

WORLDS WITHIN WORLDS: KABBALAH AND THE NEW SCIENTIFIC PARADIGM

by Kerry Gordon

Abstract. Beginning with relativity and quantum theory, the deterministic view that has dominated and shaped Western culture for more than 2,500 years has begun to unravel, leading to the emergence of a new paradigm. This new paradigm effectively reformulates the project of science, conceiving of existence as an interpenetrating web of coevolving, cocreative relationships. By exploring Kabbalah and the new scientific paradigm within the context of shared evolutionary principles, I seek to demonstrate a viable alternative to the prevailing deterministic worldview. By going beyond the limits of determinism and re-visioning existence as an evolutionary, emergent phenomenon, we can establish a new basis for an authentic dialogue between science and religion.

Keywords: attractor; autopoiesis; cocreative; complexity; cosmological natural selection; creation; determinism; emergence; evolution; existence; holomovement; implicate order; Kabbalah; *Keter*; macrocosm; microcosm; new scientific paradigm; open system; paradigm; *sefirot*; self-organization; structural coupling; transformation; tree of life; whole and part.

At the dawn of the twenty-first century Western science finds itself at the forefront of a shifting paradigm that marks perhaps the most significant cultural transition since Copernicus. After four hundred years, science is abandoning its basis in determinism and re-visioning the story of cosmological origin and the emergence of life in a radically new light. In this retelling we are no longer bound by the staid certainty of the absolute but are drawn instead to engage in a continuously evolving, infinitely creative universe.

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It has been said that “there are always risks in freedom. The only risk in bondage is that of breaking free” (Gita Bellin, quoted in Hayward 1995, 133). And indeed, at the very moment that we are released from the constraints of determinism we find ourselves thrust headlong into the terrifying uncertainty of impermanence and continuous change. When the very fabric of existence is a shifting ground of interdependent relationship, where can we take our stand? What can we count on to get us through to the other side? Surely we must know by now that, by itself, science cannot stem the rising tide of anxiety that pervades and threatens to overwhelm us. Knowledge alone does not have the power to combat the insecurity and despair that arise in the face of primordial uncertainty. Just as knowledge is in need of wisdom, so science is in need of faith. But if the absolute is obsolete, where do we turn? How can we envision God in accord with a new paradigm of creative emergence? The question before science is therefore simultaneous with the question before religion: If not in a deterministic God or a deterministic universe, where shall we find the faith and the courage to live a creative life?

If, as the new paradigm suggests, determinism is not the only basis for scientific research, we might wonder if this is not also true for religious experience. To this end, it is my intention to demonstrate here a relationship between the evolutionary principles of Kabbalah, the term traditionally used to describe the esoteric teachings of Judaism and Jewish mysticism, and the new scientific paradigm and show that the two traditions offer a strikingly similar alternative to a deterministic worldview. In order to do so I must first acknowledge a far broader concern—the relationship between science and religion and the possibility for their integration.

The schism between these two domains of experience has, over the course of four hundred years, become profound. Like two imperial powers carving up the world, these domains have been clearly, though often arbitrarily, demarked, and it seems that never the twain shall meet. Indeed, it is hard to be optimistic about closing the gap. Meaningful dialogue across paradigms is at best a tricky business and never easily accomplished. As Thomas Kuhn points out, such debates tend to degenerate into pointless circularity since “each group uses its own paradigm to argue in that paradigm’s defense” (1996, 94). So it is that science and religion have remained locked in a centuries-old power struggle that has the same comical effect as two people shouting at each other as though they were hard of hearing when in fact they simply don’t speak the same language.

Science and religion are recognized as competing paradigms, based on very different worldviews and having entirely different ways of establishing meaning in the world. Science finds its basis in verifiable proof and reason; religion is based in faith and revelation. But while these distinctions are undeniable, they are not absolute. If religion is to retain its vitality, it cannot simply dismiss reason as antithetical to faith. Indeed, the

preeminent twentieth-century rabbi Abraham Heschel has gone so far as to say that religion “is under obligation to offer a criterion for its validity either in terms of ideas or in terms of events. . . . We cannot continue to employ our critical faculty in all our endeavors and at the same time abstain from raising questions in regard to religion” (1955, 10). On the other hand, neither can science dismiss faith in favor of pure reason. Albert Einstein himself considered “the cosmic religious feeling . . . the strongest and noblest motive for scientific research” ([1954] 1997, 14). That being said, any dialogue instituted between paradigms must be approached with caution.

Since the publication of Frijof Capra’s *The Tao of Physics* in 1975, there has been a proliferation of scientific and pseudoscientific studies attempting to reconcile science and religion. These efforts have met with varying degrees of success. It seems to me that the distinction between a specious and a meaningful debate lies in maintaining as much respect for difference as for similarity; otherwise, as has too often been the case, metaphors are mixed and distinctions obscured to the point where all vitality is lost in a homogenized mass of vague generalities. As Heschel states, “If science and religion are intrinsically identical, one of them must be superfluous” (1955, 13).

Clearly science and religion are not the same thing, and obscuring that fact in the name of misguided ecumenism serves no useful purpose. It has never been the primary intention of science to address spiritual or religious questions—the nature of faith, ultimate reality, and our relationship with the divine. Nor is religion required to adhere to scientific method—the means by which theory is subject to verifiable proofs and repeatable results or, conversely, as Karl Popper would have it, the construction of theories that are refutable, that have at least the potential to be proved false. In this regard the distinctions between religion and science in general and Kabbalah and the new scientific paradigm in particular are essential and must not be blurred. But I believe that in Kabbalah and the new scientific paradigm there is a valid basis for discourse. Indeed, I would propose that despite the obvious differences of intention, time, and place, these traditions embrace certain fundamental principles that simultaneously inform and deepen our understanding of both.

To begin our investigation let me quickly define what I mean by the new scientific paradigm. First, a paradigm implies a model—a mode of understanding that allows for a coherent interpretation of the natural world. Second, by adding that it is a scientific paradigm, I am referring specifically to a way of doing science that ultimately determines what areas of research are either valued or of special interest and therefore likely to be pursued. It is in this sense that scientific paradigms are by definition conservative in that they effectively limit possibilities for research, forcing “scientists to investigate some part of nature in a detail and depth that would

otherwise be unimaginable” (Kuhn 1996, 24). But to the extent that they are interdisciplinary, scientific paradigms are expansive, providing the basis for research across a wide range of scientific disciplines. Finally, by a “new” paradigm I mean what emerges when the prevailing one is unable to deal with the increasing number of anomalies that continue to appear relative to its own prescribed research. This is the case with the new scientific paradigm, whose appearance is coincident with the classical paradigm’s relative inability to respond to those phenomena relating to whole systems, including complexity, self-organization, chaos, interdependent nonlinearity, and coevolutionary emergence.

The hallmark of the classical paradigm—scientific determinism—has pervaded Western science, leaving an indelible mark on culture and society. While determinism has proved to be a valuable scientific tool, we must keep in mind that a deterministic theory’s success in describing the world does not mean that the world it purports to describe must itself be inherently deterministic (Popper 1982).

From the outset, Isaac Newton assumed the universe to be a closed system moving inexorably toward equilibrium. Although the metaphor of the watch and the watchmaker has become hoary and dull over time, for Newton it was a vital and totally appropriate concept consistent with his religiosity. Indeed, is not the universe like a complex machine running its course in a thoroughly mechanical and predictable fashion? And, like a machine, does it not run according to a set of universal laws that unequivocally guide its unfolding? The only question is who creates the laws that determine its course. The answer for Newton was God. There was no shame in this formulation, for, unlike his nineteenth- and twentieth-century heirs, Newton was pleased to demonstrate that religion and science were essentially compatible. Obviously they represent a different order of questioning, but they share the same basic understanding that the world objectively exists through a God, its creator. If God exists as an objective observer, the world, at least theoretically, must be objectively observable. This is the essence of determinism—the world is a closed system with a beginning and an end and as such runs a predictable course according to universal laws that can be known. By understanding the physical laws that God laid down, we can penetrate the inner workings not only of nature but of the mind of God.

Putting aside for a moment the hubris of such an assumption, it turns out that there are other serious flaws in this perspective. Beginning with relativity and quantum theory, the deterministic project began to unravel, leading to the emergence of a new paradigm. The new scientific paradigm effectively reformulates the project of science through conceiving of existence as an open system, an interpenetrating web of coevolving, cocreative relationships. In this respect the difference between the new and classical

paradigms relates not to that which defines science as science but rather to the kinds of phenomena with which science wishes to concern itself. And it is precisely the nature of these new concerns that allows for an authentic and productive dialogue between the new scientific paradigm and Kabbalah.

KABBALAH

We are often surprised to discover the level of sophistication that our intellectual forebears could bring to the deep questions of existence. In our present technological age we are quite capable of imagining, for example, that with our high-speed computers we invented the nonlinear paradigm of self-organizing complexity. And even if the paradigm had been broached in earlier times, because it lacked a basis in scientific empiricism or quantitative research we might dismiss it as little more than naive philosophy or bad science. While there is little doubt that science has the ability to layer new levels of understanding upon the old, it is important to consider that Kabbalah, whose focus is demonstrably holistic and nonlinear, was an energetic, innovative, cultural force four hundred fifty years before the advent of Western science.

Kabbalah, which literally means “tradition,” is a synthetic approach to Jewish mysticism, magic, and metaphysics that includes various systematizing attempts but never really achieves the level of a system. In this regard it is difficult to define Kabbalah within the simple parameters of a homogenous system of thought and practice. In fact it has evolved robustly for more than eight hundred years, giving rise to many schools and interpretations. Although traditional kabbalists claim that the teachings in their primordial essence derive from the Garden of Eden, modern scholars are somewhat more conservative and trace the movement’s origins to the Provence region of France during the latter part of the twelfth century. It is true that Kabbalah conforms to all the basic tenets of Torah and Talmud, but it goes well beyond those boundaries, incorporating many ideas and practices from outside the aegis of Jewish orthodoxy.¹ How Kabbalah may have been practiced in its various forms over the centuries remains open to conjecture and debate, but it is certain that sophisticated meditative and yogic techniques were an intrinsic part of the kabbalistic path (see Scholem 1978; Merkur 1998; Idel 1988; Wolfson 1994). In this regard Kabbalah was as much phenomenological as philosophical. Many of its texts describe levels of awareness and insight that indicate its authors are speaking by way of direct experience rather than mere symbolic or metaphorical abstraction.

The compelling concern for Kabbalah is the same as that which has absorbed philosophers since the time of Heraclitus and Parmenides, namely, the relationship between the One and the many. By struggling with this problem within the monotheistic parameters of Judaism, Kabbalah arrived

at a cosmological model of breathtaking complexity. Unlike the Neoplatonists before them, who regarded temporal existence as base and evil, a kind of unfortunate stopover on the way to something sublime, the kabbalists, in accord with Torah, refuted the notion that creation could somehow be separate from the divine essence of its creator. The problem thus assumes a whole new level of complexity, since there can be no distinct separation between the one God, source and creator of the universe, and the manifest diversity that is God's creation. But neither can all manifest things be regarded as God, because that would blaspheme against the very essence of monotheism, "the Lord is One."

The sixteenth-century kabbalist Moses Cordovero addresses this point by saying, "There is nothing not pervaded by the power of divinity. If there were, the Unknowable Mystery would be limited, subject to duality, God forbid! Rather, God is everything that exists, though everything that exists is not God" (cited in Matt 1995, 24).

Such an interpretation clearly challenges the limits of the subject/object dualism consistent with a cause-and-effect understanding of reality. Accordingly, Kabbalah adopts a dialectical perspective that modern systems theorists would call interdependent nonlinearity. It is in this sense that God, as ultimate reality, transcends all mathematical logic by being the super set that is simultaneously within the set-of-all-possible-sets and without it. The kabbalists call this supreme mystery *Ein Sof*, and, recognizing that it is beyond reason, turn their attention instead to that which can be fathomed—the manifest diversity of existence as it emerges continuously in creation.

EMERGENCE

Kabbalah begins with the realization that creation is not a *fait accompli*, an object made by God. Nor is it a singular event that occurred at some time in the primordial past. Rather it is the immediate, ongoing process of continuous emergence: "Creation is not something completed, but is constantly becoming, evolving, ascending" (Matt 1995, 99). Such a concept was stunningly original, for, unlike the Neoplatonists, who imagined existence as locked in an endless cycle of emanation and return—the "banality of eternal repetition" (Smolin 1997, 144)—the kabbalists celebrated existence as a dynamic process of continuous emergence and transformative change. Existence is nothing less than God's manifest expression, God's metaphoric account of himself. But if God is to be likened to a poet, then his metaphors must be infinite in accordance with his own infinitude. Existence is, therefore, never complete, nor is it an eternal, repeating cycle of death and rebirth, but rather it evolves as an endlessly unfolding source of astonishment and delight.

It is in this sense that existence, from the kabbalistic point of view, is itself a self-organizing, self-creating system comprising self-organizing, self-creating subsystems. As such, existence can never be conceived as inactive, that is to say, “created,” but is rather understood to be in a constant state of motion, signified as “creating.”

Perhaps the clearest statement of this position appears in the work of fourteenth-century philosopher and theologian Hasdai Crescas, who was reacting against Maimonides’ assertion that God creates time itself. Crescas was not strictly speaking a kabbalist, but he was greatly influenced by its precepts.² In his magnum opus *Or Adonai* (“Light of the Lord”) Crescas dismissed Maimonides’ contraposition of eternalism and creationism as a nonissue. For Crescas, whether the world is eternal is inconsequential. What is important is the understanding that existence arises *ex nihilo*—continuously and spontaneously from the fertile ground of God’s imagination. For, according to Crescas, God is “creating each day, continuously, the work of the beginning” (cited in Harvey 1972).

In the eighteenth century, the great Hasidic master Rabbi Levi-Yitzchak of Berdichev offered much the same teaching in his commentary on the opening words of Genesis: “In every second He emanates an emanation and therefore we say He fashions light and creates darkness and not that He fashioned light and created darkness. Because in every second He creates that, every second He emanates (overflows) life to every living thing” (1993, 1).

In this respect, at least, we are able to advance a concept of existence that conforms to both science and religion without violating the principles of either. God as prime mover is of course a religious proposition, but the idea of existence as an expression of continuous creation is completely consistent with new-paradigm thinking. Moreover, even with respect to God, once we begin to think in terms of existence as indeterministic, that is, as the continuous and therefore unpredictable process of its own creation, then an unknowable God, *Ein Sof*, can be considered in more scientific terms as a kind of supreme attractor—that “pattern of behavior toward which all nearby patterns (or trajectories) converge” (Kahn, Krippner, and Combs 2000, 5). In the context of such a formulation, creation is shaped by the creator in the same way as a system is shaped by its attractor. But also in the same way that an attractor has no objective reality independent of its manifest expression, so our knowledge of *Ein Sof* is limited to the dynamics of its evolutionary unfolding. Creation is therefore not a product but a process in which the pattern of existence is constantly emerging, organizing around the divine matrix—the “numinous attractor” (Ainslie 1995, 311). Thus, existence, the manifest expression of the “numinous attractor,” is infinite in its evolutionary potential for novelty and transformative change.

Indeed, it is this dynamic of evolutionary emergence that serves as the main focus for Kabbalah. The twentieth-century kabbalist Abraham Isaac Kook unequivocally states, “The theory of evolution accords with the secrets of Kabbalah better than any other theory. . . . When we penetrate the inner nature of evolution, we find divinity illuminated in perfect clarity” (quoted in Matt 1995, 31). Here Kook reiterates the kabbalistic conception of divinity, not as the creator of the universe but rather as the process of its continuous creation. Thus, while God is beyond all capacity for human understanding, investigation of the evolutionary dynamics of God’s manifest expression is encouraged as a fruitful ground for exploration.

SUCCESSION

The central metaphor for Kabbalah is the sefirotic tree of life. We intuitively guess, just by looking at the sefirotic diagram (Fig. 1), that it represents a complex interdependent system. Simply put, the diagram *looks* cybernetic, as indeed it is. Given that the subtle complexity of relationship inherent in the tree-of-life diagram is the subject of hundreds of volumes of kabbalistic commentary, it would be presumptuous to propose anything like an analysis of its meaning in the context of this article. But in a general sense we can understand the diagram as twofold in meaning, being a map of both the macrocosm—the cosmological realm of the evolving physical world—and the microcosm—the embodied realm of soma and psyche (including evolving human consciousness).³ In either context the sefirotic tree expresses the dynamics of evolutionary emergence. The diagram is a symbolic representation of the creation matrix, the pattern that connects and ultimately manifests itself at every level and between all the levels of existence.

Physicist David Bohm (1980) calls this deep primordial pattern the generative order and proposes that all of manifest creation emanates from this profound expression of potentiality for being. In this sense, levels of order do not simply emerge in succession, each subsuming the characteristics of prior states and thus progressing in a more or less linear fashion toward infinite complexity. Rather, the generative order is that very expression of dynamic emergence that springs from the fundamental matrix of cocreative relationship. The complexity of the generative order is therefore not acquired but is continuous within each level of manifest differentiation regardless of its assumed rank or stage of emanation. In the paradigm of generative order, the part is not merely evolving toward the complexity of the whole but in every instance already contains the whole within it as the dynamic essence of its being. Thus, within a paradigm of generative order, every entity is evolving in actuality toward that which it already is in potentiality: “the general is now seen to be present concretely, as the activity of the generative principle within the generative order. This suggests a

new notion of hierarchy, in which the more general principle is immanent, that is, actively pervading and indwelling, not only in the less general, but ultimately in reality as a whole” (Bohm and Peat 1987, 164).

Bohm’s holistic notion of interdependent hierarchies accurately mirrors the dynamic, cocreative nature of the sefirotic tree of life. Bohm conceives of the implicate order as a hidden level of reality that deterministically influences the seemingly indeterministic realm of quantum reality. But Bohm takes this idea of hidden levels even further by extending it beyond its implications for quantum mechanics. He proposes that underlying the implicate order is yet another implicate order, and so on, each in turn

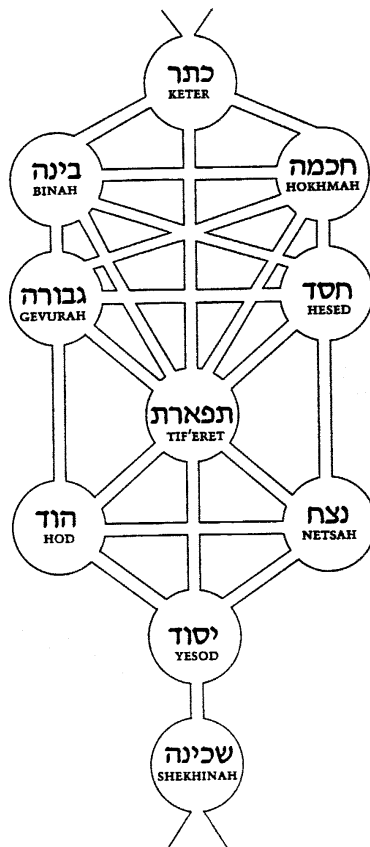


Figure 1. The Sefirotic Diagram of the Tree of Life. The fundamental theme of Kabbalah is relationship. Though the *sefirot* are spoken of in terms of their difference, they are nonetheless embraced as dynamic and profoundly interconnected domains. It is therefore not surprising that when we look at the schematic depiction of the sefirotic tree, even without knowing its specific meaning, we can instantly see the depth of systemic interconnection.

emerging from a hidden ground of complexity. In this way Bohm conceives of an infinite cascade of implicate orders that influence not only quantum reality but every manifest level of existence. He refers to this hierarchy of implicate orders as the “superimplicate order.”⁴ Bohm’s concept bears a striking similarity to the uppermost *Sefirah* of the Tree of Life known as *Keter*, or Crown, traditionally conceived as “the primary generative force of the cosmos” (Hoffman 1995, 8). In the same way as the entirety of the differentiated world emanates from out of the undifferentiated nothingness of *Keter*, Bohm imagines that all matter and mind emerge from the primordial ground of a superimplicate order that he also calls the “holomovement.” As he states, “there may be a further unknown set of entities, each having its implicate order, and beyond this there may be a common implicate order, which goes deeper and deeper without limit and is ultimately unknown. This unknown and indescribable totality will be called the *holomovement*. It acts as the fundamental ground of all matter (and mind)” (Bohm and Peat 1987, 180). The holomovement therefore refers to the ultimate extension of even the superimplicate and suggests a level of subtlety akin to the Kabbalist notion of *Keter*. And beyond the holomovement there is something still, an ineffable unknowable that has the same sense as *Ein Sof*.

The essence of Bohm’s paradigm of generative order is anticipated in the sefirotic tree. Both models focus on a hierarchy of emergence that is a continuous process of unfolding and enfolding. A hierarchical model provides a dynamical systems view of the relationship between whole and part, which is engaged at every level of existence. In a model of hierarchical emergence, every expression of matter and mind, like each of the *sefirot*, manifests the complexity of the implicate order that is at once primordial and relative. And whether we call it *Keter*, or the holomovement, we are nonetheless contemplating the selfsame thing, the ambiguous ground of relationship from which the implicate becomes explicate and the world is revealed in all its diversity.

And yet, despite this continuous process of differentiation, all entities retain the primordial “intelligence” of the holomovement. Thus, in each moment there is the potential to be in imitation of nothingness and, transcending mind and matter, collapse all concepts of contradiction and separateness. In this way we can consider the *sefirot* as a succession of implicate orders. Every order, at once in relationship to its self and the other, is both giving birth and being born. All levels of order are in this sense implicate relative to the level that emerges from its complexity. Thus, the lower emerges (unfolds) from the higher even as it evolves (enfolds) toward it. In every case, at the level of every *sefirah* there is a hidden level from which it simultaneously emerges and returns. And this is never resolved, for there is always a superimplicate order underlying each implicate order, even including the subtlest level in *Keter*. And this succession of implicate orders

is extended beyond the individual *sefirah* to include the entirety of existence, the ten combined.

It is in this context that we speak of pattern within pattern, the pattern that connects. When looking at the diagram of the sefirotic tree (Fig. 1), we notice that the uppermost and lowermost realms, *Keter* and *Shekhinah*, are depicted as being open at either end. This indicates that even the entirety of existence is informed by an underlying implicate order, that nothing in creation, not even creation itself, is the final word. Everything is in a process of emergence, unfolding from an implicate ground. And while we may speak of levels, we are reminded that in truth they are not discrete manifestations but are the explicated expressions of a deeper, hidden order of unresolvable mystery. The thirteenth-century kabbalist Moses de Leon supplies this commentary: “The sublime, inner essences secretly constitute a chain linking everything from the highest to the lowest. . . . The entire chain is one. Down to the last link, everything is linked with everything else; so divine essence is below as well as above, in heaven and on earth” (quoted in Matt 1995, 26).

This is the same sense in which Bohm speaks of the holomovement as being infinite and recursive, the ground for the manifestation of all differentiated existence: “In principle this reality is one unbroken whole, including the entire universe with all its ‘fields’ and ‘particles.’ Thus we have to say that the holomovement enfolds and unfolds in a multidimensional order, the dimensionality of which is effectively infinite” (Bohm 1980, 189).

THE MICROCOSM

From its earliest beginnings Kabbalah has held that the coevolutionary dynamics exhibited at the macrocosmic level of cosmological unfolding are reiterated in a self-similar fashion at the microcosmic level of human consciousness. In saying that “At opposite poles, both man and God encompass within their being the entire cosmos” (Scholem 1978, 152), there is already the acknowledgment that a single dynamical model is applicable to both whole (the entirety) and part (the entity). The new scientific paradigm adopts a similar approach in embracing principles of self-organization and cocreativity that address both the cosmology of an evolving universe and the biology of evolving human consciousness. But in either case, whether Kabbalah or the new scientific paradigm, the question still remains: What is the mechanism by which unity and diversity coevolve?

Considering this question with respect to the microcosm, biologists Humberto Maturana and Francisco Varela regard the emergence of cognition and consciousness as an extension of biological evolutionary principles and therefore subject to the same laws that guide all evolutionary processes. They propose two guiding principles for evolutionary emergence—autopoiesis and structural coupling—and further suggest that these

mechanisms account for the complex interrelationship between unity and diversity inherent in existence.

Autopoiesis essentially addresses the question of the part, how entities emerge and function as autonomous systems while simultaneously maintaining a profound connection with the whole. *Autopoietic organization* refers to the fact that all living systems are characterized as being in a continuous process of self-creating. In the same way that a living cell creates itself through its own internal dynamics, which are separated from the environment by a membrane, so all autopoietic systems are bounded entities whose autonomy is articulated by the fact of their own internal dynamics of continuous self-creation. As Maturana and Varela state (1998, 49), “what is distinctive about [autopoietic systems] is that their organization is such that their only product is themselves, with no separation between producer and product. The being and doing of an autopoietic unity are inseparable, and this is their specific mode of organization.”

Autopoiesis is therefore “the mechanism that makes living beings autonomous systems” (Maturana and Varela 1998, 48). But while the internal dynamics of autopoietic systems are separate from the environment, they are also inexorably linked with it such that “every autopoietic system is a unity of many interdependencies” (1998, 116). In their ability for continuous self-creation and in their ability to be both separate and whole, autopoietic systems reiterate the dynamics of existence, the metasystem of which they are themselves a part.

Structural coupling addresses the question of the whole: how the natural world functions as a whole system—an integral pattern of weblike interdependence—without compromising the integrity of the individual entities that make up its structure. For Maturana and Varela, structural coupling is the mode of mutual interaction through which all evolutionary activity is realized: “We speak of structural coupling whenever there is a history of recurrent interactions leading to the structural congruence between two (or more) systems” (1998, 75). This means, for example, that biological entities are not in relationship with the environment in some causal way, that the environment somehow “acts” upon the entity, “causing” it to change. Rather, an entity’s evolutionary unfolding is triggered by its environment but only with respect to the inherent limits that are structurally encoded, functionally defining it as an autopoietic (self-organizing) entity. The environment draws the entity toward its own potential in the same way as the entity, by the very fact that it exists within the environment, helps the environment to fulfill its potential: “Structural coupling is always mutual; both organism and environment undergo transformations” (1998, 102).

Because of its interdependent nature, the relationship between an entity and the environment can never be resolved. Therefore the sum of these relationships expresses the profound level of ambiguity inherent in the

structure of existence. Evolution from this perspective is not a linear process of cause and effect but an interdependent web of mutual interaction, wherein everything caused is simultaneously causing and subject and object continuously engage in an ambiguous field of transformative relationship. This is not to say that there is no distinction between the whole and the part, only that the complexity of the relationship transcends the limits of any causal formulation.

Kabbalah begins its investigation of whole and part as a means of establishing the relationship between the divine realm of unity and the human domain of diversity. It concludes that the differentiated world does not simply manifest, *ex nihilo*, in all its variation but rather emanates in stages of complexity. Each *sefirah*, every level of order, is initially conceived as differentiated, though unsubstantiated, within the hidden potential of divine imagination. To this extent the differentiated *sefirot* always already exist in potentiality before they are manifest as the substantiated forms in the world. And so the part is contained within the whole. But also, the whole is contained in the part, since, in imitation of the primordial order, within each *sefirah* is the dynamical pattern for further emanations. Thus, each *sefirah* contains within it the pattern of divine intelligence, which allows and indeed requires it to participate in the continuing process of emanation. Through emanation each *sefirah* manifests a stable identity of its own and as an autopoietic entity becomes the ground for further emanation. This is the sense in which each *sefirah* adopts the autopoietic principle wherein self-stability becomes the autonomous ground for self-creation. The kabbalists demonstrate that the sefirotic tree creates itself both as a structurally coupled whole and as a differentiated autopoietic entity.

The sefirotic hierarchy is established in two ways. First is the idea of *sefirot* within *sefirot*, the way in which sefirotic levels are seen to be interdependent, embedded each within each in a unified cascade of relationship. Second is *behinot*, the discrete structures inherent to each *sefirah*, which enable, in differentiation, each sefirotic level to connect to the levels that both precede and follow it. In this way emanation encompasses both the idea of generative determinism, the sense that the pattern of existence is always already extant within the ground of the primordial whole, and the idea of emergent indeterminism, the sense that each emergent sefirotic level expresses the potential for transformative change, a level of unpredictable novelty that is progressive and evolutionary.

Cordovero developed a detailed model of emanation that simultaneously highlights the complexity of whole and part. In essence Cordovero is responding to the same evolutionary problem, and in much the same way, as Maturana and Varela—how the part emerges from the whole and the whole from the part without either losing its essential integrity. As the historian of Kabbalah, Gershom Scholem, explains (1978, 115): “With Cordovero

the Sefirot are more than emanations which manifest the attributes of the Emanator, though they are this too. They actually become the structural elements of all beings.” Thus, the sefirotic tree is the quintessence of structural coupling. As the holistic expression of the divine matrix, each *sefirah* contains within it a structural identity through which differentiated entities are established as independent systems within the whole, allowing for the emergence of diversity in the natural world. Thus, while the ten *sefirot* express the complex interactions of the unified whole, each one is a bounded entity with its own internal dynamics that allow for the generative process of self-creation. The total pattern of emanation dictates that the part is generated from the whole such that each part in turn acts as a whole in generating further emanations. Cordovero proposes that there are, in the main, six aspects extant within each *sefirah*. These aspects reflect a kind of differentiated wholeness that provides for the process of emanation:

(1) its concealed aspect before its manifestation in the *Sefirah* which emanates it; (2) the aspect in which it is manifested and apparent in the emanating *Sefirah*; (3) the aspect in which it materializes in its correct spiritual location, that is to say, as an independent *Sefirah* in its own right; (4) the aspect which enables the *Sefirah* above it to instill within it the power to emanate further *Sefirot*; (5) the aspect by which it gains the power to emanate the *Sefirot* hidden within it to their manifested existence within its own essence; and (6) the aspect by which the following *Sefirah* is emanated to its own place, at which point the cycle begins again. (in Scholem 1978, 114)

Cordovero’s dynamics of emanation reflect distinctly metaphysical concerns but nonetheless provide a perspective that is consistent with a modern systems approach to understanding the evolutionary process of emergence. The similarity is not in the method by which the paradigm is constructed but in the perspective itself, which is both self-organizing and cocreative. The sefirotic tree simultaneously expresses the emergent, primordial pattern of wholeness that is continuous at all levels of complexity (structural coupling) and the differentiated levels of order that establish their own autonomous identities while coincidentally maintaining their relationship with all other parts (autopoiesis). The dynamics of whole and part operate simultaneously as an expression of an ever-deepening, cocreative dialogue. We cannot say whether the *sefirot*, as “autonomous unities” (Maturana and Varela), are discrete or unified; aspects of both whole and part apply equally depending on the perspectival level at which they are encountered.

THE MACROCOSM

In the cosmology of Platonism and Neoplatonism, where divinity was imagined to be outside creation, existence was seen as an endlessly repeating cycle of birth and death, emanation and regression. The power of this

metaphor in the history of Western thought is evident to the extent that it was recast in the determinism of classical Newtonian physics. In either case the universe is conceived as a fixed eternal form, a closed system where life is nothing more than an anomaly, a random excursion from the norm of chaotic meaninglessness to which all existence must ultimately return. Such a model might be likened to a periodic attractor, which embodies all the dull predictability of a pendulum swinging eternally in a vacuum.

By adopting a cocreative evolutionary perspective Kabbalah breaks with earlier traditions, marking a watershed in Western metaphysics and philosophy. In similar fashion the new scientific paradigm signifies a radical shift in our scientific interpretation of the natural world. In rejecting the Newtonian worldview in favor of a model that includes and indeed celebrates the diversity of life, the new scientific paradigm mirrors Kabbalah. Both challenge the prevailing paradigm to give up the staid certainty of determinism and re-vision the universe as the generative ground of unpredictability, novelty, and transformative change.

While it is true that these two traditions encounter the world from a shared evolutionary perspective, we must keep in mind that the meaning of the encounter is essentially different. To reduce the aspirations of one system, whether religious or scientific, to those of the other ultimately trivializes the nature of both. What we can say is that Kabbalah and the new scientific paradigm are linked through a common metaphor that embraces the dynamic principles of self-organization and cocreative emergence. But we should also note that this commonality is apparent not only between the two paradigms but also at every level of the internal structure of each. Whether we are speaking of an organism or the cosmos, the dynamics of cocreative emergence are constituted at every scale of existence.

This being said, applying the biological principles of evolution to the universe as a whole is a recent development for scientific cosmology. But with advances in technology and the ability to accurately measure residual cosmic background radiation dating from the Big Bang, there have been a number of credible hypotheses along these lines (see Chaisson 1987; Davies 1992; Greene 1999; Hawking 1988; Smolin 1997). There can be little doubt that these theories reflect as much on our collective understanding of our place in the cosmos as on the way we do science. As physicist Lee Smolin notes, "apart from its use to predict the results of experiments, a good scientific theory may function as a metaphor that captures and expresses what we think is essential in the world" (1997, 145). It is in this respect that the new-paradigm approach to scientific cosmology offers insights into the meaning of existence by constructing what amounts to a modern creation myth. Out of a super-hot plasma soup of undifferentiated radiation, matter slowly begins to organize. The opaque universe becomes the light universe as temperatures cool and electrons are captured

by nuclei to form atoms. Molecules, primarily hydrogen and helium, begin coalescing as the basis of galaxies and stars. And so it goes, a process of evolutionary emergence whose latest stage includes life.

But it would be incorrect to think of this process as strictly hierarchical, one event causally leading to the next and so on down the line. Rather, what is being posited is the presence of a matrix of structural self-organization that manifests at every scale of existence from the smallest subatomic particles to the largest galactic systems.

New scientific evidence (see Smolin 1997) shows that the largest and oldest structures in the visible universe, galaxies, are far from static, closed systems that formed once and for all in the primordial past. In sharp contrast to the deterministic perspective of classical physics, galaxies appear to be dynamic self-organizing structures analogous to biological ecosystems. I am speaking metaphorically, as it would be overly simplistic to suggest that galaxies are alive. Nonetheless, composed of a delicately balanced, multiphased medium of gas and dust, galaxies demonstrate the characteristics of complex self-organizing systems. In this sense galaxies are not fixed collections of stars but rather generative processes in which stars emerge and are subsumed as part of an endless transformational flow. The accumulation of new scientific data thus reveals a cosmological story of continuous evolutionary emergence. In this regard evolution didn't happen, it is happening in every instant as the universe continues to engage in the dynamic process of its own self-creating.

This is the sense in which the universe itself comes to be regarded as a complex evolving system. But Smolin takes this hypothesis even further in imagining the universe as an autopoietic system structurally coupled to a metasystem conceived as a continuously emergent "multi-verse." Smolin is proposing that the universe is not only the emergent ground for all the evolutionary activity within it but is also both the progeny and the progenitor of other universes. This highly speculative hypothesis—a theory that Smolin refers to as "cosmological natural selection" (1997, 108)—is based on the most current scientific data regarding the phenomena known as black holes.

Black holes are the result of massive stars that have collapsed to such a density that nothing, not even light, can escape their gravity. This means that by definition we will never be able to see what is happening within the event horizon created by a black hole. But that doesn't necessarily mean that time ceases to exist within it, that nothing is happening. On the contrary, Smolin hypothesizes that black holes may in fact be the sites of new, emergent universes. If this is in fact the case, the Big Bang was not the beginning of time but only the beginning of our universe, which itself emerged from out of a black hole.

It is estimated that there may be as many as 100 million black holes in our galaxy alone. If each in turn is the site of a multitude of emerging

progeny, we are talking about a lot of potential universes. Smolin imagines universes having parameters similar but not identical to those of their progenitors, like biological entities whose progeny are genetically similar but not identical to themselves. This means that the idea of structural drift (Maturana and Varela), the coupling mechanism through which organism and environment generate novelty, may be extended beyond biological processes to include cosmological emergence. From an evolutionary perspective, those universes whose parameters allow for the creation of stars are the ones most likely to generate black holes and therefore “give birth” to many other universes. In biological terms those universes, like our own, that produce many progeny would be considered as demonstrating a favorable fitness landscape.

Perhaps the most compelling implication for a model of cosmological natural selection is the idea that the beginning and end of time is purely a local phenomenon relative only to a particular universe. In the grand evolutionary scheme of a multidimensional meta-universe, time has no beginning or end but is rather a process of continuous becoming. The statistical problem of how long it would take to create our universe, a universe whose parameters are fine-tuned to the staggering degree that life can emerge at all, is no longer an issue. There is plenty of time if universes infinitely generate more universes, the parameters of whose progeny continue to exhibit slight variation. In the context of such an evolutionary succession, fitness is based on the ability of a universe to generate progeny/black holes. If the concept of cosmological natural selection is correct, there is no need to imagine underlying deterministic laws (or a deterministic God, for that matter), because establishing the parameters suitable for life in our universe would be inevitable. From this point of view, the laws of physics are not given for all time but rather continuously evolve with an evolving universe. Within the parameters of the new scientific paradigm, time ceases to be an issue for creation.

While the hypothesis that our universe is merely one among an infinite number of variations may at first seem like science fiction, it is actually quite plausible. It appears strange only because we are so wedded to the prevailing Newtonian view that the universe is a closed system contingent on absolute time and space. In accepting the premises of classical scientific determinism we have been forced to draw two conclusions regarding the beginning and the end of time. First, there must be some supernatural force (God?) that stands outside the system and chooses or in some manner sets the physical parameters conducive to the existence of *this* universe and no other. Second, our universe, as a closed system, is subject to the second law of thermodynamics and can therefore be expected to end in the heat death of entropic chaos.

The problem, which at first seems philosophical, is that the first of these conclusions is unsatisfyingly arbitrary while the second is depressingly grim.

I must agree with Smolin, however, that this is less a problem of philosophy than of science. The result is the emergence of the new scientific paradigm, which makes a radical departure from the classical model by assuming that existence is in essence an open, far-from-equilibrium system and as such provides the “necessary condition(s) for life to exist indefinitely in the universe” (Smolin 1997, 160). What is being envisioned is a matrix of dynamic interdependence in which universes comprise “a nested hierarchy of self-organized systems . . . driven by cycles of energy . . . in the levels above them” (Smolin 1997, 159).

The concept of a multiverse composed of worlds within worlds is a notion that has been long held by Kabbalah. Once again, this proposition is arrived at because of metaphysical concerns that make it an entirely different project from that of scientific cosmology, but nonetheless the principles are strikingly similar.

Kabbalists believe that the Torah is the word of God. As such its meaning is boundless and exists in this creation as only one of an infinite number of possible variations. It is believed that the letters that make up the Torah can be configured and reconfigured infinitely and that each configuration reflects another possible world of creation. Thus “the Torah (would be) read differently in each of the millions of worlds involved in the complex of creation” (Scholem 1978, 122). In this sense the Torah is like a cosmic code similar to the laws of physics and begs the very same question that has plagued physicists for four hundred years: Why these particular laws and not others? From the point of view of Kabbalah, that from which the laws are composed is constant, but the laws themselves, far from being eternal, are relative to the particular manifestation of existence that is this creation. This relativistic view mirrors the shifting paradigm in physics, where the search for a unified theory lying behind the workings of an eternal universe may have to be abandoned in favor of the notion that laws evolve and transform with an evolving universe.

The “mystery of recurrent creation” (Scholem 1978, 121) as an underlying theme in Kabbalah is reflected in the structure of the sefirotic tree of life diagram, which, as I pointed out earlier, is open at both ends. This signifies the notion that each existence emerges out of another, and another will yet emerge out of it.

Crescas articulates the doctrine of continuous creation and defends it philosophically in *Or Adonai* (Feldman 1972). In refuting Aristotle’s argument against the existence of a vacuum, he proposes the notion of space as having infinite extension. In allowing for the possibility of infinite magnitude, he also allows for the possibility of the plurality of worlds. Crescas argues for an infinite number of coexisting magnitudes, and though he “does not explicitly posit the existence of an infinite number of worlds, . . . it is inferable” (Harvey 1972).

Such a concept anticipates Kurt Gödel's incompleteness theorems by positing that existence is not a fixed eternal form but rather an iterating cascade of sets within sets, worlds within worlds.

This is a radical departure from the metaphysics of Platonic determinism, which insists that existence is merely the pale reflection of an underlying archetypal truth. Kabbalah cannot abide the dualistic rigidity of such a system and imagines instead that existence, in imitation of divinity, is an infinite process of self-creating. This implies a truly cosmic level of evolution in which the world is the ground of creation not only for that which emerges within it but also for other worlds beyond our comprehension yet nonetheless existent. Again we are seeing a universal pattern of evolution that extends beyond the world to worlds within worlds—universes within universes—in an unending pattern of cocreative, evolutionary emergence.

It is in this sense that God does not cause the world to become but is the process of its continuous becoming. As the numinous attractor, God is the generative pattern around which the infinite variation of cocreative self-organization converges. Thus, within the evolutionary perspective of Kabbalah, the fatalism of Platonic determinism is overturned. As an open system, existence is continuously infused with energy. From such a perspective, the fate of the universe is no longer a meaningless descent into equilibrium, a state of chaotic disorder and entropic finality. On the contrary, its fate is mystery—the ongoing process of creation.

CONCLUSION

I have demonstrated that there is more to a relationship between Kabbalah and the new scientific paradigm than an interesting coincidence of metaphors. The relationship is fundamental and addresses the phenomenological and philosophical foundations on which we construct a world of meaning. For 2,500 years Western culture has embraced a deterministic view of the universe. It has dominated our approach to religion, philosophy, and science. In going beyond the parameters of determinism, Kabbalah and the new scientific paradigm take a rational approach to the evolutionary unfolding of existence while at the same time accepting that its core is ambiguity and mystery. This is a radical approach that envisions existence as an open system without boundary. Beyond existence, this interpenetrating web of relationship, there can be nothing, for there is no beyond, only the infinite complexity of continuous emergence. But just because we cannot observe the cosmos objectively does not mean that our understanding of it must be abandoned to superstitious excess. On the contrary, we are speaking of a new form of rationality that accepts existence not as an inherent object but as a relative process. As such it can be understood but never grasped once and for all, for it is as the poet Lalla says, "new and always new again" (quoted in Halpern 1994, 46).

Perhaps, in the end, it is not the role of science to resolve the mystery of existence but rather to heighten it. In relinquishing determinism, the new science draws us to the narrow ridge between chaos and order. Here we must relinquish our security in absolutes and surrender instead to the ambiguity of continuous emergence and transformative change. In abandoning our yearning for an answer, a final theory of everything, we at last accept our responsibility by willingly engaging the dialogical encounter with the cosmos. And if we wish to call this prayer, then it is to a God whose complexity is truly beyond conception; for this is not a God who created but the God who creates; not a God outside creation but the God who is creation itself. This is the God in every moment who without beginning, limit, or end is the simultaneity of all possible points of perception, of all relationship and all experience. It is in this sense that science has the capacity to draw us toward the religious moment, the moment of awe. And in return for the favor, quickened by the religious experience, we are granted the wisdom that can only come from awe, the “cosmic religious feeling” that must certainly be the basis for all scientific exploration and discovery.

NOTES

1. Although there continues to be some debate, most scholars agree that Kabbalah is indebted to a number of traditions outside of Orthodox Judaism, including Neoplatonism, Gnosticism, and Isma'ili and Sufi mysticism, as well as an earlier form of Jewish mysticism known as Merkabah. (See in particular Scholem 1978; Merkur 1993.)

2. “It is clear that Crescas was influenced by the Kabbalah, especially by the 13th-century Aragonese masters” (Harvey 1972).

3. While modern scholars (following Gershom Scholem's interpretations) agree that the sefirotic diagram is a map of cosmological evolution, what is less than universally accepted is that it is also a map of evolving consciousness—that in fact it simultaneously maps both the macrocosmic and microcosmic realms of outer and inner experience. However, noted scholar Dan Merkur has adopted a more unorthodox approach to Kabbalistic studies, especially in his endorsement of the idea that not only can the sefirotic tree be interpreted as a map of evolving consciousness but that such was the intent of its creators as early as the twelfth century. Merkur states that “a fundamental innovation of my approach to the *Bahir* is my treatment of the sefirotic diagram as a map of mystical states. The ten hypostases are each a discrete variety of mystical experience. . . . Properly to think about the sefirot is to enter the alternate states that hypostases intrinsically are” (1998, 33).

4. The superimplicate order “is much subtler than the implicate order and goes deeper. In addition, it is capable of further extensions in ways that go beyond quantum theory altogether” (Bohm and Peat 1987, 181).

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