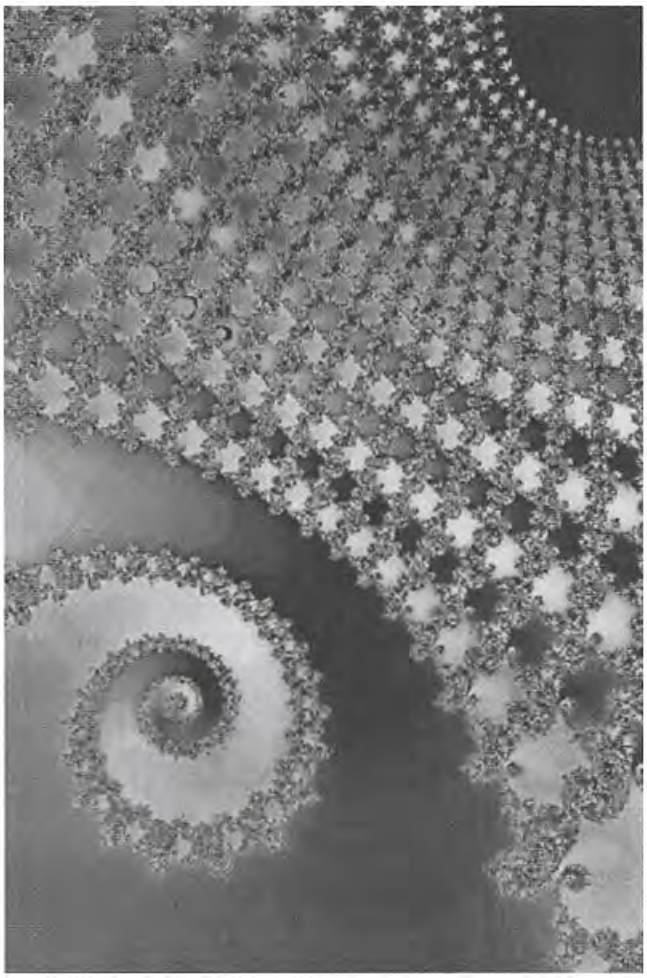
149*Amor and Psyche,* p. 65.

larity enters entropic chaos when that chaos resonates in something else, that is, when it oscillates. It is likely that the same is true of the psychic realm: order occurs when the chaos in one of its dimensions is matched by chaos in another. If so, a primary lesson of folk tale and myth may be that if one wishes to transform entropic chaos into deterministic chaosat least in the realm of the psyche*one must make it fractal*.

Trying to avoid chaos prevents us from becoming a factor in its dynamics. We become its pawn. Only by resonating with it, allowing ourselves to become part of it, do we force chaos to take us into account. We establish self-similarity across scale. Chaos becomes orderly when it finds its reflection. To open oneself to chaotic dynamics, as do both the Iroquois woman and Psyche, is to offer oneself as a potential fractal dimension of those dynamics.

This leaves us with a few lingering questions. Is it possible that in the realm of interpersonal relationships, to treat chaos with order is to precipitate entropy? Or does treating chaos with chaos create the opening for an eventual emergence of order? Are chaos and order simply two sides of the same coin? Is order simply recognizable chaos? Is chaos simply unrecognizable order? And, finally, is the chaos that occurs in relationship an opportunity for greater symmetry?

We have articulated these possibilities through our analysis of the psychodynamics of symbols. Now, in the last chapter, we shall focus on the significance of chaos theory for our experience of everyday life, particularly in its symbolic dimensions. We shall find that, as in the narratives of "The Stone Coat Woman" and "Eros and Psyche," redeeming order from the chaos in our own narratives depends less on clinging to its vestiges than on entertaining the chaos.



Candy (courtesy Art Matrix)

8
The Psychodynamics of Transformation

A knife cannot cut its own handle.
Cambodian proverb.

Chaos and Individuation

For his theories about the psychodynamics of the psyche Jung drew upon many sources, among which are writings that date practically to the beginning of the historiographic tradition. His research, like our analyses of "The Stone Coat Woman" and "Eros and Psyche," suggests that humankind has long recognized the presence of chaotic dynamics in everyday life. Furthermore, this knowledge has not been confined solely to abstraction, but has been utilized as a survival tool. Like the folk tale and myth analyzed in the preceding chapters, this tool focuses on relationship as the key to transforming entropic chaos into deterministic chaos. Yet, as folk tales and myths demonstrate, relating to chaos is never easy. It is so difficult, in fact, that to succeed we must transcend the boundaries at the edges of our definitions, of all that we consider to be real, even of knowledge itself. This movement from one form of reality to another so pervades our engagements with chaos that they are often referred to as rites of passage, or initiation rites.

Present-day Western civilization appears to have little use for systematic excursions into chaos in the name of psychological development. Certainly the mainstream mental health policy of the United States abhors chaos. But what about everyday life? Rites of passage seep into many different areas of experience, from organized religion to gang warfare. That rites of passage may be absent from areas where they could be useful (mental health policy), present in areas where they may be inadequately understood (gang warfare), and actively acknowledged in yet others where they seem to function well (organized religion), suggests that in some ways we do understand the useful dynamics of symbols, and in some ways we do not.

Jung believed that our distaste for the chaos of the unconscious led us

to project it onto the world around us. Blaming others for dilemmas spawned from our own psychology causes untold suffering. Although Jung devoted his career to explaining how this is the case, we can only wonder to what degree the message was heard. Have we lost sight of the usefulness of chaos?

Maybe only in certain areas. In some places, the useful chaos that accompanies encounters with symbolic images has been incorporated into a number of fairly commonplace rituals that help to transform youth to adulthood, integrate individuals with groups, and promulgate important values and beliefs. Common to all, however, is a basic preparation for entering into and sustaining relationships: with self, with community, and with God. They provide us with experiences that teach us an essential lesson: namely, that how we react to the chaos of relationship is essential to the outcome of that chaos. We have the option to choose. The choices we make become part of the chaotic dynamics we experience, oscillating with them and altering, thereby, our destinies.

Rites of Passage

Rites of passage teach us how chaos that feels entropic can actually be deterministic. A typical scenario goes like this: first, things become confused; then, everything is up for grabs; and finally, things become completely unmanageable. This is symbolized in "The Stone Coat Woman" and "Eros and Psyche" by events and circumstances that demonstrate characteristic patterns of chaos: mixing and instability. Mixingthe by-product of iterationcorresponds with the intrusion of the stone giants into the domain of the humans, the intrusion of the gods into the realm of the mortals, and the mixing of seeds that Psyche must sort out. Instabilitywhich accompanies phase shifts, saddle points, and Hopf bifurcationsis symbolized by the famine that sends the hunters into the domain of the stone giants, the appearance of the stone woman, the influence of Psyche' s sisters, and by the rams from whom Psyche must gather the fleece. That all of this feels unmanageable, like infinitely multiplying bifurcations, is portrayed by the size of the giants and the immortality of the gods. Wherever these appear in a story, entropic chaos looms.

In the realm of the human, what happens after the transition to chaos

depends less on the conditions that led to it than on the response of those it involves. Unless those swept up in its power are able to resonate with it, their future is dark indeed. Entropic chaos reigns. Once they begin to participate in the chaos, however, they become a critical factor in its evolution. Every response to chaos establishes a new bifurcation with an accompanying sensitive dependence on initial conditions. This is the major focus of rites of passage, which seek to recapitulate the events that occurred at the beginning of time, when the chaotic, deathlike state that existed before creation yielded to the emerging complexity of creation; or, when entropic chaos became deterministic.

For example, in an early (1909) analysis of rites of passage, Arnold van Gennep stated:

> One of the most striking elements in seasonal ceremonies is the dramatic representation of the death and rebirth of the moon, the season, the year, vegetation, and the deities that preside over and regulate vegetation. . . . The idea [of death and rebirth] is suggested or dramatized in seasonal ceremonies, rites of pregnancy and delivery, rites at birth among peoples who believe in reincarnation, rites of adoption, puberty, initiation, marriage, enthronement, ordination, sacrifice, and funeral rites among peoples who believe in the survival of the individual or . . . in reincarnation.150

All of these rituals revolve around the dissolution of order into chaos and its subsequent reappearance. This is a rather radical departure from a firmly held belief of nineteenth-century science that has endured up until now. The second law of thermodynamics describes how order dissolves into chaos through entropy. The idea of entropy is often elaborated into a model wherein death becomes the ultimate unraveling.

The opposite of this idea is contained in models that refer to rebirth, renewal, and rejuvenation. In these models, death gives way to a new state of order, to new configurations and patterns that replaceand sometimes improve uponthe old ones.

For a long time scientists have dismissed this notion as excessively optimistic, an anachronism left over from prescientific days. While they conceded the possibility of resurrection (which no scientist seeking financial support in the western world could dare to oppose), the second

150*The Rites of Passage,* pp. 182f.

law of thermodynamics barred that idea in the world of mechanics. When dynamic systems decay, it said, they never come back.

Chaotic behavior was, of course, seen as one form of such decay. By the twentieth century, however, researchers in the human sciences, particularly Jung and Eliade, were beginning to describe dynamic systems in which death and rebirth were essential components. In his clinical work, Jung observed that some of his patients could experience a death-like descent into depression that was followed by a rejuvenation of healthy relationships with themselves, others, and life in general. Finding little in the psychology of his time that correlated with his observations, he turned first to Freud, who partially confirmed the validity of the experience. Then he discovered early scientific accounts that had lost favor with mainstream science, namely, alchemy, that believed matter was more than just inert stuff behaving in a deterministic fashion. Alchemy ascribed a spirit to matter that sought its own transformation.

Correspondingly, Eliade's studies of yoga and shamanism, which led him inexorably to initiation rites, were revealing the same thing. Thus, he concluded,

> The term initiation in the most general sense denotes a body of rites and oral teachings whose purpose is to produce a decisive alteration in the religious and social status of the person to be initiated. In philosophical terms, initiation is equivalent to a basic change in existential condition; the novice emerges from his ordeal endowed with a totally different being from that which he possessed before his initiation; he has become another.151

Referring to van Gennep, Eliade traces such transition rites to the tribal belief that fundamental change can occur only by reentering the beginning of time (*illo tempore*) when the cosmos was established and humankind was created. In the rites, the "sacred history" of the tribe comes to life for the initiate.

Eliade says that this movement back to the beginning of time constitutes a ritual death. Once entrance into *illo tempore* is regained, however, initiates can participate in the original experience of creation. Thus:

151*Rites and Symbols of Initiation,* p. x.

> For archaic thought, nothing better expresses the idea of an end, of the final completion of anything, than death, just as nothing better expresses the idea of creation, of making, building, constructing, than the cosmogony [which is "the manifestations of the creative power of the gods"].152

The return to the cosmogony, the origin of the world, is important to the primitive, says Eliade, because

> If the world was restored to the state in which it had been at the moment when it came to birth, if the gestures that the gods had made *for the first time* in the beginning were reproduced, society and the entire cosmos became what they had been thenpure, powerful, effectual, with all their possibilities intact.153

As Eliade describes it, the return to origins makes it possible for a purified order to emerge once again from chaos.

There is a powerful relationship between initiation and creation. If individuals can enter that sacred time when all things were created, they can gain access to "the creative power of the gods." This creative power is sought not as an end in itself, for use by the individual, but as a means, for its transforming power upon the individual. And, just as chaos characterizes the time before creation, so also is it the essential first step in initiation. Again, states Eliade:

> Every repetition of the cosmogony is preceded by a symbolic retrogression to Chaos. In order to be created anew, the old world must first be annihilated. . . . In the scenario of initiation rites, "death" corresponds to the temporary return to Chaos; hence it is the paradigmatic expression of the *end of a mode of being*the mode of ignorance and of the child's irresponsibility. Initiatory death provides the clean slate on which will be written the successive revelations whose end is the formation of a new man.154

In other words, entropic chaos becomes deterministic.

If this sounds like Jung's view of individuation, it is virtually identical. Jung and Eliade knew each other and referred to one another in their writings. Eliade noted:

152 Ibid., p. xii.

153 Ibid., p. xiii.

154 Ibid.

> C.G. Jung has stressed the fact that the process that he terms individuation, and that, in his view, constitutes the ultimate goal of human life, is accomplished through a series of ordeals of the initiatory type.155

In this manner, both agreed, the everyday becomes invested with the magnitude of the mythic. So it is that when a people feels compelled to explain itself and its place in the cosmos, it generally does so by myth.

Both Eliade and Jung believed that myths not only give an account of a people's perspectives on its existence, but also reflect the very processes by which such perspectives are assembled. Jung, particularly, looked to myths and folk tales for insight into the structure and dynamics of the psyche, for he believed they were products of the combined activity of many individuals. Over time they become the essence of collective effort. Accordingly, their characters could be seen both as symbolic of the many dimensions of the psyche and as sources of insight into the opportunities for the ego to respond to its encounters with the unconscious.

Throughout our history, we have constructed stories that try to make sense of the chaos of our lives. Birth, adolescence, marriage and family, midlife, and mature adulthood all have their characteristic times of confusion and uncertainty. While in their grip it can be very difficult to believe that anything positive can occur. Even more unbelievable is the idea that it can occur without our conscious intervention.

Yet those who have been through these stages routinely assure us that such is the case. We seem to have learned that order can emerge from chaos. Earlier in our history we had rituals and stories to help us through difficult life transitions. Jung believed that science has undermined our belief in these without giving us any further insight into the truths they revealed. That task, he felt, now falls to psychology.

Fragmentation

Jung grounded his theories in the premise that tensions of opposites generate psychic energy and facilitate psychological growth. Such tensions also characterize the psyche's attempts to come to terms with the world around it. Perhaps these simply reflect neural impulses oscillating within

155 Ibid., p. 135.

the brain. Nevertheless, Jung believed that the self-regulation of the psyche depends on these oscillations. When psychic energy becomes overly invested in outer experience, for example, there is an automatic oscillation of energy inward. If we become overly devoted to our work, we may find ourselves in bed with a stroke or a heart attack. Correspondingly, if energy becomes concentrated in one dimension of the personality (the persona, for example), energy oscillates into others (in the case of the persona, into the shadow). For example, if we become too invested in our public image (persona) we may find ourselves unable to resist believing that we are identical with that role. Others' challenges to our affectations (like our children mocking us) may lead us to behavior that is quite the opposite (shadow) of what we would prefer to project.

If the ego cannot, or will not, embrace the complexity of tensions of opposites, preferring instead to embrace simplistic views of itself and reality, then individuation stalls until the ego can be shaken from its one-sided perspective. This the unconscious engineers by confronting the ego with the unrecognized dimensions of its existence, often in the form of dream images and daytime life experiences that are deeply symbolic. Immersed in a world of symbols, the ego with a one-sided perspective finds itself continually in the presence of perspectives that seem to be other than its own. If it fails to understand how these symbols are products of its own unconscious, it will be forced to shrink into its own limited world-view, where to defend itself it must attack the validity of anything that fails to reinforce its perspective.

Resist or attack, the ego that refuses to allow itself to oscillate into perspectives other than its own creates an impasse in the psyche. Energy continues to build up in the shadow until the ego is overwhelmed. When the ego is sucked into the unconscious, or overwhelmed by it, life seems chaotic. At first, this chaos feels entropic, for until the ego can submit itself to the conflict, all simply deteriorates into unconsciousness. But if the ego can recognize aspects of reality other than those that happen to coincide with its assumptions, it can open itself to the multiplicity of life. In short, if the ego can allow itself to oscillate with the bifurcations of life, the chaos it experiences can become deterministic. Perhaps nowhere is this more evident than in the chaos of opposing points of view. When

we begin to see the perspectives of others, chaos becomes discussion.

This, of course, is not always easy. Folk tales and myths regularly emphasize that the ego must maintain its integrity in order to survive the challenges of fragmentation. Integrity, which is the opposite of the chaos of the unconscious, appears as our capacity to sustain ourselves while buffeted by tensions of opposites. If we succeed in participating in the bifurcating system, we consciously become part of a cascade. This is crucial to the positive outcome of encounters with symbols, as portrayed by myths and folk tales, for not only does it facilitate the elaboration of chaos to that point where order can once again appear, but it also reconstitutes the original dynamic (bifurcating bifurcations) that gave rise to the chaos. Thus reverberates the eternal return.

Psychological Development

We can safely assume that if consciousness did not contribute to our survival, it would never have come into being. Jung believed that cooperation between consciousness and the unconscious is essential to humankind's evolution. This cooperation, which has developed over thousands of years, revolves around the psychodynamics of symbols. Through the appearance, recognition, and integration of symbols, the ego is given the opportunity to participate in the psychological development of the entire organism.

Initiation rites involve us in the synchronic dynamics of individuation. Tension, conflict, confusion, and suffering characterize our descent into the unconscious. The disappearance of order in the chaos of the initiatory experience and its subsequent reappearance depend on our capacity to endure the conflict of opposing forces. That is, our response to the synchronic dynamics of individuation determines whether or not they can become diachronic, leading us to a new level of development. Before the ego exists, synchronic dynamics are converted into diachronic dynamics automatically, in the same manner that deterministic chaos occurs in the mechanical world. With the development of the ego, however, choice becomes possible. If we choose to participate in synchronic dynamics, they can more easily be converted into diachronic dynamics. In other words, insight allows us to facilitate our growth. Without our cooperation, syn-

chronic dynamics tend to perseverate. We become stuck in chaotic dynamics. While it may feel like a great deal is happening, growth proceedsif at allat a snail's pace. The same old conflicts greet us in every new experience.

Clearly, the process of psychological development can be pretty intimidating. Integration of our shadows demands that we acknowledge the value of that whichoften for good reasonwe had previously relegated to the trash heap of our lives. Negotiating the challenges to consciousness posed by the shadow can seem like an ordeal, or even a journey into destruction. Yet, without this upsetting, disestablishing and chaotic dynamic our egos too easily calcify into an arbitrary and precarious condition that inevitably demands the suppression of all other points of view.

Symbols and Transformation

Psychological development, with all its chaotic aspects, is inextricably intertwined with the activity of symbols. As Jung said,

> The symbolic process is an experience *in images and of images*. Its development usually shows an enantiodromian structure like the text of the *I Ching,* and so presents a rhythm of negative and positive, loss and gain, dark and light. Its beginning is almost invariably characterized by one's getting stuck in a blind alley or in some impossible situation; and its goal is, broadly speaking, illumination or higher consciousness, by means of which the initial situation is overcome on a higher level.156

Remember the hunter who climbed the tree to defeat the finger?

Time-wise, the process may be compressed into a single dream or short moment of experience, or it may extend over months and years, depending on the person, the nature of the initial situation and the goal to be reached. The wealth of symbols naturally varies enormously from case to case. Consciousness is essential for individuation to succeed.

Nevertheless, while conscious insight is essential, it cannot solve the most complex developmental problems alone. For as von Franz states,

> The unconscious is not only chaos but is also order, and only the unconsciousness of order can overcome the unconsciousness of disorder. Loy-

156 "Archetypes of the Collective Unconscious," *The Archetypes and the Collective Unconscious,* CW 9i, par. 82.

> alty is the highest achievement of feeling, and that is where man has possibility. When this loyalty, or feeling, constellates, it calls forth the secret order which is in the chaos of the unconscious.157

If the chaos of the unconscious can be transformed into order only by the unconscious, the ego must maintain its relationship with the unconscious in the face of all its trials. Loyalty is just this steadfastness of relationship. We must learn to tolerate the disagreement, confusion, and challenges to our assumptions that result from our relations with others. We must take our dreams seriously, rather than seeing them as disorderly byproducts of sleep. If we can persevere in our relationship with chaos, order will eventually emerge. Of course, according to the law of tensions of opposites, that order will itself eventually be transformed into chaos.

The Archetypal Chaos of Survival

Jung's belief that the chaotic psychodynamics of symbols could lead to healthy growth is consistent with contemporary research in the biological sciences. The data being gathered requires some interesting reversals of the usual models of healthy rhythms in the human body, however. Such models have generally assumed that

> a healthy body has rather simple rhythms. In this view, the different parts of the body either tend to homeostasis, where interrelated systems reach an equilibrium, or else they have some simple periodic behavior, such as the rhythmic beating of the heart. A disorder will have a more complicated, less controlled tempo.158

Research into EKG and EEG patterns, however, suggests that chaotic patterns provide "a healthy variability that allows the organ to respond quickly to a variety of stimuli."159 Systems lose their capacity to respond to new situations when they are limited to regular patterns that never vary. The greater the diversity of available responses to changes, the greater the potential to survive the unexpected. Thus, "a healthy physiological system has a certain amount of innate variability, and a loss of

157*The Golden Ass of Apuleius,* p. VI: 11f.

158 Pool, "Is It Chaos, Or Is It Just Noise?" p. 604.

159 Ibid., p. 606.

this variabilitya transition to a less complicated, more ordered statesignals an impaired system."160 In other words, chaos provides a richness of response that order cannot.

Both chaos theory and psychology are sciences. The former seeks to explain the world in which we live, the latter who we are. Too often, however, both have been encouraged to forego completeness in favor of simplistic definitions that fail to respect the complexity of the phenomena they describe. But like trying to reduce symbols to a single meaning, such reduction can destroy the very certainty it seeks. Chaos theory underscores that point. James Gleick, for example, points out:

> The trend in science, and in physics in particular, has been toward reductionism, a constant breaking things down into little bitty pieces. . . . What people are finally realizing is that that process has a dead end to it. Scientists are much more interested in the idea that the whole can be greater than the sum of its parts.161

Likewise, the hypothesis that dynamic processes seek some idealized end-state, which becomes their most desirable form, is becoming increasingly untenable. With regard to homeostasis, for example,

> It was once common wisdom that biochemical reactions inevitably converged rapidly to a thermodynamic steady state and that this steady state was unique. Similarly, at the systemic level, a restrictive view of the concept of homeostasis dominated physiological thinking, and it was supposed that physiological control functioned exclusively to restore transiently disturbed systems to a steady state. It is now recognized that this is not the case. Complex dynamic behavior is an aspect of biological regulation.162

Like Jung' s view of the psychodynamics of symbols, science today is discovering how the maintenance of order and the profusion of chaos are connected. Those who believe that "healthy systems don't want homeostasis. They want chaos,"163 cite three advantages of chaos over order. First, flexibility depends on choices. Second, chaos offers more choices

160 Ibid., p. 604.

161 "New Images of Chaos That Are Stirring a Scientific Revolution," p. 134.

162 P.E. Rapp, "Oscillations and Chaos in Cellular Metabolism and Physiological Systems," p. 179.

163 Pool, "Is It Chaos, Or Is It Just Noise?" p. 604.

than order. Finally, to the degree that adaptation requires flexibility, chaos is essential for growth.

In short, wherever stability is a goal of adaptation, chaos's contribution rivals that of order. From that perspective, order and chaos reflect each another. Just where the line between the two exists depends largely on our ability to recognize similarities in the chaos. The more sophisticated we become at this, the farther into chaos moves that line. But definition cannot be imposed upon chaos. It emerges as we become able to recognize more complex patterns. Thanks to the computer, our ability to do so has increased by orders of magnitude.

Where to from Here?

Chaos, which does so much to expand our consciousness, leads us to ever more complex appreciations of existence. In our attempt to understand symbolsthose psychological mechanisms by which chaos enters our liveswe cannot expect simplistic definitions. As Jung said,

> Paradox . . . . does more justice to the *unknowable* than clarity can do, for uniformity of meaning robs the mystery of its darkness and sets it up as something that is *known*. That is a usurpation, and it leads the human intellect into hybris by pretending that it, the intellect, has got hold of the transcendent mystery by a cognitive act and has "grasped" it. The paradox therefore reflects a higher level of intellect and, by not forcibly representing the unknowable as known, gives a more faithful picture of the real state of affairs.164

Chaos theory is certainly paradoxical. As a scientific explanation of the relationship between energy and matter, it more accurately describes reality. Is it also the latest in a series of mythological motifs by which humankind has attempted to understand itself in relation to its environment? Is chaos theory simply one more way-station on the continuing route by which we try to make sense out of the myths we generate to explain ourselves and our world?

Consider the marriage between Psyche and Eros. It could be seen as a saddle point having stable and unstable manifolds. In that case, their

164 "Transformation Symbolism in the Mass," *Psychology and Religion,* CW 11, par. 417.

child would be the homoclinic point that partakes of both. That's not far from contemporary views of genetics wherein chromosomes and genes are passed along by parents who comprise a bifurcation that becomes incorporated into their children, who then create their own bifurcations with others and pass them on to their children, and so on.

From this perspective, marriage would create a bifurcating system that leads to iteration, sensitive dependence on initial conditions, self-similarity across scale, fractal dimension, and everything else that characterizes chaotic dynamics. Could "the family" be the fractal attractor that informs the whole enterprise? In that case, should we expect family dynamics to be anything but chaotic?

In the quest to control our lives, perhaps we lose track of an essential truth about our nature. In our increasingly rationalistic outlook on life, chaos theory reminds us of how illusory control really is. Symbols are the agents of such a reminder, as Paul Ricoeur notes:

> The world of symbols is not a tranquil and reconciled world; every symbol is iconoclastic in comparison with some other symbol, just as every symbol, left to itself, tends to thicken, to become solidified in an idolatry. It is necessary, then, to participate in the straggle, in the dynamics, in which the symbolism itself becomes a prey to a spontaneous hermeneutics that seeks to transcend it. It is only by participating in this dynamic that comprehension can reach the strictly critical dimension of exegesis and become a hermeneutic; but then one must abandon the positionor rather, the exileof the remote and disinterested spectator, in order to appropriate in each case a particular symbolism.165

According to Ricoeur, interpretation is less a function of detached observation than of intimate involvement.

Actually, relationship *is* hermeneutics. The only way we can recover what something meant when it first occurred is by connecting with it. If we wish to understand what an experience meant to someone, we must be willing to interact with them within the reverberations of that experience. We cannot understand why someone reacts as they do to a trauma without hearing from them what it was like, without opening ourselves to the power of their experience.

165*The Symbolism of Evil,* p. 354.

The experience of opening ourselves to symbolsof entering into their realm, as it werehas been the same throughout history. It is a "fractal moment"166 that involves death and resurrection: the death of all that which limits our vision and experienceour assumptions, presuppositions, and perspectivesand our subsequent resurrection: into the ability to comprehend fractal dimension, into the transcendence of the moment, into the freedom to experience the fullness of life. If we cannot tolerate the chaos of symbols, they cannot transform us. Just as, in Ricoeur's terminology, "language transcends itself," so must we. But transcendence always contains an element of chaos.

To interpret symbols we must enter the fractal moment, a transitional space that requires us to sacrifice our need to objectify, to define and to control. To understand symbols we must give ourselves over to them, participate in their dynamics, and resonate with their ambiguity. Whatever certainty we lose is more than compensated by the expansion of our consciousness. Consciousness of what? Consciousness that our essence and our existence are equally accessible. Immersed in existence, we encounter the essence. Once again, in the realm of symbols the journey is the goal.

We have looked at science, both "hard" and "soft," for a glimpse into the encounter with life's mysteries. Our last quotation comes from Lama Govinda. It has a refreshingly poetic ring:

> When every detail of our life is planned and regulated, and every fraction of time determined beforehand, then the last trace of our boundless and timeless being, in which the freedom of our soul exists, will be suffocated. This freedom does not consist in being able "to do what we want," it is neither arbitrariness or waywardness, nor the thirst for adventures, but the capacity to accept the unexpected, the unthought-of situations of life, good as well as bad, with an open mind; it is the capacity to adapt oneself to the infinite variety of conditions without losing confidence in the deeper connections between the inner and outer world. It is the spontaneous certainty of being neither bound by space nor by time, the ability to experience the fullness of both without clinging to any of their aspects, without trying to take possession of them by way of arbitrary fragmentation.167

166 See Van Eenwyk, "The Analysis of Defences," pp. 158, 160.

167*The Way of the White Clouds,* p. 60.

As the mechanism by which psychological growth becomes possible, symbols move us from the security of the known to the limitless potential for being. They offer us the opportunity, ever again, to participate in the eternal return. The ease with which we are able to entertain the chaotic experience of symbols determines the ease with which new order can enter our lives. Easy in, easy out.

I hope this book has given the reader not only an understanding of deterministic chaos and its presence in psychology, religion and folklore, but an experience of it as well. Parts must surely have seemed opaque, confusing and disturbing. Do not be overly concerned if you feel you understand less than you would like. If you have entered a chaotic space, simply let the oscillations build. Something may come of it . . .

On the other hand, if you are left with a vague impression that you have a sense of what I've been discussing, or even that you can see how it relates to your own life, but you just can't seem to specify what it is that you understand, then your confusion is likely to be the evidence of the authenticity of your experience of deterministic chaos. For order is never pure. Like the yin and the yang, it carries within it the potential to turn into its opposite. The same is true for chaos. When you understand that, life becomes a dynamic in which you can participate, rather than a determinant that you must endure. The former can help you to develop your capacity to relate. The latter will lead to a fight for control. The choice, as always, is up to you.

Appendix 1
Sensitive Dependence on Initial Conditions

Consider two sets of iterations of the equation

y 279D *ay*2 + *c*

the first beginning with *y* set at 2, the second with *y* set at 2.001. If, to simplify things, we let *a* = 1 and *c* = 0, we now have the equation

y 279D 1*y*2 + 0, or *y* 279D *y*2

As shown below,168 in the first series of iterations that begin with 2 as the starting value of *y,* squaring *y* yields 4, which becomes the new *y* value that is squared to compute the next *y* value (16), which is then squared to compute the next *y* value (256), and so on. With each computation the equation is said to iterate, and in only five iterations the value of *y* becomes 4,294,967,296.

For the second set of iterations, *y* is set at 2.001. After five iterations (rounding off each to three decimal places for simplicity) the value is 4,364,222,021.240. So, an initial value larger by only 1/1000 yields a result that is larger by 69,254,725.240 after only five iterations!

y>D *y*2	*y*>D *y*2
y = 22	*y* = 2.0012
y = 4	*y* = 4.004
y>D *y*2	*y*>D *y*2
y = 42	*y* = 4.0042
y = 16	*y* = 16.032
y>D *y*2	*y*>D *y*2
y = 162	*y* = 16.0322
y = 256	*y* = 257.025
y>D *y*2	*y*>D *y*2
y = 2562	*y* = 257.0252
y = 65,536	*y* = 66,062.259
y>D *y*2	*y*>D *y*2
y = 65,5362	*y* = 66,062.2592
y = 4,294,967,296	*y* = 4,364,222,021.240

168 From Van Eenwyk, "The Chaotic Dynamics of Everyday Life."

With regard to any system, this sensitive dependence on initial conditions means that "tiny changes in certain features could lead to remarkable changes in overall behavior."169

Thus, not only do values that are substituted in the equation increase, but the rate at which they increase itself increases (accelerates). If, as in the above example, $y > 1$, the equation rapidly approaches infinity. When $y < 1$, however, the opposite occurs. For example, if $y = 1/2$, $y2 = 1/4$, whereupon the new value of y, or 1/4, is substituted into the equation to yield 1/16, and so on. Again, after five iterations, the value of y is 1/4,294,967,296. Thus, if $y < 1$, the equation rapidly approaches zero.

Finally, if $y = 1$, the equation, no matter how many times it is iterated, always equals 1. Consequently, there are only three destinations for the iterations of such equations: infinity, zero or stuck at one.

169 James Gleick, *Chaos: Making a New Science,* p. 178.

Appendix 2
Mutual Inhibition Equations

Imagine an equation that describes the interactions between a population of animals and its food supply. Sometimes referred to as "predator-prey," or "host-parasite" models, they are actually complicated feedback loops that can be written mathematically as

$x^{i+1} = rx^{i}(1-x^{i})$, or x 279D $rx(1-x)$

where x^{i} = the initial *(i)* size of the population

r = its rate of growth

$1 - x^{i}$ = the factors that moderate growth

and x^{i+1} = the next value of x to be substituted into the equation.

With regard to the food supply, as the population (x^{i}) increases, the food supply ($1-x^{i}$) decreases.

For example, suppose x^{i} refers to a group of chickens and $1-x^{i}$ to its food supply. If each chicken needs one piece of corn to stay alive, when a population of 65 chickens eats into its food supply of 100 pieces of corn, 35 are left.170 The flock now faces a dark future, as there is only enough food left to feed 35 chickens. During the next generation of chickens and corn, however, the 35 chickens (excluding, for a moment, the chickens born into the new generation) have a food supply surplus of 65 (10035) pieces of corn. Thus, not only can those chickens all survive, but new chickens born to the flock will have a food supply as well. This increases the total population of chickens, which diminishes the food supply. As they survive, the number of chickens increases, and the food supply decreases. Over the years, the balance between chicken populations and food availability continually changes.

170 Because mutual inhibition equations express ratios between mutually moderating factors, x is assigned a number between one and zero. Thus, with regard to our chickens and their food supply, x and $1 - x$ would be fractions of the total potential of each, which is 1 (100%). If chickens comprise .65 (65%) of the total that could possibly be supported by a given food supply, then .35 (35%) refers to the percentage of the total food supply left over to support the next generation.

Much, of course, depends on the rate of growth or decline of the population of chickens (*r* in the equation above). If the growth rate is small enough, population and food supply can reach a balance. For higher rates of population growth, however, the food supply cannot keep pace. At some point the population reaches a maximum level, after which it must decline until the food supply is once again sufficient to sustain further growth. As the equation describing the dynamic between population and food supply iterates, the result is sometimes a balance, and sometimes an oscillation between/among two or more figures, depending on the ability of the food supply to keep pace with the rate of population growth.

The rate of growth of the population *(r)* is expressed as the percentage by which the population grows in each new generation. If the population grows by 100%, *r* is 1; if by 200%, *r* is 2, and so on. Curiously, when the growth rate enters the threes (3.1, 3.2, 3.3 and so on), populations begin to oscillate between/among two or more values. The populations split, or *bifurcate,* and if the growth rate continues to rise, bifurcate again, among four, eight, sixteen, thirty-two and more values. In effect, the enormous magnitude of the numbers that we saw generated by iterating the equation *y*> D *ay*2 + *c* (appendix 1) now becomes focused on the tension between two mutually moderating factors. The equation mixes within itself, folding one result into the other, creating yet more bifurcations that oscillate back and forth among values.

Consequently, as the growth rate of a mutual inhibition equation rises through the threes, the bifurcations themselves bifurcate, leading to an endless expansion in bifurcations called *period-doubling cascades*. The end product of such cascades is so chaotic as to defy analysis. Yet most surprisingly, the transition to chaos occurs so reliably that its appearance can actually be predicted, that is, when *r* = 3.5699456.

Viewed geometrically, graphing the equation at this point generates a curve that splits into two curves, like a parabola lying on its side with the apex at the bifurcation point. As the value of *r* moves through the threes, each side of the parabola bifurcates, which bifurcations themselves bifurcate (period doubling), which generates a graph that contains massively confused configurations of bifurcations. However, as *r* continues to increase, repetitions of the original pattern of bifurcations appear within

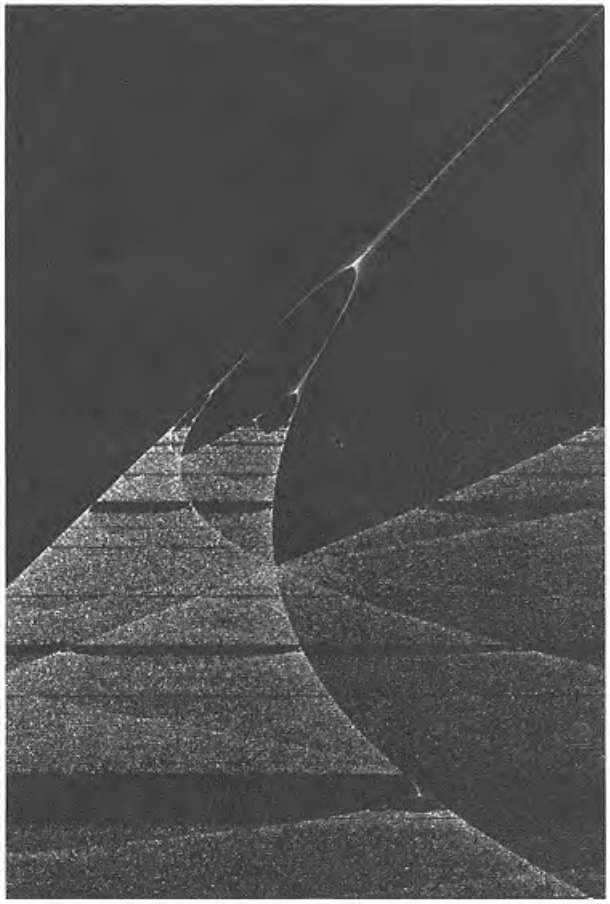
the chaotic state. The same dynamic that led to chaos now leads to the emergence of order from that chaos, as shown in the figure opposite.

Thus, to graph the equation

x 279D *rx(*1-*x)*

is to discover some of the more remarkable aspects of chaotic dynamics. First, we can see how relatively simple equations can yield highly complex results. While the results often border on the inconceivable, anyone with a calculator or computer can plug in numbers, press a button and watch the results unfold. However complex the result, the input is very simple.

Second, we can better appreciate what these results tell us about the basic mechanics of dynamic systems. Until fairly recently, the performance of the calculations necessary to demonstrate deterministic chaos was beyond our grasp. Henri Poincaré, for example, knew a hundred years ago that the movements of a three-body system in space were chaotic, but he couldn't prove it, because he couldn't do the necessary calculations. Today we can set up the equation, specify its parameters, push a button, and have our computers figure it all out for us. And unlike my father's calculating machines, today's computers are not limited to sacrificing their lives in pursuit of the unachievable!



Berceau Léger (courtesy Art Matrix)

Appendix 3
Strange Attractors

As these transition points between stability and instability mix together, they become a strange attractor. Technically and precisely,

> A strange attractor can be considered as the limit set of an unstable manifold which is a curve of infinite length with an infinite number of loops without self-intersection and with a Cantor set as a cross-section.171

This intimidating description means simply that a strange attractor is a composite of all the dynamics generated by an unstable manifold. "Unstable manifold" refers to the dynamic that permeates a homoclinic point, where transitions to chaos occur. The attractor consists of an infinitely long curve that goes on forever in loops that never intersect. "Cross-section" refers to the slice of the three-dimensional orbiting dynamics that creates a picture of the points of intersection between the orbits (loops) and a plane. A "Cantor set" is formed by removing from a line segment its middle third, doing the same for each remaining segment, and continuing that process ad infinitum.

> The set generated in this way has the remarkable property of containing uncountably many pointsi.e. the same number of points as the whole real lineyet being nowhere densei.e. for any point in the set one can always find a point not in the set arbitrarily close to it. 172

In the same spirit as measuring coastlines, where the smaller the measuring device the longer the coastline, the greater the number of points in the pictures of the strange attractors, the less dense is the attractor.

Cross sections of strange attractors resemble Cantor sets because, like the runners in our race, they consist of some regions from which orbits disappear and others wherein they reappear. To account for the way in which "the orbit leaves the plotting area but returns after a few iteration steps . . . we may imagine that the orbit is leaving along a branch of the unstable manifold and returning along a branch of the stable mani-

171 H.A. Lauwerier, "Two-Dimensional Iterative Maps," p. 59.

172 C. Gibson, ed., *The Facts on File Dictionary of Mathematics,* pp. 19f.

fold."173 Homoclinic points represent (manifest) the activity of manifolds. Where does the orbit go in the meantime? It simply travels one of the numerous loops that take it in unpredictable directions.

Two-dimensional cross sections of fractal attractors demonstrate how bizarre can be the behavior of a "curve of infinite length with an infinite number of loops without self-intersection and with a Cantor set as a cross-section." Try magnifying an area of the attractor where iterations that approach infinity diverge from those that approach zero. We might expect to find a line between the two, or at least some area where no movement occurs, as in the exact center of a rotating wheel. But as we magnify the area repeatedly, complexity after complexity unfolds. Rather than reaching a line, or an area of no movement, the same patterns that originally bordered one another eventually emerge once again from the magnification. The pattern "leaves the plotting area but returns after a few iteration steps." This is certainly curious! In effect, the pattern simply repeats itself at smaller and smaller levels (greater and greater magnification). Consequently, magnifying the area between patterns never reveals a line.

173 Lauwerier, "Two-Dimensional Iterative Maps," p. 83.

Appendix 4
Mathematics as Language

While many of us think of mathematics as some abstruse science known only to the brilliant or the nerdy, it is, in fact, little more than a language. And it can open up many possibilities for playing with the concept of symbols. For example, we can express what Jung meant by a "value" through an equation. It would read

value = archetype + energy

We can then go on to define a symbol by use of another equation:

symbol = value + image

We already know what a value is from the first equation. What, however, is an image? Jung believed that all images are combinations of form and content. They are, in a sense, arrangements of "stuff." Expressing this also as an equation yields:

image = form + content

But remember, not all forms that arrange contents express ideals that transcend the content of the image itself. For example, consider a baseball diamond and the players on it. Is it anything more than a game? But now combine this with an archetypal form. Imagine a player hitting a "home run," and gaining free passage to "home plate." Does the idea of "home" add anything to the game? Possibly. If it does, meaningthat which invites interpretationis generated. This is, of course, the essential characteristic of a symbol. Thus, symbols embrace qualities that transcend their content and, in so doing, comprise the "destinations" toward which our attention and energy are drawn.

Continuing our exercise in the language of mathematics, let us now combine the equations we have composed into a larger one that describes symbols. First, remember that

symbol = value + image

Second, the definition of a value is

value = energy + archetype

Finally, we can describe an image as

image = form + content

Therefore, by substituting in the above equation, we can write

symbol = (energy + archetype) + (form + content) or simply

symbol = energy + archetype + form + content

The beauty of using an equation to define symbols is that it respects the dynamics that define symbols. In the above equation, the content of the image accounts for only one-fourth of the elements of the symbol. The other three are not only less tangible than the contents, but also resist reduction. Furthermore, expressing the dimensions of a symbol in a quasi-mathematical form opens up another language to play with the definitions. For example, archetypes are basically "forming devices." That is, they arrange psychic energy and, when their character complements the form of the image, arrange the content of the image. So, perhaps a better equation to express the dynamics of symbols might be:

symbol = energy + form + content/archetype

In this case, the archetype is the denominator that permeates the three elements of the numerator. This sets up a proportion between numerator and denominator that can evaluate the degree to which a symbol is conscious or unconscious. The larger the numerator, the more conscious the symbol. The larger the denominator, the more unconscious the symbol.

So don't be afraid of mathematics. Think of it as a game. Once you know the rules, you can have a lot of fun!

Glossary of Chaos Theory Terms

A

Attractor. The configuration or pattern into which a dynamic eventually settles, like the routines in our lives that emerge after we move to a new location.

B

Bifurcation. A split in a dynamic that establishes two dynamics where previously there was only one. If the dynamic continues to bifurcate, then four, eight, sixteen, thirty-two (and so on) dynamics evolve from the original.

Bipolarity. The division of a dynamic into two domains, as in the bipolarity of archetypes. Jung believed that one pole pulled energy toward the instincts, the other toward the spirit. Bipolarity also applies to a dynamic after it bifurcates.

C

Cascade. A rapidly repeating, infinitely multiplying dynamic. Deterministic chaos occurs when bifurcations multiply so rapidly that a cascade is established.

Chaos. Occurs when a dynamic becomes so complex as to be unpredictable. Entropic chaos never resolves into a new order; deterministic chaos does.

D

Diachronic. Evolving over time, as in the evolution of increased complexity of a species over time.

F

Fractal. A term coined by Benoit Mandelbrot, referring to elements of a dynamic that cannot be defined by categories.

Fragmentation. Falling apart, as in dividing into component parts.

H

Homoclinic point. The point of entry and departure of a dynamic when it becomes chaotic or orderly. Usually associated with saddle points, homoclinic points allow stable dynamics to become chaotic, and chaotic dynamics to become orderly.

Hopf bifurcation. The point at which a stable dynamic splits in two, leading to a cascade of bifurcations (splits) that become so complex they appear chaotic.

I

Iteration. Feeding back into a dynamic the results of its own dynamics, for instance substituting a value for a variable in an equation that is the result of an immediately preceding computation of that same equation.

M

Mixing. The result of iteration, especially when an equation contains two or more mutually modifying dynamics, as in a mutual inhibition equation.

Mutual inhibition. Sometimes called a "Verhulst Dynamic," it describes two or more dynamics that modify one another, as in the equation $y(1-y)$, where y is a fraction. As y increases, $1-y$ decreases, and vice versa.

P

Period-doubling cascades. An endless expansion in bifurcations (i.e., when bifurcations themselves bifurcate). The end product of such cascades is so chaotic as to defy analysis

S

Saddle point. Functions as an attractor and/or a repellor of a dynamic. Thus, as an equation iterates, it approaches certain values and avoids others. Saddle points designate where both occur. Thus, they are said to attract and repel.

Scale-invariance. Refers to patterns that preserve their appearance no matter how they are magnified or reduced. In other words, they look the same no matter what the scale.

Self-organization. The clustering of random events, as for instance the patterns that emerge in rush hour traffic.

Self-similarity across scale. The same as scale-invariance.

Sensitive dependence on ititial conditions. Where a dynamic ends up depends on where it begins. When very slight differences in a starting point lead to enormous differences over time (as in turbulent weather conditions), the dynamic is said to manifest sensitive dependence on initial conditions.

Strange attractor. The pattern into which a dynamic eventually settles is said to "attract" the dynamic. In the case of strange attractors, the dynamic settles down into a pattern, but never crosses over itself or repeats exactly any particular "path" in that pattern. It is always doing something new, yet it confines itself to certain domains. Thus, it is said to be "strange."

Symmetry. Refers to patterns that preserve their character through changes in their orientation. For example, a square rotated about its center looks the same as it does when it is turned over.

Symmetry building. An elaboration of a dynamic's ability to self-organize. Symmetry building occurs when two chaotic attractors merge to form one attractor with greater symmetry.

Synchronic. Constantly repeating, like the roller at the end of a conveyor belt or the gears in a car. They simply go around and around, while the belt and the car move from one place to the other. Psychologically, synchronic dynamics, as the product of a constantly recurring dynamic between consciousness and the unconscious, are the very essence of the individuation process.

T

Transcendent function. Defined by Jung as "a natural process, a manifestation of the energy that springs from the tension of opposites." It describes the active role that the archetypes play in resolving the conflicts generated by the synchronic dynamics of individuation.

Bibliography

Arendt, Hanna. *Crises of the Republic*. New York: Harcourt, Brace, Jovanovich, Inc., 1972.

Bassler, Jouette. "The Parable of the Loaves." In *The Journal of Religion,* vol. 66, no. 2 (April 1986).

Bateson, G., Jackson, D.D., Haley, J., and Weakland, J.H. "Toward a Theory of Schizophrenia." In *Behavioral Science,* vol. 1 (1956).

Briggs, John, and Peat, F. David. *Turbulent Mirror*. San Francisco: Harper and Row, 1989.

Bruchac, Joseph. *Iroquois Stories: Heroes and Heroines, Monsters and Magic*. Freedom, CA: The Crossing Press, 1985.

Churchland, Patricia S., and Sejnowski, Terrence J. *The Computational Brain*. Cambridge, MA: M.I.T. Press, 1992.

The Complete Grimm's Fairy Tales. London: Routledge and Kegan Paul, 1975.

Conrad, Joseph. *The Nigger of the Narcissus, Typhoon and Other Stories*. New York: Penguin Books, 1983.

Dewdney, A. K. "Computer Recreations: Probing the Strange Attractor of Chaos." In *Scientific American,* vol. 259, no. 7 (July 1987).

Eilenberger, Gert. "Freedom, Science, and Aesthetics." In *The Beauty of Fractals: Images of Complex Dynamical Systems*. Ed. H.O. Peitgen and P.H. Richter. New York: Springer-Verlag, 1986.

Eliade, Mircea. *The Myth of the Eternal Return, or Cosmos and History*. Princeton: Princeton University Press, 1974.

Eliade, Mircea. "The Eternal Return." In *Parabola,* vol. 13, no. 2 (May 1988).

Eliade, Mircea. *Rites and Symbols of Initiation*. San Francisco: Harper Torchbooks, 1975.

Field, Michael, and Golubitsky, Martin. *Symmetry in Chaos: A Search for Pattern in Mathematics, Art and Nature*. New York: Oxford University Press, 1992.

Freeman, Walter J. "The Physiology of Perception." In *Scientific American,* vol. 264, no. 2 (February 1991).

Gibson, C., ed. *The Facts on File Dictionary of Mathematics*. New York: Charles Letts & Co., Ltd., 1988.

Gleick, James. *Chaos: Making a New Science*. New York. Viking Press, 1987.

Gleick, James. "New Images of Chaos That Are Stirring a Scientific Revolution." In *The Smithsonian* (December 1987).

Govinda, Lama Anagarika. *The Way of the White Clouds*. Boston: Shambhala Press, 1970.

Grant, Michael. *Myths of the Greeks and Romans*. New York. New American Library, 1962.

Guggenbühl-Craig, Adolph. *Eros on Crutches: Reflections on Amorality and Psychopathy*. Irving, TX: Spring Publications, 1980.

Hamilton, Edith. *Mythology*. New York: New American Library, 1969.

Harlow, H.F., and Harlow, M.K. "Social Deprivation in Monkeys." In *Scientific American,* vol. 207 (1962).

Heidegger, Martin. *Discourse on Thinking*. New York. Harper, 1966.

Homans, Peter. "Psychology and Hermeneutics: Jung's Contribution." In *Zygon,* vol 4 (December 1969).

Humbert Elie. C. G. Jung: *The Fundamentals of Theory and Practice*. Wilmette, IL: Chiron Publications, 1988.

James, William. *Varieties of Religious Experience*. New York: The Modern Library, 1929.

Jung, C.G. *The Collected Works* (Bollingen Series XX). 20 vols. Trans. R.F.C. Hull. Ed. H. Read, M. Fordham, G. Adler, Wm. McGuire. Princeton: Princeton University Press, 19531979.

Jung, C.G. *Jung Speaking* (Bollingen Series XCVII). Ed. Wm. McGuire and R.F.C. Hull. Princeton: Princeton University Press, 1977.

Kepes, Gyorgy. *Language of Vision*. Chicago: P. Theobald, 1944.

Larousse World Mythology. Ed. Pierre Grimal. Secaucus, NJ: Chartwell Books, Inc., 1965.

Lauwerier, H.A. "Two-Dimensional Iterative Maps." In *Chaos*. Ed. A.V. Holden. Princeton: Princeton University Press, 1986.

Mandelbrot, B.B. *The Fractal Geometry of Nature*. New York: W. H Freeman and Company, 1983.

Marius, Richard. "The Browser." In *Harvard Magazine,* vol. 96, no. 2 (NovemberDecember 1993).

Meier, C.A. (1971). "Psychological Types and Individuation." In *The Analytic Process: Aims, Analysis, Training*. Ed. J.B. Wheelwright. New York: G. P. Putnam's Sons, 1971.

Merton, Thomas. *The Wisdom of the Desert*. New York: New Directions Publishing Company, 1970.

Neumann, Erich. *Amor and Psyche* (Bollingen Series LIV). Princeton: Princeton University Press, 1990.

Neumann, Erich. *The Origins and History of Consciousness* (Bollingen Series XLII). Princeton: Princeton University Press, 1973.

Nozick, Robert. *The Nature of Rationality*. Princeton: Princeton University Press, 1993.

Nunn, Kem. *Pomona Queen*. New York: Pocket Books, 1992. Ortega y Gasser, Jose. *Meditations on Quixote*. New York: W. W. Norton and Company, 1961.

Peitgen, Heinz Otto, Jurgens, Hartmut, and Saupe, Dietmar. *Chaos and Fractals: New Frontiers of Science*. New York: Springer-Verlag, 1992.

Pfeiffer, John. *The Creative Explosion*. New York: Harper and Row, 1982.

Piaget, Jean. *Main Trends in Interdisciplinary Research*. Evanston, IL: Harper Torchbooks, 1973.

Pool, Robert. "Is It Chaos, Or Is It Just Noise?" In *Science,* vol. 243, no. 1 (Jan. 1989).

Pool, Robert. "Is It Healthy To Be Chaotic?" In *Science,* vol. 243, no. 2 (February 1989).

Rapp, P.E. "Oscillations and Chaos in Cellular Metabolism and Physiological Systems." In *Chaos*. Ed. A.V. Holden. Princeton: Princeton University Press, 1986.

Ricoeur, Paul. *From Text to Action: Essays in Hermeneutics, II*. Evanston, IL: Northwestern University Press, 1991.

Ricoeur, Paul. *Interpretation Theory Discourse and the Surplus of Meaning*. Fort Worth, TX: Texas Christian University Press, 1976.

Ricoeur, Paul. *The Symbolism of Evil*. Boston: Beacon Press, 1967.

Ruelle, David. *Chance and Chaos*. Princeton: Princeton University Press, 1991.

Sander, L.M. "Fractal Growth Processes." In *Nature,* vol. 322 (August 1986).

Sparrow, C. "The Lorenz Equations." In *Chaos*. Ed. A.V. Holden. Princeton: Princeton University Press, 1986.

Stevens, Anthony. *Archetypes: A Natural History of the Self*. New York: Quill, 1983.

Thelen, Esther. "Development As a Dynamic System." In *Current Directions in Psychological Science,* vol. 1, no. 6 (December 1992).

Tillich, Paul. *The Dynamics of Faith*. New York: Harper and Row, 1956.

Timmerman, Jacobo. *Chile: Death in the South*. New York: Vintage Books, 1988.

Tomita, K., "Periodically Forced Non-Linear Oscillators." In *Chaos*. Ed. A.V. Holden. Princeton: Princeton University Press, 1986.

Toulmin, Stephen. *Foresight and Understanding*. New York: Harper and Row, 1961.

Van Eenwyk, John R. "The Analysis of Defences." In *The Journal of Analytical Psychology,* vol. 36, no. 2 (April 1991).

Van Eenwyk, John R. "Archetypes: The Strange Attractors of the Psyche." In *The Journal of Analytical Psychology,* vol. 36, no. 1 (January 1991).

Van Eenwyk, John R. "Chaotic Dynamics and the Development of Consciousness." In *Fractals of Brain, Fractals of Mind: In Search of a Symmetry Bond*. Ed. Earl R. MacCormac and Maxim I. Stamenov. Philadelphia: John Benjamins, 1996.

Van Eenwyk, John R. "The Chaotic Dynamics of Everyday Life." In *The Quest,* vol. 4, no. 1 (Spring 1991).

van Gennep, Arnold. *The Rites of Passage*. Chicago. University of Chicago Press, 1960.

von Franz, Marie-Louise. *Creation Myths*. Zürich: Spring Publications, 1972.

von Franz, Marie-Louise. *The Golden Ass of Apuleius*. Zürich: Spring Publications, 1970.

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