

CHAPTER ONE

Postmodern Ecology and the Crisis of Modernity

From a Gaian viewpoint, all attempts to rationalize a subjugated biosphere with man in charge are as doomed to failure as the similar concept of benevolent colonialism. They all assume that man is the possessor of this planet; if not the owner, then the tenant.

—J. E. Lovelock, *Gaia: A New Look at Life on Earth*

The most important task today is, perhaps, to learn to think in a new way. . . . Consider a tree and a man and an axe. We observe that the axe flies through the air and makes certain sorts of gashes. . . . If now we want to explain this set of phenomena, we shall be concerned with differences in the cut face of the tree, differences in the retina of the man, differences in his central nervous system, differences in his efferent neural messages, differences in the behavior of his muscles, differences in how the axe flies, to the differences which the axe then makes on the face of the tree. Our explanation will go round and round that circuit. . . . But if I am cutting down a tree, I still think that “Gregory Bateson” is cutting down the tree.

—Gregory Bateson, *Steps to an Ecology of Mind*

[T]he rhizome is an acentered, nonhierarchical, nonsignifying system without a General and without an organizing memory or central automaton, defined solely

by a circulation of states. What is at question in the rhizome is a relation to sexuality — but also to the animal, the vegetal, the world, politics, the book, things natural and artificial . . . all manner of “becomings.”

—Gilles Deleuze and Félix Guattari,
A Thousand Plateaus

What is written as *différance*, then, will be the playing movement that “produces” — by means of something that is not simply an activity — these differences, these effects of difference.

—Jacques Derrida, “*Différance*”

A difference which makes a difference is an idea.

—Bateson, *Steps*

The Languages Of “Nature” and “Culture”: Ecological and Postmodern Discourses

What is the relationship between postmodernity and ecology? The ideas of ecology and postmodernity are the complementary halves of a new environmental ethics and practice. In the language of ecology, the biosphere is a conversational domain. The languages in which its discourses unfold are written in the genotypes and expressed in the phenotypes of myriad organisms. Their “conversing” is in the diverse forms of relationship among creatures, temporally unfolding like a Japanese scroll, creative yet ordered, violent and serene, Yang and Yin, competitive and cooperative. The ideas of postmodernity are like the fishes of M. C. Escher that metamorphose into birds, carrying time and being with them. Like Franz Kafka’s Gregor or Nietzsche’s Madman, they are self-transforming metaphors inscribed beyond the boundaries of logocentric discourse, burrowing into realms opened by the sleep of reason, deterritorializing the real estate of the great Western technological utopia—Viet Cong of the imagination. “What is required,” says radical ecologist and communication theorist Anthony Wilden, “is a GUERRILLA RHETORIC”: a new form of writing, an *écriture* inscribed in rubrics from DNA to MLA, spiraling through “nature” and “culture.”

Metaphorically, the ideas of postmodernity and those of ecology are complementary halves of a new multidimensional environmental ethics

and practice—of a guerilla rhetoric designed to deconstruct the closed discourse of modernity. The “eco-logic” of ecology and the “para-logic” of postmodernity are both based on the generative idea of “difference” or *différence*. But this “idea” diverges fundamentally from the old Platonic notion of *idea* as Form and likewise from the Aristotelian one of *idea* as category. It furthermore diverges from the logico-mathematical concept of identity underlying the technological models of modern science. It therefore provides the basis for a critique of both classical and modern metaphysics, especially the Cartesian doctrines of the *cogito* and of primary and secondary qualities. Traditional humanism and Romanticism, especially in their opposition to the technological project of modern science, are arguably precursors to postmodernity and ecology, but the latter are new and fundamental correctives to the hubris of industrial civilization. What doesn’t fit into the program of the Managers of the Planet are “externalities”: the rich living worlds “out there” in Vineland, beyond the mall, the bullet-proof glass, SAC headquarters, the space capsule. By their affirmation of difference, postmodernity and ecology open modernity to those very externalities; they become the generative forms of a new creative process that breaks down the wall between nature and culture: the *poësis* of living.

The Convergence of Postmodernity and Ecology

In what way do postmodern and ecological ideas embody the “externalities” of modernization? Postmodern thinking is external to several key aspects of modernity. It may be useful to summarize them here. First, postmodern thought typically invokes metaphor rather than logic as the guiding idea of its discourse. Second, it rejects the fundamental dichotomies upon which modern thought is based: subject and object, culture and nature, literature and science, male and female, primary and secondary qualities. Third, it develops in terms of a notion of ideation—particularly Derrida’s *différance*—that diverges from the metaphysical ideas inherited by modern thought from Plato. As a result, fourth, it is skeptical both of metaphysics and of the master narratives like progress and enlightenment based upon them. Similarly, ecological thought, especially as it has been developed by thinkers from Bateson to Haraway, first rejects the idea that natural history may be adequately represented in terms of logical or digital systems and invokes metaphor or analogic communication as the language of evolution. Second, this strain of ecology

challenges the same dichotomies of modern thought that postmodern discourse does. Third, ecology focuses on the evolution and interaction of ideas defined as “differences”—particularly Bateson’s “difference that makes a difference”; this definition diverges from the classical and modern notion of species or genus as a unitary type and so yields skepticism about the “genetic code” as the archetype for organisms or as the “unit of survival” in evolution. Fourth, ecology therefore rejects the master story that natural and cultural history consist in species or peoples struggling for survival and, especially in the case of *homo sapiens*, imposing their kind on others.

Postmodern and ecological ideas converge in the ideas of communication, evolution, and play. As I have suggested in the introduction, communication theory and cybernetics offer a picture in which the processes of the living world are patterned upon one another by metaphor and homology. This sharing of analogies between various creatures generates what Bateson called “the pattern which connects” the various logical oppositions of metaphysics like “organism” and “environment” in the polyform web of ecology. Ecological diversity becomes “external” to the uniformity imposed by logical classification. That diversity is, as I try to show below, more akin to the forms of the poetic imagination than to the linear deductions of reason. Romanticism, which offered a poetic view of nature to counter the logic of what Blake called “single vision and Newton’s sleep,” is therefore an important predecessor of both ecological and postmodern thought. Both postmodern and ecological ideas, however, do not accept the metaphysical dichotomy of “primary” and “secondary” qualities. They therefore are not inclined to accept the “objective” status of logical and mathematical discourse and the “subjective” status of poetic language. As I argue in Chapter 3, this has led Habermas to characterize postmodern thought as confusing the genre distinction between science and literature, mistakenly treating poetics as a language worthy of steering the modern ship of state. In this regard, Habermas is a good modernist for he criticizes a key issue of postmodernity: it challenges the hegemony of logical and mathematical discourses in the description and demarcation of “nature” and “culture.” Bateson’s alternative view of communication theory in terms of metaphor instead of logic, combined with the postmodern challenge to the genre distinction between “literature” and “science,” however, cannot be so easily dismissed. For as I try to show, that distinction is itself a characteristic of modern thought and is, to put it simply, self-justifying. The question is

whether the fundamentals of modernism are tenable. Both postmodern and ecological thinkers argue that they are not. In their place they propose a very different language game. If I am right, the postmodern-ecological game offers a fundamental change of course for modernity.

Ecological and postmodern ideas also converge in the idea of evolution. The Neo-Darwinian picture of evolution represents species as evolving in terms of random mutation and natural selection. The genetic code inscribed in DNA is selected at the level of the genetic population. That code is seen as mutating and reshaping itself in response to environmental stress. Random changes at the genetic level result, via the reproductive cycle of organisms, in a variety of phenotypes that are subjected to the stresses of the environment. Those genetic changes that produce phenotypes capable of surviving and reproducing in the current environment are transmitted to future generations and so form the new configuration of the code. In pre-cybernetic terms this relationship is seen as one of "blind" variations on the part of the genotype that are shaped into adaptations by the interactions of phenotypes with the environment. In cybernetic terms, as described by Bateson, Waddington and others, however, the relationship between genotype and phenotype is viewed as a feedback loop.

Environmental stress on phenotypes provides feedback to the genotype via natural selection. The patterning in ecosystems is emergent from shared codes in the initial genetic configurations of organisms and shared environmental stresses. In Neo-Darwinian terms this patterning is the product of chance: there is no *design* or *teleology* evident in the evolutionary process. In cybernetic terms, nevertheless, there is what Waddington calls a "canalizing" effect whereby organisms internalize environmental conditions that trigger genetically programmed responses and so simulate the Lamarckian inheritance of acquired characteristics. So ostriches, as Waddington argues, may develop conditions in their epigenetic system that trigger the expression of the genetic disposition to develop callouses, thereby allowing what seems originally to have been a response to the environment during embryogenesis. What result are baby ostriches with callosities that appear to have been designed for a particular environmental stress. In cybernetic terms this is describable as "communication" between the genetic code and the environment.

But communication is in terms of *ideas*. As Bateson would say, there is an increasing "redundancy" or patterning emergent between phenotypic expressions and environmental stresses that, in traditional terms,

suggests design. Designs are the expression of ideas, traditionally ideas in the mind of God or eternal Platonic Forms which were supposed to account for the patterns of nature. The relevant question about evolution is: how could ideas (information) evolve out of random processes (entropy)? The answer in Neo-Darwinian terms is that they do not because there are no “ideas” in nature, only material processes. Ideas are the subjective or secondary qualities inhering in the human mind. That mind is defined by Descartes, the architect of modern thought, as the *cogito*: the thinking self who transcends nature. Both Bateson and Derrida are critics of this Cartesian idea. Both argue that ideation—“the difference which makes a difference” and *différance*, respectively—is inseparable from “nature.” Because the attribution of ideas only to the realm of the human self and exclusion of them from nature is a fundamental tenet of modernism, both Bateson, the ecologist, and Derrida, the “post” or “neo” structuralist, are in agreement that a “post” modern form of thinking is necessary. Thus I trace the relationship between these two thinkers throughout this book. I argue that the “evolution” of ideas from a cybernetic perspective is analogous to their temporal and spatial displacement in the play of *différance* from a neostructuralist one. A postmodern picture of evolution is the result.

Evolution, or spatiotemporal demarcation of patterns through the production and structuring of differences, is described by both Bateson and Derrida in terms of *play*. For Bateson play is the paradoxical interchange of messages on multiple levels of abstraction by which mammals, including humans, generate their communities. The players in those communities are related to one another in interchanges that, in Bateson’s view, are analogous to the interaction of populations, organisms and environments in evolution. Players—social or biological—are engaged in a communicative dialogue with one another and with their environments. Similarly, Derrida views all of the constructions of metaphysics—from culture to nature—as derivative from the play of discourse. For Derrida, authors are generated by the play of language, and not vice-versa, just as for Bateson “species” or “selves” are generated by the play of communication and not vice-versa. For both, therefore, the biological differentiation of “male” and “female” as well as the cultural demarcation of “masculine” and “feminine” is, like other metaphysical distinctions, *constructed* from the play of shared discourse. Both argue that modern thought has things the other way around. The play of discourse and communication

producing the web of life is, therefore, “external” to the theory and practice of modernity.

So it is that I begin with an historical fable, a play, about the development of modern thought and postmodern alternatives. After all, if the perspective I am developing is correct, modernity is a great artifact, a fiction. I therefore elect to enter an historically fictive mode to communicate with it.

The Project of Modernity: A Historical Fable about the Domination of Nature

The project of modernity was, from the start, to give one hypostatized entity—“man”—control over another—“nature.” That the program was in many respects a “success” is evident in the omnipresent concatenation of more or less useful devices that have all but displaced nature and put in “its” place a technological environment. Believe it or not, we live in the utopia envisioned by the great minds of the Renaissance who initiated the ambitious modernist paradigm. This utopian quest to become, in the words of Renaissance humanist Giordano Bruno, “god of the earth” (*The Expulsion of the Triumphant Beast*, 1585, 205) has become realized in the great technological project of the modern world, to progress toward an air-conditioned paradise. Accordingly, knowledge is to be valued principally insofar as it contributes to the emerging Kingdom. In the words of Francis Bacon, spoken by the Father of his utopian Salomon’s House, “The end of our foundation is the knowledge of causes, and secret motions of things; and enlarging of the bounds of human empire, to the effecting of all things possible” (*New Atlantis*, 1627, 210). Thus in the history of modern ideas science is usually represented as rising triumphantly in the service of progress.

The Foundations of Modern Science

Descartes is often thought of as a founder of modern science, for he lays down the theory of knowledge and method in terms of which science has progressed. As he says in his *First Meditation*, “I had to undertake seriously once in my life to rid myself of all the opinions I had adopted up to then, and to begin afresh from the foundations, if I wished to establish something firm and constant in the sciences” (95). Descartes sought to establish certain and indubitable knowledge by laying out the conceptual

and methodological guidelines for researchers to follow. Thus, building on the work of Galileo, he developed what John Locke would call the doctrine of primary and secondary qualities.

The doctrine of primary and secondary qualities epitomized the new science founded by Galileo and Descartes. It in effect created a new world picture by distinguishing between two kinds of phenomena: “primary” status was accorded to quantifiable phenomena and “secondary” status accorded to unquantifiable ones. The former, furthermore, were designated as “objective” while the latter were tagged “subjective.” The result was a picture of “objective” nature that was thoroughly mathematized. The “subjective” nature of human beings, left to the impressionistic whims of consciousness, was in effect removed from the objective or primary—that is, the real—world. Galileo argues, accordingly,

But that external bodies, to excite in us these tastes, these odours, and these sounds, demanded other than size, figure, number, and slow or rapid motion, I do not believe; and I judge that, if the ears, the tongue, and the nostrils were taken away, the figure, the numbers, and the motions would indeed remain, but not the odours nor the tastes nor the sounds, which, without the living animal, I do not believe are anything else than names . . . and that the thing that produces heat in us and makes us perceive it, which we call by the general name fire, is a multitude of minute corpuscles thus and thus figured, moved with such and such a velocity. (*Opere*, IV, 336ff., quoted in Burt, *Metaphysical Foundations*, 88)

Based on this demarcation of experience, the foundations of a new empire were laid.

The “Human” Empire: Science, Technology, and Capitalism

It was a central goal of the scientific and technical project from its outset, moreover, to embark on a conquest of nature, even while obeying her laws. As Francis Bacon, again, succinctly articulates the modernist project: “human knowledge and human power meet in one; for where the cause is not known the effect cannot be produced. Nature to be commanded must be obeyed; and that which in contemplation is as the cause

is in operation as the rule" (*Novum Organum*, Aphorism iii, 39). Thus an operational and *instrumental* paradigm was superadded to the primary–secondary doctrine, so that nature was now seen as a material domain, quantitatively defined, whose principal value was as a means to an end.

The end, by and large, was defined by the new social and economic class, also emergent from the Renaissance, the bourgeoisie. Thus the entrepreneur became the new embodiment of Bruno's ambitious god, and the end he sought was capital. That the latter could be quantified only served to further the alliance between capitalism and the rise of science, for just as the scientist employed the primary–secondary and instrumental paradigms in order to understand nature's machinery, so the entrepreneur subjected the process of production, including of course the worker, to quantitative analysis and instrumental value. Thus production was operationalized in the form of the factory, and the workers employed as wage slaves, selling their labor power in a system punctuated by the time clock: the Newtonian clockwork universe inscribed into the life-world of the industrial proletariat.

With the development of the "social" sciences, which served in part as the ideological mirror in which the proletarianization of the workforce was reflected, the reference of scientific discourse was shifted from "nature" to human beings, but the assumptions about scientific veracity, stemming from the primary–secondary and instrumentalist paradigms, were not substantially altered. Therefore to establish a true account of the human mind, or of human behavior, or of man's social milieu, required a mathematical or functional model. So Thomas Hobbes argues, echoing Galileo,

and this seeming, or fancy, is that which men call *sense*; and consisteth, as to the eye, in a light, or color figured; to the ear, in a sound; to the nostril, in an odor; to the tongue and palate, in a savor; and to the rest of the body, in heat, cold, hardness, softness, and such other qualities we discern by feeling. All which qualities, called *sensible*, are, in the object that causeth them, but so many several motions of matter, by which it presseth our organs diversely. Neither in us that are pressed, are they anything else but diverse motions; for motion produceth nothing but motion. (*Leviathan* I.i, 25–26)

Both the natural and the social scientist agree that the secondary qualities are derivative effects of the primary ones; that perceptual experience is

the subjective result of “matter”—quantifiable objects—in motion. Both agree, furthermore, that the objectification of secondary qualities, as in the “visible species” and “audible species” and “intelligible species” of Aristotle (*Leviathan* I.i, 26) or in the referents of “names” (Galileo loc. cit., Burt, *Metaphysical Foundations*, 88), is fundamentally mistaken.

If Hobbes did not, like Bacon, explicitly see the task of science as establishing dominion over nature or society, he did represent individual and collective human existence in such a way as to insure the same result; for to him society and its inhabitants were virtually machines:

Nature . . . can make an artificial animal. For seeing life is but a motion of limbs, the beginning whereof is in some principal part within; why may we not say, that all *automata* (engines that move themselves by springs and wheels as doth a watch) have an artificial life? For what is the heart, but a spring; and the nerves, but so many strings, and the joints, but so many wheels, giving motion to the whole body, such as was intended by the artificer? Art goes yet further, imitating that rational and most excellent work of nature, man. For by art is created the great *Leviathan* called a *Commonwealth*, or *State*, in Latin *Civitas*, which is but an artificial man. (Introduction, 23)

Likewise the “thoughts of man” are, in Hobbes’ view, the effects of “sense” which, as we have seen is itself the effect of material particles in motion: “concerning the thoughts of man . . . [t]he original of them all is that which we call *sense*, for there is no conception in a man’s mind which hath not at first, totally or by parts, been begotten upon the organs of sense” (25). Thus man in his body, mind, and society is understood in accordance with the materialist and quantitative assumptions of the primary–secondary doctrine and of instrumentalism. The smooth-running machines of the new human order, under the dominion of the new functional model, complete Bacon’s project by closing the modern universe of discourse to all but the technologically and economically empowered industrialist or his apologists.

The Mastery of “Mother” Nature

The entrepreneur was also male and his project one of dominating nature as female, just as he subjugated women (not to mention children) in the workplace and his wife in the household. The Enlightenment was a

men's club, contemptuous of the medieval economy and worldview and confident that the new world it envisioned would be a beacon of freedom for all. But women were not invited to join, only to be either servants or "ladylike" guests, genteel as they were disempowered. As Francis Bacon vividly said, "I am come in very truth leading Nature to you, with all her children, to bind her to your service and to make her your slave. . . . So may I succeed in my only earthly wish, namely to stretch the deplorably narrow limits of man's dominion over the universe to their promised bounds" (from *The Masculine Birth of Time, or the Great Instauration of the Domination of Man over the Universe* [1603]).

As Carolyn Merchant argues in *The Death of Nature*, "it is important to recognize the normative import of descriptive statements about nature" (20); thus the new mechanical model of the cosmos developed at the outset of modern science concealed within its allegedly neutral descriptions a prescriptive agenda: the domination of nature. Aristotle understood masculine form as being imposed on feminine matter: "if, then, the male stands for the effective and active, and the female for the passive, it follows that what the female would contribute to the semen of the male would not be semen but material for the semen to work upon. This is just what we find to be the case" (*Generation of Animals* 729a 29–32). With the inception of the mechanistic paradigm, the formal cause, bound up with the efficient cause in Aristotle's description, is separated from the natural realm, leaving only the efficient cause operating in the mechanistic "laws of nature" articulated mathematically by the *cogito* of the technologist. The new paradigm also separated the concept of mind from that of nature, rejecting the classical notion of mind implicit in the teleology of final causation as well as in the Christian belief that nature is God's design. The human mind, understood as the *cogito*, became the sole instance of mind in nature, though not of it. As Descartes says, in the *Second Meditation*,

this alone cannot be detached from me. I am, I exist: this is certain; but for how long? For as long as I think. . . . I am therefore, precisely speaking, only a thing which thinks. . . . I am not this assemblage of limbs called the human body; I am not a thin and penetrating air spread through all these members. (105)

The *cogito* is compelled to think if it wants to keep existing, just as the entrepreneur is compelled by competition to produce if he wants to stay in business and the scientist or technologist to discover or invent to

advance progress. Thus the mind of man, to the extent that it can “master” the principles of mechanism through the study of technology, is “free” to compete, discover, and invent in order to impose its designs on the random play of matter for the expansion of the human empire. Masculine intellect thereby dominates the feminine body of nature under the guise of a purely descriptive and objective science.

Classical and Medieval Antecedents: The Great Chain

The scientific paradigm, as the above discussion suggests, amounted to the reapplication of an old world system in a “progressive” and aggressive new way, particularly by making man’s mind separate from, yet lord over, nature. The structure of the classical and medieval world systems was in terms of what Alexander Pope called the Great Chain of Being. This chain consisted of a hierarchy descending from the highest to the lowest orders of being:

	MEDIEVAL	CLASSICAL
	God	<i>Nous/Ideai</i>
MIND	Angels	<i>Mathematica</i>
	Man	Man/ <i>Anthropos</i>
BODY	Animals	Animals/ <i>Zoa</i>
	Plants	
	Minerals	Images/ <i>Eikones</i>

The old Platonic system set the terms of the chain for the classical world. The ultimate reality consisted of Forms (*ideai*), which were apprehended by pure intellectual contemplation (*nous*); at one level lower (arguably) were mathematical formulas (*mathematica*) apprehended by means of discursive thought (*dianoia*); below that were natural bodies (*zoa*) accepted by common sense or belief (*pistis*) but, strictly speaking, unintelligible; and at the lowest level were images (*eikones*) of natural bodies, taken as real by those in a state of illusion (*eikasias*), for instance, those who might take a painted image for the reality it depicts. The Platonic ideal was the “love of wisdom,” philosophy: to achieve a state of *nous*, to contemplate the *ideai*, and if possible to teach others and even legislate for others based on this superior form of knowledge: to lead the prisoners out of the cave of nature into the sunlight, as Plato’s famous allegory has it, or to order the lives of those incapable of the ascent from the vantage point of luminous wisdom.

Aristotle made a fundamental change in the Platonic schema by incorporating the form or *idea* with matter or *dunamis* in his theory of substance. Just as in the generation of animals he understood the semen to act as both efficient and formal cause of an organism's coming into being, so he thinks of form, which is primary, being imprinted on matter, which is secondary, in the construction of natural substances:

Since we must know the existence of the thing and it must be given, clearly the question is *why* the matter is some individual thing, e.g. why are these materials a house? Because that which was the essence of a house is present. And why is this individual thing, or this body in this state, a man? Therefore what we seek is the cause, i.e. the form, by reason of which the matter is some definite thing; and this is the substance of the thing. (*Metaphysics* 1041b4–10)

And although Aristotle is willing to say "it is clear also that the soul is the primary substance and the body is matter" (1037a5–6), nevertheless he seems unwilling to *separate* form from matter in reality, though he allows the severance in definition (1033b20–24):

Is there then a sphere apart from the individual spheres or a house apart from the bricks? Rather we may say that no 'this' would ever have been coming to be, if this had been so. The 'form' however means the "such," and is not a "this"; thus when it has been generated, it is a "this such."

"This" is the particular; "such," the universal or the form implanted in matter that individuates it. Because the form is in reality inseparable from the matter, moreover, they become a "whole" or "one":

As regards that which is compounded out of something so that the whole is one—not like a heap, however, but like a syllable—the syllable is not its elements, *ba* is not the same as *b* and *a*, nor is flesh, fire and earth; for when they are dissolved the wholes, i.e. the flesh and the syllable, no longer exist, but the elements of the syllable exist, and so do fire and earth. The syllable, then, is something. . . . And this [the compound] is the substance of each thing; for this is the primary cause of its being. (1041b28–29)

So Aristotle anticipates the “holistic” view of organisms and other organized systems characteristic of ecological theory; he also provides the philosophical basis for what Dwight Eddins has called Orphic Naturalism and for the immanence of the Great Chain as a regulating principle in the natural and human worlds.

The classical immanence of mind in nature—expressed in the Aristotelian “unity” of form and matter, which nevertheless contains a dichotomy insofar as it involves a hierarchy dominated by masculine form—is mirrored in the medieval world system. As Anthony Wilden has argued in “Changing Frames of Order: Cybernetics and the *Machina Mundi*,” the medieval conception of the Great Chain culminated in a metaphor of a God not separated from nature but intrinsically a part of it—as its steersman, *kubernētēs* (the Greek root of “cybernetics”), or governor (Latin *gubernator*). He cites Nicholas of Cusa—mystic, mathematician, philosopher, theologian—from *On Learned Ignorance* (1440):

In consequence, there will be a *machina mundi* whose center, so to speak, is everywhere and whose circumference is nowhere, for God is its circumference and its center, and He is everywhere and nowhere. (224)

The Great Chain operates here, in Wilden’s view, as a “hierarchy of constraints” governing various subsystems, including human society, within an organically organized whole. “The ultimate constraint on all communication in the system (production, reproduction, exchange, maintenance, interaction) is embodied in a mysterious principle called God” (225). Given Cusa’s philosophical sophistication, “God” cannot be taken literally but must be grasped metaphorically. Thus Wilden argues, “taking the metaphor seriously, as a metaphor, we note at once that ‘God’ simply symbolizes the ultimate constraint on all past, present, and future behavior on this planet, the constraint we now call entropy” (225). Citing A. S. Eddington’s *The Nature of the Physical World* (1928), Wilden argues that entropy is not only a quantitative but also a qualitative conception depending on “the qualitative signification of a chosen relation between ‘order’ and ‘disorder.’” (See my Introduction for both views.) It is therefore comparable to “beauty” in that it is a characteristic of arrangement (226). Note that the Greek word for beauty, *kosmon*, also means an orderly arrangement of parts, as in the Parthenon or the ideal human figure, *The Spear Bearer*, sculpted by Polycleitos. Moreover, Wilden points out that, “for Nicholas, God is the locus where there is ‘the highest concordance’ . . . the locus of the coincidence of antitheses (*coincidentia con-*

triorum, oppositorum), the concordance of differences (*De concordantia catholica*, 1433)" (226). This might be taken to describe a system in a state of maximum entropy, where all differences are equalized. God is one. Finally, Wilden argues, "the concept of a hierarchically constrained universe is an elementary ecosystemic principle, and one that most readily distinguished the rules governing the behavior of living and social systems from the linear or efficient causality which is assumed to operate in the isolated, mechanical, equilibrium systems of a Newtonian universe" (226).

If God was the ultimate constraint on the medieval world system, what did the metaphor constrain? From the viewpoint of Marxism, Wilden contends, the concept of God "is simply a set of ideological *representations* of the real and material conditions which govern the *mode of production* dominant in medieval times and the *reproduction* of medieval society itself" (227). But if we supplement this view with that of information theory, he argues, we find that "these ideological constructs represent to consciousness (and to the unconscious), at the level of ideas and images, the *semiotic* organization of the medieval economic structure by the *information* flowing through the system at all levels" (227). Control and constraint are imposed on the system by the various semes and signs, levels and types of information that make up its organization; these are "encoded in various sign systems: in money, in capital, in commodities, in artifacts, in the patterning of the natural landscape by human activities, and in the structure of social relations" (227). Thus the ideological representations function as metastatements about the deep structure of the system; various forms of communication within the system—writing, painting, architecture, and so on—are describable as messages set in deep-structural code. "A code may be defined," Wilden says, "as a set of rules governing the permissible construction of messages in the system" (228).

In the medieval social system, the Great Chain culminating in God functioned as an ideological set of messages structured by the code of the feudal economy: one in which those higher in the feudal or ecclesiastical hierarchy exploited those below, to be sure, but in a steady-state system. As in Dante's *Commedia*, "progress" is principally spiritual, toward the ineffable unity of God:

God does not need the heavens or any other place for Himself because He is everywhere—both outside and inside the heavens. The heavens are moved by immaterial and incorporeal or

spiritual things called intelligences or separate substances. . . . Spiritual things are indivisible and neither occupy nor fill any place. . . . Each intelligence is whole and wholly in every part—however small—of the heaven that it moves, just as the human soul is whole and wholly in every part of the human body—except that the soul is in the body by information (*informacion*), and an intelligence is in its heaven by mutual fitting together (*appropriacion*). (Nicole Oresme, *Du ciel et du monde*, fols. 69d–70a; quoted in Wilden, 229)

This is a world organism built by an analogy derived from Aristotle: “it is clear also that the soul is the primary substance and the body is matter,” he argues, “and man or animal is the compound of both taken universally. . . . If he [Socrates] is simply this particular soul and this particular body, the individual is analogous to the universal” (*Metaphysics* 11.1037a5–9). In the medieval model, God, the ultimate constraint, is “everywhere” just as the human soul is “whole and wholly in every part of the body” (again, compare Aristotle on the nature of “flesh,” above). As Wilden comments on Oresme,

all relationships are conceived to be truly interrelational; the dominating pattern is that of a hierarchical unity of differences and a reciprocity of oppositions . . . *similitudo, analogia, aemulation, convenientia*: the dominant theme is that every apparently separate entity shares its being . . . with all the others; that they all know their place (in every sense); and that the cosmos is ordered as it is because all beings literally *co-operate* together in the whole. (229)

Because God is everywhere in the world, just as the soul is distributed throughout the body, there is no controller external to either cosmos or individual. “In other words,” Wilden argues, “the primary locus of constraint and control in this medieval system is exactly where it actually is in all non-engineered living systems: it is in the structural relations of the system itself” (231). This is a description of “social ecology” in a human-ecological system in steady state, internally regulated by the twin steersmen, God and man: “the Creator made man of all things, as a sort of driver and pilot, to drive and steer the things on earth, and charged him with the care of animals and plants, like a governor or steward subordinate to the chief and great King,” says Philo Judaeus (30 BCE–5 CE); “there was a god,

either maker or governor or both, of all this whole engine of the world," says Thomas More in *Heresyes* (1529) (both quoted in Wilden, 229). It was an ecology whose patterns of information or differentiation were woven by metaphor. But this social system was about to "evolve" under a new stress.

Splitting the Ecosystem: The Ecological Crisis Implicit in Modernism

The cataclysm for this medieval ecology came with the Renaissance, which brought a fundamental shift in the deep structure of European society, a mutation in the code of its political economy, from feudalism to capitalism. It is in this context that the aforementioned doctrine of primary and secondary qualities should be understood, for along with its instrumental and patriarchal concomitants, this doctrine provided the ideology for the capitalist expansion and global exploitation that would culminate materially in the Industrial Revolution and ideologically in the idea of progress. As E. A. Burtt describes it,

medieval philosophy, attempting to solve the ultimate *why* of events instead of their immediate *how*, and thus stressing the principle of final causality . . . had its appropriate conception of God. Here was the teleological hierarchy of the Aristotelian forms, all heading up in God or Pure Form, with man intermediate in reality and importance between him and the material world. . . . Now, with the superstructure from man up banished from the primary realm, which for Galileo is identified with material atoms in their mathematical relations, the *how* of events being the sole object of exact study, there had appeared no place for final causality whatsoever. The real world is simply a succession of atomic motions in mathematical continuity. With final causality gone, God as Aristotelianism had conceived him was quite lost. . . . The only way to keep him in the universe was to invert the Aristotelian metaphysics and regard him as the First Efficient Cause or Creator of the atoms. (98–99)

Thus God is conceived as external to the material body of the universe, setting the atoms in motion like a billiards player. The externalization of mind from nature in the macrocosm was duplicated in the microcosm of

the individual, with the Cartesian dualism between mind and body, so that the *cogito* took up the role of commander over the material atoms of the human machine, “this assemblage of limbs,” to reiterate Descartes, “called the human body.” From a Marxian perspective the deep structure underlying these ideological changes was economic, and the entrepreneur became the external agent setting into motion the alienated labor of the proletariat:

[The factory system] involves the idea of a vast automaton, composed of various mechanical and intellectual organs, acting in an uninterrupted concert for the production of a common object, all of them being subordinated to a self-regulated moving force. . . . Three distinct powers concur to their vitality [manufactures]—labour, science, capital; the first destined to move, the second to direct, the third to sustain. When the whole are in harmony, they form a body qualified to discharge its manifold functions by an intrinsic self-governing agency, like those of organic life. (Andrew Ure, *The Philosophy of Manufactures* [1835]; quoted in Wilden, “Changing Frames,” 233)

Despite the apparent organic analogy and affinity with the holistic medieval model, the above description precisely embodies the inverted Aristotelian metaphysics that Burtt describes, designating the powers of science and capital to regulate the movements of the workers, who are not allowed self-regulation or -direction: the proletariat become the atoms in the productive machinery of capitalism. The factory, furthermore, amplifies human labor with that of machines, prefiguring modern automated production. The system as a whole is guided by the material goal of ever-expanding capital and ideologically by the idea of limitless progress. As Wilden argues, “the essence of this change can be captured in the metaphor of ‘infinite progress’ (infinite growth, the infinite production and accumulation of exchange values). This restructuring required that the emerging system transcend the constraints on growth represented metaphorically in the medieval steady state economy by the figure of God” (236). Overall this separation of God from nature and mind from body, in a Faustian quest for limitless money, knowledge, and power, is the basis of what Wilden calls “splitting the ecosystem”: the bifurcation of the Great Chain and sundering of the constraints that it provided for the premodern European system. Thus God becomes the *deus absconditus*

anticipated by Nicolas of Cusa, man becomes “the ghost in the machine,” and for better or worse we enter the modern world.

From Ancient *Mythos* to Modern *Logos* to Postmodern *Ecologos*

The project of modernity—from the Gaian viewpoint of Lovelock, the colonization of the earth—conceivably entails no less than splitting the biosphere itself, and so human extinction, as the final product of progress. As Bateson argues, we can destroy the world with the best of intentions. Consider the ecological notion, articulated by Bateson, that the “unit of survival” is not, as Darwinism postulates, the individual organism, or species, or as social Darwinism would have it, entrepreneur, or enterprise or nation or class—a view that leads to the further, modernist assumption that the survival unit, “man,” must struggle against and attempt to dominate nature, or “we” must overcome “them,” using the most efficient means at his/our disposal. What tenaciously lives is, instead, a heterogeneous pattern involving both “organism” and “environment,” “us” and “them.” As Bateson argues, “the unit of survival is a flexible organism-in-its-environment” (457). Or, as Heidegger would say, living is “being open,” *Dasein*. What does not live for long in evolutionary ecology is a “species” that embodies the modernist paradigm:

It is now empirically clear that Darwinian evolutionary theory contained a very great error in its identification of the unit of survival under natural selection. The unit which was believed to be crucial and around which the theory was set up was either the breeding individual or the family line or the sub-species or some similar homogeneous set of conspecifics. Now I suggest that the last hundred years have demonstrated empirically that if an organism or aggregate of organisms sets to work with a focus on its own survival and thinks that is the way to select its adaptive moves, its “progress” ends up with a destroyed environment. If the organism ends up destroying its environment, it has in fact destroyed itself. (457)

The word “species” is the English form of the Latin *species*, which is in turn the translation of the Greek *idea*, the word, often rendered in English as “Form,” at the basis of Plato’s theory of Forms and of Aristotle’s natural kinds. The Forms are the objects of knowledge as well as the orga-

nizing divisions of the world, the archetypes or in modern terms “genotypes” on which the phenotypes of natural entities are patterned. A rational account of nature was called *logos*, and indeed Aristotle formalized the principles of correct reasoning as “logic.” The Socratic intellect evident in Plato’s Dialogues subjected the “stories” (*muthoi*, “myths”) of the Homeric tradition, to rational analysis, subordinating *mythos* to *logos*, or myth to logic (see Nestle, Havelock). Stories, or myths, are arguably encoded in a fashion similar to the *ecologies* of organisms and, though some Darwinists might scoff, evolution might be described, so Bateson thinks, as a kind of story.

There is a story which I have used before and shall use again: A man wanted to know about mind, not in nature, but in his private large computer. He asked it (no doubt in his best Fortran), “Do you compute that you will ever think like a human being?” The machine then set to work to analyze its own computational habits. Finally, the machine printed its answer on a piece of paper, as such machines do. The man ran to get the answer and found, neatly typed, the words:

THAT REMINDS ME OF A STORY.

Why would the computer suggest that the question about the analogy between human and machine intelligence might be answered in terms of a story?

A story is a little knot or complex of that species of connectedness which we call *relevance*. In the 1960’s, students were fighting for “relevance,” and I would assume that any A is relevant to any B if both A and B are parts or components of the same “story.”

... Now I want to show that whatever the word *story* means in the story which I told you, the fact of thinking in terms of stories does not isolate human beings as something separate from the starfish and the sea anemones, the coconut palms and the primroses. Rather, if the world be connected, if I am at all fundamentally right in what I am saying, then *thinking in terms of stories* must be shared by all mind or minds, whether ours or those of redwood forests and sea anemones. (Mind and Nature, 13)