CONTINUUM LOGIC: A CHINESE CONTRIBUTION TO KNOWLEDGE AND UNDERSTANDING IN PHILOSOPHY AND SCIENCE

INTRODUCTION

In the following analysis, we shall offer two propositions for consideration:

1. There is a continuum logic implicit in traditional Chinese philosophy.
2. This continuum logic has particular relevance for the pursuit of knowledge and understanding in philosophy and the sciences in contemporary “participant/spectator” views of the universe.

We have divided our discussion of the above propositions into three sections: The first considers contemporary philosophical perspectives in the sciences, especially biology; the second presents various approaches to logics, and proposes viewing logics and consciousness as related aspects of a mind and nature continuum; the third offers an exposition of Chinese continuum logic and its applications in the acquisition of knowledge and understanding.

PHILOSOPHY OF NATURE AND THE NATURAL SCIENCES

A. C. Graham, in his comparison of Indo-European and Chinese language structures and functions, suggested that the usages of the verb “to be” were the source of many of the metaphysical problems that have characterized “the history of Western philosophy, from Parmenides to the Existentialists.”1 The presupposition that “to be” implied an unchanging identity and existence beyond its functioning as copula was fundamental in the development of both classical mathematics (geometry) and physical science. By the end of the nineteenth century, however,
classical static and reductionist theories of the world had become increasingly problematic as physicists began exploring nature at the subatomic level in what the physicist John A. Wheeler calls a “participatory universe.”² According to the physicist Erwin Schroedinger, “‘Reality’, ‘existence’ and so forth are empty words.”³ Or as Schroedinger’s contemporary, the English physicist Sir Arthur Eddington expressed it, “It is a primitive form of thought that things either exist or do not exist; and the concept of a category of things possessing existence results from forcing our knowledge into a corresponding frame of thought.”⁴

The shift in perspective away from static reductionism has been equally radical in the biological sciences as well, where according to the German molecular biologist Friedrich Cramer, such an approach may lead to a study not of the “living” but of the “dead,” because in the examination of highly complex living systems “only by ripping apart the network at some point can we analyze life. We are therefore limited to the study of ‘dead’ things.”⁵ And Ernst Mayr in his *Growth of Biological Thought* offers a critical list of “do nots” for biological research, which “should not waste any time on a futile attempt at theory reduction . . . should not take one of the existing philosophies of physics as a starting point . . . should not focus most of its attention on laws, considering what small roles laws actually play in much of biological theory.” Mayr argues that “what is needed is an uncommitted philosophy of biology which stays equally far away from vitalism and other unscientific ideologies and from a physicalist reductionism that is unable to do justice to specifically biological phenomena and systems.”⁶

Another important shift in the natural and social sciences in the modern period has been away from the view of a simple and complete separation between observer and observed to an awareness that an observer also represents a living aspect of that which is being observed—both as a product and an aspect “of” nature, and as the mental possibility “in” nature of perspectives upon observing. Friedrich Cramer argues that the very concept of “objectivity,” which maintains that the observed and observer are separate, does not hold in the study of “highly complex biological processes such as evolution or the functioning of the central nervous system. . . . We cannot distance ourselves from the object being considered; indeed, this is so at the very moment we start to think.”⁷

It is amazing how close in understanding, and that across six centuries, modern physics and biology would seem to be to the neo-Confucian philosopher Wang Yang-ming’s continuum view of “innate knowledge” when he wrote: “The innate knowledge of man is the same as that of plants and trees, tiles and stones . . . Heaven, Earth, the myriad things, and man form one body. The point at which this unity is manifested in its most refined and excellent form is the clear intelligence of the human
mind.” The French mathematician and physicist Henri Poincare maintained that the very process of generalizing implies a belief in the unity of the world: “if the different parts of the universe were not like the members of one body, they would not act on one another . . . know nothing of one another, and we . . . would know only one of these parts. We do not ask if nature is one, but how it is one.”

The position on mind and nature of Amit Goswami, professor of physics at the Institute of Theoretical Sciences at the University of Oregon, would also seem consistent with that of Wang Yang-ming, and Poincare, when he suggests that “we are not the geographical center [of the universe], but that is not the issue. We are the center of the universe because we are its meaning.”

Certainly, one of the most interesting comparisons of the Chinese continuum view with Western science can be made in biology with the contemporary understanding of “deoxyribonucleic acid,” or “DNA,” as the basic recipe for all living organisms—a recipe that manifests itself in the uniqueness of its contexts from microorganisms to plants and animals. “Thingist” philosophies tend to view these DNA recipes as strings of genes, and to view genes as some kind of static, temporally, and spatially bounded particle with a biological “meaning” that is basically determined by its chemical structure. This is misleading in two senses.

First, as biologist Jacques Monod has stressed, the meaning, the translation from DNA base sequence, let’s say adenine-cytosine-quanine to the amino acid cysteine (or protein building block) does not follow from chemical necessity. Any coupling between specific bases and specific amino acids is only one of several possible couplings that are chemically permissible. The choice of the established meaning, from the set of possible meanings, results from an original and contingent coupling that took place at the beginning of life’s processes. This original, arbitrary choice is now preserved by the common ancestry in different life forms. In other words, the DNA base-amino-acid code is the result of a contingent, historical collapse of possible meanings, not a chemical necessity.

Second, genes (sequences of bases in DNA) are far from being bead-like “things” strung on a DNA chain. Genes are better conceived as aspects, or nodes—to give them a name somehow—in a network of causal processes. A gene for a given biological property is the sequence of DNA that causes the presence or absence of that property in a given context. A certain sequence of DNA can cause property “X” in a given genetic context (i.e., a gene for “X,” in that given genetic context), property “Z” in another (i.e., a gene for “Z,” in that given genetic context), and no property at all in yet another genetic context (i.e., no gene for that kind of property, in that given genetic context), and so on. And this phenomenon is not restricted to genetic contexts. The same genetic recipe, in
different biological contexts, can cause the existence of different biological properties. For instance, imagine a bird carrying a heritable piece of DNA that makes it prone to eating pink fruits. This bird will have a gene for “pink fruit preference” only in a place where pink fruits grow. To put it more precisely, the genetic sequence of the DNA recipe is context-independent but the biological properties of the genes in that recipe are local, contextual phenomena. Again, and putting it slightly differently, in a contextual, biological vacuum, there are genetic sequences, but there are no such things as “genes for something.”

This perspective would seem, too, to reflect that of the fourth century Taoist Lieh-tzu’s view of “shape” and “shapelessness”: “Whatever is born reverts to being unborn, whatever has shape reverts to being shapeless. But unborn it is not the basically Unborn, shapeless it is not the basically Shapeless.”

Wang Yang-ming’s philosophy can also be related to the idea of “mind” in modern biological theory where one can argue that to have a mind is to have a centralized nervous system that processes information. In this vein, Ernst Mayr has suggested that “‘Mind’ refers not to an object but to mental activity and since mental activities occur through much of the animal kingdom . . . one can say that mind occurs whenever organisms are found that can be shown to have mental processes.” Consequently, mind is not an exclusively human property but a process that belongs to “central nervous system” types of life form in a greater, natural context. Being aware of this “nature of mind,” however is a process in the human intellect, that is, human “minding.”

We would suggest that mind or “minding” like the Tao occurs in two senses: (1) as “imitating” in an organism’s immediate experiences of and responses to its surroundings, and (2) when applied to human “reflexive self-awareness,” as awareness of the process of imitating. The terms “imitate,” “imagine,” and “image” are all akin to the Latin root *imitari*, and we believe they more clearly express the relation of ideas and symbols to the world of experiences than do the terms “abstract” and “abstraction,” which are often associated with a privileged position for the intellect as somehow “in” the world but not “of” the world and so theoretically possessed of a special and axiomatic take on “reality,” “essence,” “existence,” and “truth,” whatever these words symbolize.

A human being is a genetic imitation of his or her ancestors, a social imitation of his or her society and culture, and a conceptual imitation of his or her experiences and memories. Of course, an image or imitation is always unique in that it occurs in the context of the individual as a genetic synthesis in an environment. Every organism has a history and so is an imitation of a living process that is millions of years old. The present individual of any species, unique as that individual may be, is
the present imitation of the species processes, as far as its ancestry goes back. The amazing aspect of the process of imitation is that in human reflexive self-awareness there is an awareness of imitating, which provides a perspective upon human imitations and imitating processes.

**Philosophy of Mind and Logical Systems**

Logic comes from the Greek roots for “word,” “speech,” and “reason.” Logic, like any applied or theoretical science, is not nature but a product of the reflexive self-awareness capacity of the human intellect. Just as there are many disciplines in the sciences, there are many logics, and these are perhaps best distinguished from one another according to their origins and uses within different traditions. For example, the Stoic Chrysippus, who saw *Pneuma*, or divine reason, as implicit in all aspects of the world, considered the Aristotelian universal categories as mere *lektia* (words), and he devised a propositional logic to accommodate the immediate experiences of everyday life. The modern biologist Ernst Mayr would seem to echo Chrysippus and the Stoic position when he suggests that “The avoidance of nouns that are nothing but reifications of processes greatly facilitates the analysis of the phenomena that are characteristic for biology.”

The Chinese Confucian philosopher Hsün Tzu wrote, “He who thinks only of words will take the Way to be wholly a matter of logic.”

Philosophers sometimes presuppose that there is only one “logic” and it is a European monopoly. However, as the problems posed by quantum mechanics cannot be resolved by classical physics, which has become a subset of a larger domain, a similar situation has developed in classical views of logic where the implications of the quantum paradoxes are clearly related to the paradoxes posed by attempts to make logic “logical.” This is reflected in Erwin Schroedinger’s comment that “it may perhaps be possible for logical thinking to disclose at least this much: that to grasp the basis of phenomena through logical thought may in all probability be impossible, since logical thought is itself a part of phenomena, and wholly involved in them.” Feng Yu-lan viewed this as one of the most important, if frustrating, aspects of human thinking, for “the totality that lies in one’s thought does not include the thought itself. For it is the object of the thought and so stands in contrast to it. Hence the totality that one is thinking about is not actually the totality of all that is. Yet one must first think about totality in order to realize that it is unthinkable. One needs thought in order to be conscious of the unthinkable.” According to Friedrich Cramer, “At issue in the activity of the brain . . . is the consciousness of consciousness. At issue in the
quantum-mechanical uncertainty principle is the measurement of measurement. At issue in the propositions about indeterminacy is the logic of logic. The meta-theoretical prerequisites of our sciences cannot be firmly established.”

We would define that mental possibility which is the source of nature’s perspectives upon itself and the possibility of expressing these perspectives in symbols and metaphors, as “reflexive self-awareness.” The root term in this definition is the word “flex,” which means to bend, and so reflexive self-awareness is awareness that is turned back upon itself, reflects upon itself, as it were—both as physical and mental processes. Human reflexive self-awareness is “ordering awareness” in what is assumed to be an orderly universe. The human intellect as minding can be viewed both as an orderly aspect of nature and experience, and the source of perspectives upon order in nature and experience. Knowledge and understanding accordingly are both positive and negative—that is, positive in the sense of finite inclusion and focus upon the distinctions identified and known in a limited situation, and negative as an awareness of both the “distinguishing,” which is the source of distinctions, and as an awareness of experiences and interpretations excluded and ignored. It is this latter that makes possible negative concepts such as “emptiness,” “infinity,” “indefinable,” the “speaking of unspeakability.” It also accounts for the distinction understood by the ancient Greek philosopher Socrates, and the modern Chinese philosopher Feng Yu-lan, that is, that having “no” knowledge, is not the same as having “no-knowledge” (knowing that one does not know).

**Continuum Logic Exposition and Application**

We suggested in the preceding analysis of the sciences and logics that the world and our experience of it can be seen as a unity of imitations in which nature is constantly replicating and reproducing itself: “All things come from the originative process of Nature and return to the originative process of Nature.” The intuitive awareness of this imitating “process of nature” occurs in mind. This combination of nature and mind (or naturing/minding process) is illustrated in modern biology where DNA contains the recipe for the individual biologist who in turn develops a theory of “DNA recipes”! Seen another way, the biologist, like all human beings, is an imitation of previous life forms, but is also that imitation that is aware of imitating.

This intuitive awareness of imitating in Chinese philosophy and continuum logic occurs within the interpretation of the world as a naturing/minding totality in which human beings are both spectators and
participants, “in” and “of” nature. For example, subject to gravitational “pull,” they produce theories of matter, space, and motion based on their experiences of this “pull.” As living organisms, they generate definitions of and observe “life.” As a result of this “in” nature and “of” nature assumption, the logic, like much of traditional Chinese philosophy in general, strives to achieve harmony and balance in reflexive self-awareness between distinctions as products and an awareness of distinguishing as process. Trying to separate distinctions from distinguishing would be, as Mencius might say, to lose the mind, and for him, “The great end of learning is nothing else but to seek for the lost mind.” When, in the lost mind, reflexive self-awareness confuses process with product, it tends to understand and know itself only as product—perhaps within the categories of some religious or scientific dogma.

In the *Chuang Tzu*, there is an interesting theory of minding as emerging and merging. This theory might be seen as the metaphorical basis for continuum logic in its descriptions of the developmental stages of awareness. The first of these stages refers to a time before there were things. At the next stage, there was a recognition that there are things, but no “distinctions” were made between and among them. In the third stage, distinctions were made and judgments applied to them. It was at this point, according to Chuang Tzu, that the Tao was destroyed and individual preferences came “into being.” At the end, however, he wonders: “Are there really construction and destruction? Is there really no construction and no destruction?”

Whether this description represents a “historical fiction” like the “social contract,” a metaphor, or is an actual evolutionary event, is irrelevant here. The significance of Chuang Tzu’s position is that it stresses the mental continuum from “no distinctions” to “distinctions,” to an understanding of “distinguishing,” and finally raises the questions, Are there really distinctions or are their no distinctions? This cycle of distinctions, with its perspectives on distinguishing, characterizes continuum logic, whose goal is an understanding of this process even as one pursues the acquisition of knowledge within it.

Continuum logic interrelates human perceptual and conceptual experience within a series of at least four “continua,” each of which connects distinguishing/distinctions at different levels, enabling one at each continuum level to develop the perspectives that lead into other levels. The idea of level indicates an experiential context, just as the question, What time is it? would seem to occur on a different but related level from the question, Time, what is it? And consistent with the idea of a naturing and minding totality, the logic at each of its levels combines knowledge emphases with understanding of emphasizing.
At each level in the logic, one relates the syntheses of aspect/perspective to both their potential sources in and implications for other levels. (Note: It is possible to enter and apply the system beginning at any level, for all are connected; however, the value of the logic’s application entails synthesizing all four levels, paying particular attention to the relationship of level IV to level I.)

LEVEL I: NATURING AND MINDING CONTINUUM

The physicist Roger Jones wrote in his *Physics as Metaphor* that “we are part of some aspect or phase of the One in which only a portion of all the potentialities appears actualized. We experience the manifestation with its variety and multiplicity, but we sense only dimly the unity and often lose sight of it altogether. We forget that we are one and believe instead that we are individuated.”

The first level of Chinese continuum logic is the affirmation of a unity of nature, which includes human “being” in both its physical and mental dimensions, that is, participant and spectator. Here, the image is of a totality beyond distinctions. In a comparison of Native American with European/American philosophy and science, Viola Cordova, an Apache philosopher, stresses that whereas the former is “intuitively” monistic, the latter is “intuitively” pluralistic. She suggests that in a pluralistic view of the world, even when one does posit some underlying unity such as matter, one is constantly confronted by the detail of difference. And if one assumes there may be an underlying sameness, it is difficult to see this sameness as other than just an abstraction—so ultimately it takes a leap of faith that denies one’s experiences of the many. Whereas, if one starts life as a Navajo monist, “difference” becomes the basic challenge. Even when things appear individual and separate, one intuitively understands that they are a unity. Thus the leap of faith is in the other direction. This comparison is similar in many ways to the different approaches in modern biology, which stress either the differences in individual and species or stress the unity of living process in DNA.

Chinese philosophy also starts with a harmonious totality and realizes that the unity of nature/mind means that there is no position outside the “whole” from which one might reduce the “unspeakable” Tao to the speakable Tao. Definitions and names are indeed important, for as the *Tao Te Ching* suggests in the third line, the “Named” is mother of all things. But it also adds that the “named” and the “nameless” are the same. This unity and harmony, as with the Navajo, applies to all aspects of life and is the source of perspectives upon these aspects. For example, the *Doctrine of the Mean* in its discussion of “sincerity” claims sincerity to be the
fundamental ordering principle of Heaven and Earth, and so produces the completion of all things including human beings. For the physicist Amit Goswami, the apparent dualism of mind and matter ultimately resolves itself into two aspects of the same substance.

At this level, the universe as naturing (i.e., “self-arising”) and human reflexive self-awareness as minding (i.e., “heart,” “minding”) together form a “naturing/minding” continuum. Within this totality, the human as “minding process” is the possibility of and for perspectives upon aspects of naturing processes. One can view this continuum as a “fiction,” or as perhaps the great paradox of human being in which “The answer to the question ‘What is a human being?’ is the possibility of posing the question itself.”

Application

At this level, one develops an awareness of a natural participant/spectator unity, which becomes the context for relating the aspects “of” and perspectives “on” knowledge and understanding on all other levels, for it is within this naturing/minding context that the levels in the logic arise, and to it they return. This sense of harmony is particularly important at the end of the fourth level, where one has dealt with its application in the pursuit of specific facts in specific situations and may well have lost awareness of the whole. In applying the perspectives of this level on other levels, when one discusses mental events, one understands these to be aspects of natural events as well, and vice versa. Human “being” is not isolated from nature but is an aspect of nature capable of sensing and imagining nature into concepts. Thus, any observation or statement about the world reflects at least two process aspects: The first is “world” as encountered and expressed in perceptions and conceptions; the second is as the possibility of experiencing—perceiving and conceiving—in the world. It would seem to us that it is to this second possibility that the TaoTe Ching refers in chapter 56 in suggesting that “One who knows does not speak; one who speaks does not know.”

The critical application “aspect” on this level would be the “not speaking”; the critical “perspective” would arise in asking oneself why such speaking is not possible.

Level II: Minding versus Naturing Continuum

At this level, reflexive self-awareness in its images begins separating mind from nature. This separation is conceptual and symbolic, and in great part “language dependent.” This brings with it a number of diffi-
cultivates, the most important of which is mistaking symbols for the aspects of the totality that they are supposed to represent. This paradox is expressed in the *Chuang Tzu* when he muses: “The universe and I exist together, and all things and I are one. Since all things are one, what room is there for speech? But since I have already said that all things are one, how can speech not exist?”

This nature/mind separation is most clearly reflected in the questions that are now posed within interpretative contexts in different traditions. These are the ultimate “what” and “why” and “how” questions, such as, What is the nature of the world? Why are things the way they are? Are there gods? What are human beings? What is society and what is correct social behavior? What is consciousness and how is it possible? How does the individual realize or actualize himself/herself and the group to which he or she belongs? The answers to these questions and the presuppositions upon which they rest provide the axioms of various traditions East or West and their religions, sciences, and philosophies. At this level, these separating axiomatic answers become the sources of the *yin/yang*, “real/apparent,” “constant/change,” “one/many,” *brahman/maya*, “being/non-being,” “having and not having,” “naming/named” images. This separation process in Greek and European philosophy not only often separated mind from nature, but tended to do so in a context that excluded mind from what was considered an “objective analysis of a static nature.” This separation was facilitated historically by a monotheistic theology that placed both a creating deity and the human soul/intellect completely outside of nature as the “immaterial in the material.”

At this level, knowledge distinctions express and depend upon concepts of “reality,” “being and non-being,” “existence,” “values,” “symbols,” and “epistemological methodologies.” This level of emergence can be illustrated with two different continuum images and their corresponding assumptions. The first is the Chinese *yin* and *yang*; the second is the Greek–European perception/conception cycle.

**Chinese Minding Continuum**

The idea of *yin/yang* represents the early Chinese attempt to explain the unity in and the cyclic nature of the world: the complementarity of opposites, the regularity of the appearances of the sun and moon, the coming and going of the seasons, and the birth and death of living organisms. Here, knowledge and understanding are part of “processes” and/or things as aspects of processes.

At this level, the minding aspect of the naturing/minding continuum begins distinguishing “mind” from “nature.” For example, Mencius believed that “Sincerity is the way of Heaven. To think *how* to be sincere
is the way of man.”

For Hsün Tzu, man formed a triad with Heaven and Earth, but it was critical that he recognize his position: “if he sets aside that which allows him to form a triad with the other two and longs for what they have, then he is deluded.” And the fifteenth century philosopher Lo Ch’in-shun believed that it was mind as feelings which set it apart from the unity of Tao: “The mind of Tao is the nature. The human mind is the feelings. The mind is one, but one speaks of it as two because of the distinction of activity and tranquility and the difference of substance and function.”

One of the most important characteristics of Chinese continuum logic is that at this level of distinguishing of minding from naturing, the totality of nature/mind is still preserved. Mencius saw this distinguishing–unifying combination in the unity of the human heart and Heaven: “For a man to give full realization to his heart is for him to understand his own nature, and man who knows his own nature will know Heaven . . . All the ten thousand things are there in me.

Feng Yu-lan, writing of the early role of the yin/yang school of thought, believed that it demonstrated a scientific interest, in that it tried to explain natural events with natural principles. He suggested that the original meaning of yang was probably sunshine and light, whereas the meaning of yin was shadow and darkness. In time, however, yin and yang came to mean the two cosmic principles that govern the universe and from which, in their interactions, all things were generated. Yin in this later sense, then, stands for darkness, moisture, the feminine, softness, quietude, and cold. Yang stands for the qualities of light, dryness, the masculine, solidity, activity, and heat. The Tao Te Ching explains: “The ten thousand things carry the yin and embrace the yang and through the blending of the material force they achieve harmony.”

Coupled with the cosmological complementarity of yin and yang within the Tao is the principle of five elements, or wu-hsing: fire, water, earth, metal, wood. These are not elements in the occidental sense of static entities, but rather processes: The nature of fire is heating and ascending, the nature of water is moistening and descending, the nature of earth is the possibility of sowing and reaping, the nature of metal is yielding and the capacity of being shaped, the nature of wood is bending and the capacity of being straightened. As processes, the combinations of the universal principles of yin and yang and the five wu-hsing forces, or elements, produce the “ten thousand things,” or aspects of the world of which the human is aware. It is suggested by Chinese scholars that these two sets of creative forces were united in the fourth century B.C. by the philosopher of the yin and yang school, Tsou Yen. In this combined cyclic view of the cosmos, all objects and events, the animate and inanimate are a changing synthesis of alternative forces and principles
synthesizing with one another and succeeding one another in a harmonious continuum. As the introduction to Luo Guanzhong’s *Three Kingdoms* states: “The empire long divided, must unite; long united, must divide. Thus it has ever been.” This proposition expresses both aspects of historical processes and perspectives upon them. The important point here in Chinese continuum logic is that human minding now recognizes and interacts with these forces and patterns. Distinctions in naturing have become aspects of human awareness and interpretation.

**Greek–European Minding Continuum**

The Greek/European version of *yin/yang* entails not a two- but a fourfold activity of mind. This is a tradition within which knowledge and understanding are of things and/or processes and laws as “things” with specific particular or universal identities. Here, the four aspects or fields are identified in philosophies, sciences, and religions by the questions that occur within them and define them—and of course, historically, as with the Chinese, by the emphases that these questions generate with their answers. Here, too, the questions succeed one another: *Axiology*: What are the good, the true, the beautiful? Where and how do value dichotomies originate? To what do they apply? *Metaphysics*: What are things really? Is the apparent world real? Is the real world apparent? In what sense can *real* be applied in either case? Are there gods? *Epistemology*: How do we know what we claim to know? Is certain knowledge possible and how is it possible? What is the relationship of perception to conception, to intuition, to reason, to faith? *Ontology*: What do we mean by terms such as *existence*, *reality*, *I*? How do things, thoughts, and symbols relate when it comes to *meaning*? Is there a difference between “what things are” and the claim “that things are”?

One of the important characteristics in the history and development of this occidental *yin/yang* principle has been the search for certainty, that is, a fixed starting point that provides the knower with some sort of privileged position apart from the known. For the Greeks and the monotheistic religions, this was expressed in the non-natural origins of a rational soul, which would facilitate the certain apprehension of “self-evident truths.” Thus, in the Western scientific/philosophical tradition, once a particular aspect of this four-part continuum has been selected as “most basic,” or the “point of departure” for acquiring knowledge, then this aspect will tend to provide the perspectives upon the other three aspects of the continuum—for example, the nature of reality will determine the possibility and nature of knowing, of values (including objectivity and subjectivity as values), and meaning. In turn, each of these aspects of the occidental *yin/yang* is the gateway to an infinite “question
regress,” which ends only with an axiomatic position, usually borrowed from one of the other disciplines—what the Tao Te Ching might suggest is “mystery upon mystery, the gateway to manifold secrets.” We believe that ultimately, as with the Chinese yin/yang, one can view all four aspects from the perspective of their complementarity, where no aspect takes precedence and they are all interdependent.

Application

At this level, human minding in both the Chinese and the occidental versions of yin/yang, or the “principle of complementarity,” has separated itself from nature. This separation defines our most basic presuppositions as to the nature of the world and the nature of human thinking, for within these presuppositions, the intellect begins to “identify” cosmological principles and order the various aspects of human experience. For the Chinese, this is the level of application of yin/yang balance and wu-hsing succession. In the Greek and European tradition, this is the level of questions about the homogenous or heterogeneous nature of reality, the methodologies for knowing it, the nature of value dichotomies, and the meaning of terms and nature of reason.

Application at this level consists of identifying the “isms” of minding, which are the contexts for the answers in philosophy, the sciences, and religions that the tradition has accepted to the questions it has posed, that is, monism, dualism, pluralism, realism, idealism, nominalism, rationalism, empiricism, mysticism, pantheism, monotheism, polytheism, Taoism, Buddhism, Christianism, Brahmanism, and so forth.

Level III: Intending and Attending Continuum

The separation of mind from nature that begins in level II, allows minding a clearer focus upon the activities and operations of thought processes in level III. Now, and in a new “social reality,” minding becomes an independent force unto itself. According to Hsün Tzu, as “the ruler of the body and the master of its god-like intelligence. It gives commands, but it is not subject to them . . . What it considers right it will accept; what it considers wrong it will reject.” Minding, on the basis of the answers accepted to the questions in level II, now creates the contexts within which “intention” (intentus, or “stretching out” [pp intendere]; “meaning,” “connotation,” “significance,” “volition”) determines and focuses “attention” (attentus [pp attendere]; “the act of applying the mind to an object or thought or sense observation”) in a society’s various philosophical,
scientific, and religious fields and disciplines. Erwin Schroedinger, for example, insists that “it depends entirely on the observer what he chooses to regard as essential and what as inessential in a thing. Per se everything is equally essential. This would turn ‘organic’ and ‘inorganic’ into characteristics, not so much of the object as of our point of view or the direction of our attention.”

And this is the level at which intention determines attention within specific scientific disciplines, for example, biology, physics, chemistry, astronomy, mathematics, sociology, psychology, and so forth. It is at this third level, too, that the intentions of reflexive self-awareness design the parameters that contain and determine its attentions. At this level, standards for both knowledge and values are set, and Mo Tzu’s argument for mental standards is as compelling for the various disciplines in science as it is for the field of ethics, “for to try to speak without a standard of judgment is like trying to establish the direction of sunrise and sunset with a revolving potter’s wheel . . . a theory must be judged by three tests . . . Its origin, its validity, and its applicability.” Each of these will relate in different ways to “spectators” and “participants” in different disciplines.

Illustrations of the problems encountered at this level in relating intention and attention can be found in all interpretations, for any interpretation is a synthesis of perception and conception. For example, in the area of medical and health research over the last seventy-five years, the great majority of such studies have used mice and other mammals to draw inferences about the effects of various drugs and diseases on human beings. These relied almost exclusively on data gathered from male animals. Males were used, of course, because they do not become pregnant nor have estrus cycles, and so much of the data is less applicable to females—mice or human.

On the other hand, attention, which is in great part immediate sense experience, can so distort intention that the daily experience of the sun’s rising in the east and setting in the west can effectively block the interpretation that the earth moves around the sun. Here, a mix of theological “intention” based on everyday “attention” determined what the planets could or could not do.

Together with any distinction between intending and attending there will be a correlative concept of self. In the Western tradition, this idea of self was often of an essence entering the physical world from outside, for example, for Plato and Aristotle as well as the monotheistic Near Eastern religions. In Chinese thought, self is usually an integrated aspect of nature, but with its own functioning as intending and attending in nature. Chenyang Li suggests that in a Confucian context, “the self is a dynamic ‘making process.’ The self is not a ‘given’ . . . One has to
make one's self. This is the Confucian belief of ‘person-making’ and ‘self-cultivation.’ And this process of self-making is the process of reflexive self-awareness constantly reviewing intentions as these influence and determine attentions. This is the essence of the learning process, for “[t]o learn is to develop and cultivate oneself.”

This is the level at which intentions and attentions as separate emphases of minding are involved in the creation of branches and disciplines of knowledge. Intending and attending in this level determine the possibility of including and excluding intentions and attentions into disciplines that outline various knowledge areas, such as the physical and social sciences, arts, and humanities. In this respect, Friedrich Cramer believes we are now living “a history shaped exclusively by the dominion of human thought . . . for the first time in the history of our world—we have been given the moral responsibility not only for our history . . . but also for natural history.” A critical question at this level is, of course, to what degree is it possible for the separation of minding from naturing to become absolute? Is the human intellect already at this point, as Cramer might suggest?

Application

There are at least four developmental aspects and corresponding perspectives that arise in the application of continuum logic at the level of intending and attending:

1. At this level, one develops a perspective upon those aspects of nature and society that are organized into the parameters and data of particular knowledge fields and disciplines as intentions and focuses of attention. For example, what are the parameters and uses of ideas of “force,” “time,” “causality,” and so forth, in biology, theology, physics, philosophy? How do these fields differ? In what senses are they the same in terms of the “metaphysical,” “epistemological,” “axiological,” and “ontological” assumptions made at level II?

2. One develops a perspective upon those attentions and intentions that are relevant, fit into a paradigm, and so forth, and rejects those that are considered irrelevant. In this process, one seeks to relate the vast detail of experience in any knowledge field to the intentions with which the field has been defined and its “detail” has been collected and organized. But as Wang Yang-ming argued, “If the highest good means no more than having the detail correct, then dressing like an actor and acting out these details correctly on the stage would be called the highest good.”

3. One attempts the very difficult task of developing an understanding of the relationship of attending to intending in one’s field in science,
philosophy, and so forth. If the one aspect is separated from the other, the perspective that results from the syntheses of the two aspects in minding is lost. Lu Xun expressed for the modern world the dilemma this separation presents: “Today we have produced bombs and shells, and what with planes, which are very progressive too, it is much easier than before to make a name. And a man who starts greater fires than ever before will be more highly respected. Seen from a distance he appears like a Saviour, and the blaze is taken for brightness.”

4. At this level, one develops perspectives upon the assumptions and definitions that have been used to categorize intentions and attentions in the acquisition of knowledge—for example, are sociological concerns relevant to physics and vice versa? This question is, of course, crucial in the use of the sciences by governments. The distinction between relevant and irrelevant becomes particularly important when one claims some epistemological methodology is more relevant to one field than another. Any method, scientific or otherwise, is at this level based on a synthesis of intention and attention, and as intention, guides what is acceptable attention in a “participant/spectator universe.” Distinctions between “subjectivity” and “objectivity” are drawn at this level as well.

LEVEL IV: KNOWING AND UNDERSTANDING CONTINUUM

At this level, the other three levels merge as aspects of knowing and perspectives into understanding within the spectator/participant contexts created by these levels, that is, (1) the context of an ultimate view of the totality of “nature/mind”; (2) the contexts created by the presuppositions that were used to distinguish mind from nature and to provide the possibilities for mind’s contemplation and knowledge of nature, such as, yin/yang, metaphysics-epistemology-axiology-ontology; (3) the contexts created by the application of #1 and #2 in conceptual and perceptual experiences of nature in intending and attending in the sciences, philosophy, religions, and so forth.

The fourth level of the logic (IV), then, couples these three individual levels of immediate experience with reflection upon them and their interrelationships. At this level, the complexity of immediate experience is accommodated within unity of reflexive self-awareness: “It is from the ‘simple’ and the ‘easy’ that all the complexity and multiplicity of life and change have arisen. Consequently the complexity and multiplicity can be understood through that which is easy and simple” (Chuang Tzu).

At this basic, applied level, knowledge and understanding occur within an experiential continuum with at least five aspects: (1) a “knower aspect” of observer, interpreter, definer, explainer, and so forth; (2) a
“known aspect,” which is the observed, interpreted, defined, explained, and so forth; (3) a “knowing aspect,” which is the process of observing, interpreting, defining, explaining processes; (4) a “knowledge aspect” as observations, interpretations, definitions, explanations, and so forth, that follow from aspects (1) through (3), as these can be conceptualized, symbolized, and communicated; (5) a “perspective aspect” upon that which was emphasized or de-emphasized, assumed, rejected, included, excluded, and so forth, in each of aspects (1) through (3), especially as these are expressed in aspect 4.

These five aspects reflect emphasizing and de-emphasizing based on individual choices and assumptions made by the knower and observer as an individual and as a member of a social collective. The objective at this level is relating these aspects, and as Hsün Tzu pointed out, “avoiding obsession” with any particular one, for example, subject, object, observing instruments, or methodologies, and so forth: “When one makes distinctions among the myriad beings of creation, these distinctions all become potential sources of obsession. This is a danger in the use of the mind that is common to all men.” For example, absolute “objectivity” without consideration for the subjective definition of “objectivity” can become an obsession.

These aspects are also a sort of intellectual feedback loop of interrelating yet inseparable processes. The goal of the logic at this level is an ever-expanding awareness of the different aspects of knowing and perspectives upon their interconnectedness in immediate experience. As Chuang Tzu wrote, “Everything has its ‘that’, everything has its ‘this’... ‘that comes out of this’ and ‘this’ depends on ‘that’—which is to say that ‘this’ and ‘that’ give birth to each other.” The paradoxes that emerge in this process are the source of much of the humor that occurs in Chinese philosophy when individuals seek to give primacy to one aspect over another.

Application

The goal of the logic at this level in each of the first four of the five aspects is to identify as clearly as possible the contexts from levels I, II, and III within which observing and interpreting occur. Each aspect is a combination of knowledge with an understanding of its context. A perspective upon each aspect is attained by posing and answering the questions associated with it.

Aspect 1: Context of the “knower-observer.” What experiences, intentions, assumptions, and potential interpretations from levels II and III does an observer bring to an event or object, which will influence his or
her intentions and attentions. Are there personal intentions and conditions that are relevant, such as gender, profession, and so forth? How aware is the observer of his or her concepts and how can these influence the “conceptualizing” that arises in his or her observations? Mencius, applying this perspective in an ethical sense, argued that “Men must be decided on what they will not do, and then they are able to act with vigor in what they ought to do.”51

The importance of this self-awareness is illustrated in the Creation of the Gods, a Ming novel dealing with the fall of the Zhang dynasty to the Chou. One of the most effective weapons in the Chou arsenal was the “Topographical Diagram of the Kingdom.” This was a magic map; once one had “entered” it, it seemed to reproduce all of one’s inner thoughts in the external world. If one thought of a mountain, it appeared, and so forth. The Zhang general, Yuan Hong, was tricked into the map, which his spirit filled with his memories and desires. The map-trap was then rolled up and taken to headquarters where the general, captured by his own illusions, was put to death.52 To the degree that past experiences and intentions influence and determine present observations and interpretations, every observer enters the Topographical Diagram of the Kingdom. It is essential that one be aware of the contexts that this paradox creates.

Aspect 2: Context of the “known-observed.” Since every event or object represents emphases and foci upon limited aspects within a totality of relationships and processes, it is essential that one identify what were or are the relevant and irrelevant aspects and characteristics of the observed. Under what conditions and in what circumstances is/was the observed event or object experienced? What was included or excluded in terms of circumstances and characteristics . . . and why? Are there relevant connections to other observations that are being considered or ignored? For example, one of the Buddhist theories of observation is that one sees what one sees by not seeing what one does not see. The focus of the observer or knower is limited, but it is critical that one remember that these limits are arbitrary. As Chu Hsi noted in his discussion of the totality of Principle of Heaven and Earth, “nothing exists in isolation.”53 And Yang Wang-ming cautioned his disciple that “useful” and “useless” will determine what we “see” when we look at weeds and flowers.54

Aspect 3: Context of “knowing-observing” processes. In addition to the senses, what techniques, methods, instruments are employed in the observing and how do these affect observing. For example, to measure a phenomena means to introduce some sort of measuring device, whether
as instrument or statistical method. A class being tested is not a class “not being tested.” What limits to observing are incorporated in or determine the act itself? How do direct versus indirect knowing and observing relate? Which is given preference, for example, in a view that divides experiences into real and apparent? The problem with distinguishing, as Hsün Tzu warned, is that it, in turn, can lead to obsession. Mencius might ask if the observer in observing is “forcing” to appear that which he or she wants to see, that is “helping the rice to grow,” as in the case of the “man of Sung” who pulled up his rice. It is with this aspect of the knowing and observing process that one must be aware that distinguishing creates distinctions.

**Aspect 4: Context of the “knowledge–observation product.”** Since it is knowledge as “observation” or “explanation” that is symbolized and communicated, it is important to consider what the linguistic, categorical and/or cultural constraints are that will determine the expression of the observation. This aspect is a categorical and/or conceptual synthesis of aspects #1 through #3. This level combines syntax, semantics, and pragmatics. To what degree is the ego of the observer included or excluded in the symbolized and verbalized observation? Is the observation to be expressed in a combination of natural and artificial languages, and if so, how will the languages used and their structures interrelate and influence what is said or written—this question is particularly relevant to the uses of statistics and polls. As Albert Einstein cautioned, “As far as the propositions of mathematics refer to reality, they are not certain, and in so far as they are certain, they do not refer to reality.” What are the purposes of the observation and to whom is it to be communicated? One of the most fundamental concerns within the history of Chinese philosophy is with the “rectification of names,” that is, making sure that the terms that are used in communication are agreed upon. This means, of course, that “meaning” is relative to the user and the listener. There is no correspondence of name to thing; rather, there is correspondence to “linguistic agreement.” Hsün Tzu emphasized that “Names have no intrinsic appropriateness. One agrees to use a certain name . . . and if the agreement is abided by and becomes a matter of custom, then the name may be said to be appropriate.”

**Aspect 5: Context of the “perspectives” upon aspects (1) through (4).** It is at this stage where, as Chu Hsi suggested, the “student must first of all know how to doubt” in order to reflect and question, for “People who do not doubt simply have not devoted themselves to concrete practice. If they have concretely practiced, there must be some doubts.” With the fifth aspect, the knower, observer, and/or interpreter,
begins reviewing and even doubting the interrelationships of the first four aspects. For example, does the “observed” take priority over the “observer”? Does “observing” alter the “observed,” and thus the “observations”? How do the observations verbalized and conceptualized relate to the observed and influence observing? What was included or excluded in observing? What was included and/or excluded in symbolizing the observation? How do name and named relate in their origins? What are the most important definitions involved in stating the observation? What terms remain indefinable in stating the observation? What preconditions were placed upon observation by stated and unstated assumptions of the observer and/or the condition and circumstances of the observed?

The function of the fifth aspect of the knowing process is to provide an understanding of the basic perspectives and questions at the level of immediate experience, which will carry reflexive self-awareness “back” into the other levels of the logic and finally to the unity of nature and mind at level I. At this level of continuum logic, one begins to discover and understand the experiential paradoxes and problems of the human intellect as spectator and participant in the world. Here, one becomes aware of the priorities that a person and his or her culture accept and/or assign, and the influences that these have in turn upon knowledge and understanding. Niels Bohr, with his profound insight into process philosophy, would seem to have summarized most effectively the critical function of this level with its five aspects: “Scientific research in many domains of knowledge has indeed time and again proved the necessity of abandoning or remolding points of view which because of their fruitfulness and apparently unrestricted applicability, were regarded as indispensable for rational explanation.”

Georges Devereux, in his Ethnopsychoanalysis, would seem to have had the same objective in mind in the social sciences: “The simple fact is that a human phenomenon which is explained in one way only is, so to speak, not explained at all . . . and this even—and, in fact, chiefly—if this phenomenon’s first explanation has made it perfectly comprehensible, controllable and foreseeable in terms of its own specific frame of reference.”

Finally, perspectives at this level reflect the presuppositions, advantages, and limitations of the “Minding versus Naturing Continuum” and the “Intending and Attending Continuum”—thus enabling a return to the “Naturing and Minding Continuum” with which and within which one began the acquisition of knowledge, and the achieving of understanding. This provides not only a perspective upon the possibility “of” minding and possibilities “for” minding; it is also the source of human creativity in all fields. Indeed, it is fundamental to understanding both
ourselves and our natural environments, and to developing tolerance between and among different groups and cultures.

**Summary and Conclusions**

One can view these continua levels as historical or evolutionary, or immediate and intuitive. Each level is an aspect of a totality and so imparts an ever-expanding series of perspectives on human minding separating from, reflecting upon, anticipating, explaining, inquiring into, questioning naturing. But each level can also be viewed as reflecting the process of individual reflexive self-awareness separating itself from some social collective, for example, a scientific paradigm, a family, a society, a religious belief system. The use and application of the logic is in the hierarchy of aspects it accommodates and encourages with a corresponding hierarchy of perspectives. At each level, the logic enables one to expand perspectives, as aspects multiply and are understood—thereby deepening the understanding of the larger naturing/minding continuum. One way to understand the significance of this potential might be to contrast it with classical Aristotelian syllogistic, which arises in the subjecting and predicating of the world . . . where things correspond to their categories . . . where naming is often secondary to names.

Our interest in comparative logics in general and continuum logic in particular is that we see such a logic supplementing and complementing all others. One of the most important values of continuum logic is that in using it, one can, and indeed should, incorporate all other systems at its different levels. It also seems to us to provide a most valuable analytic technique as we seek to understand the changes and their implications, which have accompanied the modern social and natural sciences.

**Appendix: Outline of Continuum Logic Levels**

*Level I: Naturing/Minding Continuum.* This is the level of the ultimate presuppositions of a tradition and its original views of the unity of nature and mind (naturing/minding) as the context of the whole of human experience.

*Level II: Minding versus Naturing Continuum.* This is the level of the theories and assumptions that have been employed to distinguish mind from nature to analyze and/or know and talk about nature—for example, in *yin* and *yang*, or metaphysical, epistemological, axiological, and ontological contexts.
**Level III: Intending and Attending Continuum.** Minding at this level, using the distinguishing contexts and assumptions and theories of level II as a foundation, establishes relevant intentions and attentions in various disciplines and fields with their corresponding technologies, methodologies, and categories for focusing attentions in observing, exploring, and controlling nature in the natural and social sciences, religion, and philosophy.

**Level IV: Knowing and Understanding Continuum.** At this level, via the contexts established in levels II and III, minding acquires knowledge within a combination of four aspects of experience: (1) knower/interpreter, (2) known/interpreted, (3) knowing/interpreting, (4) knowledge/interpretation. The fifth aspect of minding on this level is the aspect of understanding, whereby the mind reflects upon and develops perspectives into the interrelationships of these four aspects. The perspectives developed at this level should lead back to the context of the whole of naturing/minding developed in level I, and an awareness of the totality here, as well as an awareness of the limitations that accompany levels II and III.

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**ENDNOTES**

15. Ibid., pp. 74–75.
23. This level is that of Chuang Tzu’s first ancients, of Chang Tsai’s “Western Inscription,” Wang Yang-Ming’s “innate knowledge of man and nature,” Heracleitus’s idea of “universal flux” and “natural process,” Amit Goswami’s *Self-Aware Universe*, and the biologists’ “deoxyribonucleic acid.”
36. Ibid., p. 138.
41. Schrödinger, pp. 42–43.
44. Ibid., p. 93.
56. *Mencius* (Lau), bk. II a, 2, p. 78.
59. Wing-tsit Chan, *Chu Hsi and Lu Tsu-ch’ien*, pp. 85, 94.