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THE NEW SACRED MATH

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The individual soul is an ageless idea, attested in prehistoric times by the oral traditions of all cultures. But as far as we know, it enters history in ancient Egypt. I will begin with the individual soul in ancient Egypt, then recount the birth of the world soul in the Pythagorean community of ancient Greece, and trace it through the Western Esoteric Tradition until its demise in Kepler's writings, along with the rise of modern science, around 1600 CE. Then I tell of the rebirth of the world soul recently, in new branches of mathematics.

KEYWORDS: *Computational mathematics, field, sacred mathematics, soul.*

ANCIENT SOUL

Here are some brief notes on the biography of the World Soul, from Ancient Egypt to Kepler.

Ancient Egypt, 2500 BCE

We take seriously the possibility that ancient Egyptian culture began around 10,000 BCE. Thus, tentatively, we may regard it is the Ur source for the soul concepts of the Western Esoteric Tradition, including those of Greece and India. We begin our story of the history (as opposed to the prehistory) of the soul in 2500 BCE, with the Great Pyramid of Cheops.

"This world is alive in its entirety and infused with divine spirit."(p. 46). [All references in this section are to (West, 1995).]

Spiritual elements or bodies of ancient Egypt include the Ba, the Ka, and several others. The Ba, or soul, is "the animating principle, the vital or divine spark that vivifies all sentient creatures" (p. 63). The Ka, or double, is "the power that fixes and makes individual the animating spirit that is Ba." (p. 64).

"If during life on earth, the Ka has degenerated to the point where it has been divested of all virtue, of everything truly human, then it does not reincarnate, and the Ka disperses into the various lower animal and vegetal realms. . . . It may be this understanding that lies behind the curious doctrine of metempsychosis in which the deceased may be reborn as an animal or even a bush or tree." (p. 64).

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Recent studies of the pyramid of Cheops, and the pyramid texts, give an idea of the journey of the soul in the reincarnation process.

"After death, the Pharaoh's soul was said to become a star, to join with Orion in the sky" (p. 452). Alexander Badawy determined in 1964 that the two shafts cut 200 feet from the King's chamber to the surface were aimed at the Pole star, and Orion, in the year 2600 BCE. And according to Robert Baumol, the two shafts from the Queen's chamber were aimed at Orion and Sirius in 2450 BCE (p. 453). The supposition is that these shafts were to facilitate the journey of the Pharaoh's soul, after his death and the internment of his body in the pyramid, to its home in the sky.

Plato, 400 BCE

Pythagoras of Samos was born about 570 BCE. He travelled and studied in Egypt and Babylon. Initiated into the mysteries of several traditions—Egyptian, Babylonian, and Persian—he returned to Greece and Magna Graecia in southern Italy and carried on with the reforms set in place by the Orphic religion, which became the most important religion of ancient Greece. Pythagoras synthesized spiritual and natural philosophy into the framework for classical Greek culture, including the metaphysical and sacred aspect of Number, the One (monad, unity) and its emanations. He introduced the terms philosophy and cosmos. He created a school around 520 BCE in Croton (southern Italy) that emphasized communal living, gender equality, vegetarianism, mystery initiations, Orphic poetry, harmonics, music therapy, the monochord, geometry, arithmetic, and cosmology. The school was destroyed by a rejected and disgruntled follower who led a popular revolt against the community around 500 BCE. Among the important followers of Pythagoras were Philolaus (b. 474 BCE) and Archytas of Tarentum, an important influence on Plato.

The Pythagorean doctrine is based on these three principles:

1. Ideas: matter is attracted to absolute forms, or ideas, which have an existence of their own. Mathematics is the study of these forms.
2. Souls: an animal has an immortal soul, which reincarnates (transmigrates) after death, until a state of perfection is attained.
3. Harmony: ideas and souls are related by sympathy, resonance, or musical ratio.

We may recognize the Pythagorean theory of reincarnation as derived from the Egyptian. The idea of the world soul evolved in this community.

Socrates (479–399 BCE) was the agent of a major shift in which philosophy turned from nature (or physis) to human life. Also, he is considered among the first to emphasize the concept of the world soul.

Plato (429–347 BCE) synthesized Pythagoras and Socrates. First he became a follower of Socrates. He had the genius to grasp Socrates' meaning, and to present it brilliantly in a series of ten dialogues. Around 390 BCE, Plato had visited Western Greece (Southern Italy and Sicily), encountered Pythagorean communities, met Archytas of Tarentum, the great Pythagorean, and adopted Pythagoreanism as

a second influence. Platonism consists in the joining of these two streams, the Socratic and the Pythagorean. In 387 BCE, Plato created his school in Academe, a suburb of Athens.

Plato expanded the teaching of Socrates on the perfection of the soul into a complete system. In this system, morals and justice were based on absolute ideas. Wisdom consists of knowledge of these ideas, and philosophy is the search for wisdom. In fourteen more dialogues, Plato elaborated this unified system.

Plato's theory of soul is set out primarily in six of the dialogues: *Phaedo*, *Republic II*, and *Phaedrus*, of the middle group of dialogues, 387–367 BCE, *Timaeus*, around 365 BCE, which divides the middle and last groups, and *Philebus* and *Laws*, of the last group, 365–347 BCE. The development of the individual soul is given in the three middle dialogues.

The *Phaedo* is a long and detailed examination of the individual soul, its immortality, and reincarnation, given by Socrates on the day of his death sentence. The *Republic* describes Plato's mathematical curriculum for the Academy: arithmetic, plane geometry, solid geometry, astronomy, and music. At the end (p. 10.614b) is the *Tale of Er*, which details the reincarnation process of the individual soul, as told by an eye witness. (The numbers in parens are page numbers of the Stevens translation.¹) In the *Phaedrus*, Socrates and Phaedrus discourse on love, and on rhetoric. To understand divine madness, one must learn the nature of the soul (p. 245c). Soul is always in motion, and is self-moving, and therefore is deathless (p. 245c, d, e). Then begins the important metaphor of the chariot: two winged horses and a charioteer (p. 246a–248a). This metaphor of the soul is then used to explain divine madness, and the dynamics of reincarnation.

The world soul is developed in the later three dialogues. The *Timaeus* is a discussion of four persons: Socrates, Timaeus, Critias, and Hermocrates. It begins with a review by Socrates of a discussion on the preceding day. This concerned the constitution of the ideal State and its citizens. Then Critias tells the famous story of Atlantis, which was told to his great-grandfather by Solon, one of the seven sages (p. 21). Then Timaeus is asked to begin the feast with a description of the creation of the Universe (p. 28). He tells how God, because he was good, made the world after an eternal pattern. He brought order into the world, and soul and intelligence (p. 30). The world is composed of fire and earth (p. 31). Being solids, these two elements require two more, water and air, to bind them (p. 32). The world is a sphere (p. 34) with the soul in the center (p. 35). The gods made man and the lower animals, and God made the human souls of the same four elements as the body of the universe, along with part of the soul of the universe (p. 41). Then he sets in motion the process of incarnation, and reincarnation, of these human souls into mortal bodies (p. 42). The created gods make these mortal bodies of the four elements (p. 43). As a person becomes a rational creature through education, his human soul moves in a circle in the head (a sphere) of his mortal body (p. 44).

The *Philebus* is a lecture by Socrates on wisdom and pleasure. Along the way, he introduces the world soul as the source of individual souls (p. 30a). The *Laws* is the last of Plato's writings. It is a long dialogue of three older men, and is unique in that Socrates is absent. The actions of the world soul are discussed in detail (p. 10.896e–99a).

The Stoics, 300 BCE

From Plato and Aristotle and others came the Stoics, for 500 years the leading school. Among other ideas, they further developed the *logos* concept of Heraclitus, Aristotle, and Philo. This became an element in the Neoplatonic cosmology of Plotinus (Hahm, 1977, p. xiii). *Logos* has many meanings. Cognate of the verb *legein*, to say, it may mean language, speech, expression, explanation, formula, purpose, rational basis, or plan.

Following Aristotle, the Stoics have two principles, or *archai*: active and passive. These are body and soul, or matter and *logos* (Hahm, 1977, pp. 29, 61, 74). For the Stoics, *logos* makes the world by giving form to matter in a dynamical process (Sandbach, 1975, p. 72). Like Plato, the Stoics believed that the cosmos was a living being, with a world soul (Hahm, 1977, p. 137).

Plotinus, 250 CE

The main stimuli for the Neoplatonism of Plotinus (204–270) were Plato, the Middle Platonists, and to a lesser extent, the Stoics. From Plato came Plotinus' main cosmology of the three primal hypostases: the *One*, the *Intelligence*, or *Intellectual Principle*, and the *World Soul* (Turnbull, 1948, p. 14). The sections from the Platonic dialogues that are relevant to Plotinus—*Symposium*, *Phaedo*, *Phaedrus*, *Timaeus*, *Laws*, and *Republic*—are extracted in Turnbull (1948, Appendix).

The *logos*, for Plotinus, was a supplementary structure that intertwined the three hypostases. He defined it as “a power that acts upon matter, not conscious of it, but merely acting upon it” (Turnbull, 1948, p. 15). The lower realms proceed from higher by a process of *emanation* (Hesse, 1961, p. 77).

This Neoplatonic cosmology, although further developed by Iamblichus, Proclus, and others, may be regarded as the main trunk of the Western Esoteric Tradition.

Proclus, 450 CE

Proclus (412–485 BCE) came to the Platonic Academy as a student, studied with Plutarch and Syrianus, and stayed for life. He was an outstanding mathematician as well as philosopher, and was the last of the great Athenians. His version of the Neoplatonic cosmology is rather ornate. He has, as Plotinus, the three hypostases: the *One* (the Henadic Realm), *Being* (*nous*), and the *Soul*. But the *World Soul* (including individual souls) is placed between the *Soul* hypostasis and *Nature* (including embodied individual souls) (Proclus, 1970, p. xviii). The *nous* is divided in three parts (Proclus, 1987, p. xxii).

MEDIEVAL SOUL

After Proclus, at the end of the Alexandrian period of late antiquity, Greek cosmology and theology were transmitted through Indian, Persian, and Arabic channels. Here are a few highlights.

Spanda, 800 CE

The Axial Age in India is represented by the older Upanishads, central to Vedanta and the Yoga schools of ancient Sanskrit philosophy. In the middle ages, many schools diverged. One of these, Kashmiri Shaivism, developed a doctrine of vibration in its basic texts: *Siva Sutras* and *Spanda Karikas*.

Spanda means "some sort of movement" (Singh, 1980, p. xvi). The text of the *Spanda Karikas* suggests a sophisticated field concept applied to consciousness. From the Sanskrit dictionary: Throbbing, trembling, oscillation, vibration, or pulsation. This may have evolved from the older Akasha concept of the Upanishads.

Al-Kindi, 850 CE

Al-Kindi (805–873) was an Islamic heir of Plato and the Neoplatonists. For him, the world soul was an emanation from the One, as light from the Sun (Lindberg, 1983, p. xlv). His work on optics, *De aspectibus*, and his astrological work, *De radiis stellarum* had an important influence on Western scientists, including Roger Grosseteste (1168–1253), Roger Bacon (1214–1294), Marsilio Ficino (1433–1499), and John Dee (1527–1609). *De radiis* presented an astrological theory based on rays from the planets. Everything radiates, and space is full of these radiations. The universal activity of Nature is through these radiations of power or force (Lindberg, 1976, p. 19).

Suhrawardi, 1100 CE

Suhrawardi (1153–1191) restored the ancient Greek philosophy of light, and early Persian angelology, within Islam. He connected Plato and Zoroaster (Corbin, 1977, pp. 12, 110). He was greatly influenced by Proclus.

Roger Bacon, 1267 CE

In *De multiplicatione specierum*, around 1267, Bacon presents a doctrine of the physics of light. He was inspired by Plotinus, Al-Kindi, and Roger Grosseteste. This doctrine survived for three centuries, and ended with John Dee. The word *species* meant the likeness of any object, transmitted through any media. This evolved from Plato, the Old Testament, Philo, Plotinus, St. Augustine (d. 430), Proclus (d. 485), and al-Kindi (Lindberg, 1983, pp. xxxv–liii).

RENAISSANCE SOUL

Ancient Greek wisdom reached the Renaissance through Byzantine and Islamic transmissions.

Ficino, 1400 CE

Ficino's originality derived from his syncretism of Pagan and Christian elements. His primary wells of inspiration were Plato, Plotinus, Proclus, the *Hermetica*, the

Table 1
Ficino's Cosmological Model

Collective	Individual discarnate	Individual embodied
The One*		
The Intelligence (nous)*	Ideas	
Reason		
The Soul (psyche)*	Angels	Indiv. soul (incl. mind)
Spirit (pneuma)	Stars	Indiv. spirit
Nature (physis)	Matter	Body

The levels marked with an asterisk are the primary hypostases of Plotinus.

Areopagite, Augustine, and Aquinas (Allen, 1981, p. xi). Among the facets of this syncretism were:

- orphic music, music therapy (Ficino's personal practice),
- astrology (astrological psychology), and
- magic, psychology.

He was heir to the long line of astrological magic—Synesius, Proclus, Macrobius, and Al Kindi—and was followed by Bruno and Agrippa. His cosmological model, the foundation for the whole of Renaissance philosophy, is summarized in Table 1.

The One is the undivided source of everything. The Intelligence, or Cosmic Mind, contains Plato's ideas, the archetypes and blueprints for creation. The World Soul has three parts (rational, sensitive, and vegetative) and gives rise to individual minds (both human and angelic). Reason communicates between the Intelligence and the Soul, and Spirit (astral matter) intermediates between the World Soul and Nature, the created universe of matter, energy, and life. Angels belong to the Cosmic Mind.

Ficino created a Platonic Academy in his home in Careggi, near Florence. For an excellent description of this institution, read chapter V in (Panofsky, 1939). Ficino's astrological magic, psychology, and medical practice were based on his understanding of Spirit, and its relation to the stars and planets. (Couliano, 1987, p. 28) They have a contemporary revival in the work of James Hillman (1983) and Thomas Moore (1982). The *Books on Life* of Ficino, his most relevant work on astrological psychology and medicine, is available in new English translations (Ficino, 1980, 1998).

Kepler, 1600 CE

Johannes Kepler (1571–1630) was a contemporary of John Dee (1527–1609) the last emanationist, William Gilbert (1544–1603) the scholar of magnetism, the first field of modern physics, Giordano Bruno (1548–1600) the champion of the cosmos as an infinite plenum, and Galileo (1564–1642), the first modern dynamicist.

Table 2
Some Highlights of Kepler's Life

1571, Born, December 17 in Weil der Stadt
1572, A new star appears, the first since 125 BCE
1577, Winter, very bright comet, his mother took him up a hill to see it
1594, April, Became professor of mathematics at Graz
1595, July 19, Vision of his cosmological model
1597, <i>Mysterium Cosmographicum</i> appears, sent to Galileo, Tycho
1597, August 4, Galileo replies to Kepler
1600, January 1, leaves Graz for Prague
1600, Gilbert publishes <i>On Magnets</i>
1601, Tycho dies, Kepler replaces him as Imperial Mathematicus
1602, Discovery of his 2nd law (equal areas)
1604, October 17, he sees a new star in Ophiuchus
1606, Publishes a book on the new star, mentions Gilbert
1607, September, sees Halley's comet
1608, He hears of Bruno, burned at the stake in 1600
1609, Pub'd <i>Astronomia nova</i> , incl. 1st law (elliptic orbits)
1610, August 9, writes to Galileo
1610, August 19, Galileo replies
1615, Kepler's mother accused of witchcraft
1619, Pub'd <i>Harmonice mundi</i> , incl. 3rd law (period-distance relation) and the music of the spheres
1620, Kepler's mother imprisoned, threatened with torture
1621, Pub'd <i>Myst. cosmographicum</i> , 2nd ed.
1630, November 15, died

Some highlights of Kepler's life are listed in Table 2 (Cf. www.visual-kepler.org). The events of 1572, 1577, and 1604 are especially relevant to the biography of the World Soul, for these events broke the spell of the Aristotelean dogma on the permanence of the celestial sphere. Also, Kepler's epiphany of 1595 became the subject of his first book, the *Mysterium Cosmographicum*, published in 1597 and again in 1619, which reveals his Pythagorean philosophy.

In his work on elliptical orbits of the planets (especially Mars), Kepler proposed a theory of universal gravitation, the second field of modern physics. In his explanation of noncircular motion, around 1604, he actually changed the word *spirit* (as in angelic influence) to *force* (that is, mechanism) in the manuscript for his most important work, *Astronomia Nova*, published in 1609. And here we may locate the death knell of the world soul, concomitant with the birth of modern physics.

Galileo, 1600 CE

As a youngster, Galileo worked with his father, Vincenzo, on experimental aesthetics. This early deviation from the received wisdom of the ancients became his normal mode of working. It was apparent in his kinematic experiments at the University of Pisa around 1589, which contradicted Aristotelean dogma, and caused him to be expelled from the faculty in 1591. His experimental method became the paradigm of modern science. Later he came into conflict with the Roman Church

for his support of the Copernican model, and also for his atomic theory, again contradicting Aristotelean dogma. In his writing there seems to be no Pythagorean nor Neoplatonic elements: he is totally modern.

THE NEW SACRED MATH

The computer revolution has given birth to new branches of mathematics: chaos theory, fractal geometry, and complex dynamical systems (also known as system dynamics). We find ourselves, since about 1970, with a totally new capability to model, to simulate, and thus to understand, massively complex systems. The unification of many scientific models may be regarded as the return of world soul in the contemporary worldview.

The *individual soul* has been with us since time immemorial. But earlier in this article I argued that *world soul* emerged into literature with the Pythagoreans, around 500 BCE, and died with Kepler, around 1600 CE, along with the birth of modern science. It has been missed, as the support for our commonsense of the coherence of all and everything has so far been lacking since modern science became our theology and cosmology. Calls for a renewed foundation for the cosmos are now multiplying, as for example, the books of Rupert Sheldrake (1981), Fritjof Capra (1996, 2002), and Ervin Laszlo (2004), among others, testify.

Sheldrake, 1981

In his first book, *A New Science of Life: The Hypothesis of Formative Causation* (1981), Rupert Sheldrake began with a consideration of unsolved problems of biology, in the areas of behavior, evolution, the origin of life, parapsychology, and so on. He delineated three levels of wholism: mechanism, vitalism, and organicism. We may relate these, respectively, to the Nature, Spirit, and World Soul levels of Table 1.

Building on the 20th-century organismic ideas of Whitehead, Smuts, Waddington, and others, Sheldrake posed the existence of non-energetic fields, called morphogenetic fields, that direct the emergence of form in complex systems of all kinds. In the contexts of physics, chemistry, biology, and the social sciences, these may be called morphic fields, mental fields, family fields, and so on. Although non-energetic, these fields may have measurable effects on energetic systems, like the logos of Plotinus. Sheldrake described the effect of a morphogenetic field on an energetic system metaphorically as *morphic resonance*. His *hypothesis of formative causation* proposes that these fields evolve from unknown seeds called *morphogenetic germs*. They then evolve their structures from previous similar systems; the past intervenes in the present; morphogenetic fields have memory.

In terms of the premodern cosmologies described earlier, we may locate Sheldrake's morphogenetic fields in the World Soul, whereas the morphogenetic germs reside in the Intelligence. The entire paradigm is organismic.

Capra, 1996

In his book, *The Web of Life: A New Scientific Understanding of Living Systems* (1996), Fritjof Capra synthesizes the general systems theory of Ludwig von Bertalanffy, the cybernetics of Gregory Bateson and Humberto Maturana, and the environmental perspective of deep ecology into a top-down understanding of our biosphere. He makes no appeal to organismic fields.

In a sequel, *The Hidden Connections: Integrating Biological, Cognitive, and Social Dimensions of Life into a Science of Sustainability* (2003), Capra extends his biospheric big picture to include the social and economic spheres. His fully connected world-system is consistent with a vitalistic paradigm.

Laszlo, 2003

In his book, *The Connectivity Hypothesis: Foundations of an Integral Science of Quantum, Cosmos, Life, and Consciousness* (2003), Ervin Laszlo summarizes all the most important evidence for interconnecting fields, and also proposes a new physical field, the quantum vacuum field, as the carrier wave for the integrity of the cosmos. Unlike Sheldrake and Capra, Laszlo has insisted on a single, unique field as the basis of connectedness on all levels: physical, biological, social, and universal: truly an integral theory of everything. He proposes the quantum vacuum as the modern version of the Sanskrit *akasha*, an ether with memory. Like Sheldrake, Laszlo is organismic, and may be associated with the Intelligence of the Platonic cosmology.

Mathematical Soul

Here we have created a snapshot of the rich cosmological model of the Renaissance, at the terminus of four thousand years of evolution. And now, after a lapse of four centuries, begins its current revival. At last, it is time for us to put mathematics in the scheme of the primal hypostases of Plotinus of Table 1: the One, the Cosmic Mind, and the World Soul.

Of course, mathematical models are ideas, and following Plato, they belong to the Cosmic Mind. In fact, the archetypal archetypes are none other than the five Platonic solids, that according to the *Timaeus*, are the mathematical building blocks of Nature. But since the computer revolution, we also have a semi-realization of mathematical models in the form of computer simulations. And these *cybersimulacra*, hovering midway between the Cosmic Mind and Nature, may naturally be associated with the World Soul.

The association of cybersimulacra with the World Soul is further supported by the emergence of *system dynamics* cybersimulacra around 1970, in the work of Jay Forrester. His models, World and World2 were the basis of the report, *The Limits to Growth*, of the Club of Rome. Since that early work, system dynamics, also known as complex dynamical systems theory, has become the first successful method of combining many small models (resembling individual souls) into integral models of everything. These integrations provide a computer-aided extension of our collective human understanding of the complex system we call home.

Through the mathematical world soul now emerging, we may model the collective consciousness of all living things by an abstract field, that links them to each other, and to the World Soul. In fact, the known physical fields—electric, magnetic, gravitational, nuclear, and so on—are all modeled, in mathematical physics, by the same abstract field, known to mathematics as the *d'Alembertian wave equation*. This is a bona fide card-carrying member of the Cosmic Mind, and is just as fundamental to the creation of the cosmos as are the five Platonic solids.

This wave equation idea has been used to math-model and cyber-simulate the mental field proposed by Rupert Sheldrake as a mechanism for telepathy observed between pets and their owners (Abraham, 1996).

CONCLUSION

Considering the association of complex dynamical models and computer simulation with the Cosmic Mind and the World Soul, respectively, we may regard all this as *the new sacred math*. While Galileo believed that God wrote the book of Nature in the language of Euclidean geometry, we now see that chaos theory and fractal geometry were not left out.

The pioneers of our current spiritual revival—Sheldrake, Capra, and Laszlo—are dynamically literate. That is, they use the concepts of the new sacred math—catastrophe theory, chaos theory, bifurcations, neural networks, complex dynamical systems, emergence, complexity, agent-based models, and the like—to formulate and evolve their ideas.

The new developments in computational mathematics provide the means for modeling and simulating the universal fields of information, without any assumption of intervening physical fields or specific mechanisms of communication. For all these reasons, I believe that the World Soul is now being reborn from the ashes of inadequate hypotheses, such as the mechanical clockwork universe. A renaissance of premodern cosmology emerges in our postmodern culture, as the poverty of the received paradigm of modern science turns to compost.

NOTE

1. The usual system for making unique references to sections of the text by Plato derives from a 16th century edition of Plato's works by Henricus Stephanus.

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