

Beyond Spacetime Geometry—The Death of Philosophy and Its Quantum Reincarnation^{*}

Wen-Ran Zhang

Department of Computer Science, Georgia Southern University, Statesboro, USA

Email: wrzhang@georgiasouthern.edu

Received July 5, 2012; revised August 8, 2012; accepted August 16, 2012

ABSTRACT

Contrary to the “end” and “death” assertions on philosophy, this paper predicts an equilibrium-based and harmony-centered scientific reincarnation of philosophy. Logically, the reincarnation is backed by a formal system and a background independent geometry that transcends spacetime. Physically, it is supported by definable quantum causality and bipolar logical unifications of matter and antimatter, particle and wave, big bang and black hole, relativity and quantum entanglement. Philosophically, it is distinguished from Western metaphysics and dialectics as well as the Dao of Laozi. It is named a quantum reincarnation for its central claim that YinYang bipolar quantum entanglement is the source of causality for the Being of beings following the 2nd law of thermodynamics. Thus, it presents a modest unification of science and philosophy for their reciprocal interaction (Note: Equilibrium subsumes non-equilibrium and quasi—equilibrium as local non-equilibriums can form global equilibrium or quasi-equilibrium).

Keywords: End and Death of Philosophy; Bipolar Quantum Entanglement; YinYang Bipolar Geometry; Formal YinYang Cosmology; Nature of Time; Quantum Reincarnation of Philosophy

1. Introduction

The Dao in *Yi Jing* claims that everything has two opposites and all changes in nature are caused by the reciprocal interactions of the two sides. The two sides are the Yin and the Yang of nature. Thus, Dao subsumes an equilibrium-based and harmony-centered super symmetry of negative-positive energies. The words “historically long standing” and “broad and profound” are often used to describe the Chinese philosophical thinking.

Due to its lack of a formal logic, however, the Dao has never reached the status of science philosophy. This left room for a variety of scientific and unscientific interpretations. When French philosopher Jacques Derrida visited Shanghai in 2001 he reiterated Hegel’s assertion that China has no philosophy but thoughts. In his 2004 speech at Beijing Nobel Laureate Chen Ning Yang attributed China’s failure in becoming the cradle of modern science to *Yi Jing*. While some Chinese hailed Yang’s speech, many bloggers were filled with righteous indignation by his comment and spoke out against it with excitement. But few pointed out the possibility of inventing a unique formal YinYang logic and geometry for scientific unification.

^{*}This work is based on a working book (Ref. [1]). By this note, there is no need for further copyright clearance for the book’s publication. For a more thorough and complete coverage of the subject readers are referred to the book.

On the other hand, modern physics is in a different dilemma. The searches for ether and monad have found no result; the modern quest for monopoles and strings has turned out no concrete findings. As a basis of string theory, monopoles and strings are too far away from reality. For instance, it is not clear how monopoles and strings can form an atom with equilibrium or non-equilibrium. Notably, string theory is criticized as “The Trouble with Physics” [2] and “Not Even Wrong” [3] by insiders. (Remark: When the discovery of Higgs boson is being hailed, the century old quest for quantum gravity still finds no definitive battleground).

Whenever physics is in trouble, it needs new philosophical thinking. But philosophy or metaphysics is also in trouble. Despite the continuing debate on various theories regarding being, time, and truth, philosophy is being-centered and truth-based. Now, philosophy is faced with extinction. About two centuries ago, Hegel pronounced its end. He claimed that his truth-based and contradiction-centered dialectic logic had brought philosophy to its end and there should be no new philosophy after him. Anglo-American philosophers on the whole, however, found it hard to put up with contradiction while seeking truth. Indeed, contradiction is not a scientific concept and Hegel’s *The Science of Logic* is not the logic of science as Einstein asserted later: “For the time being we have to admit that we do not possess any general theoretical basis for

physics which can be regarded as its logical foundation.”

While the end of philosophy was meant by Hegel to be the “top” or “apex”, some scholars went one step further to proclaim the death of philosophy. In *The Grand Design*, Hawking and Mlodinow declared [4, p. 5]: “*Philosophy is dead*”; “*M-theory predicts that a great many universes were created out of nothing*”; “*Their creation does not require the intervention of some supernatural being or god.*” When they advocated M-theory, however, they also promoted the concept of negative and positive energies [4, pp. 179-180] but stopped short of pointing out the unavoidable consequence that the two energies are respectively the Yin and Yang of nature. And when they proclaimed the death of philosophy, they are calling back a different philosophy.

Hawking is renowned for his black hole theory. The theory originally suggested the universe’s disappearance without information preservation. It was criticized for violating the 2nd law of thermodynamics. To remedy the inconsistency, Hawking proposed black body evaporation [5] and then particle emission [6]. After then, despite continuing criticism, he held up his theory for three decades. In 2004, he finally conceded. But so far it is logically unclear how the universe’s information can be recovered from emitted particles after a black hole.

It seems that Hawking has introduced a similar paradox by advocating M-theory and negative-positive energies at the same time. If particles and antiparticles can survive a black hole and the two energies form the regulating force of the multiverses, YinYang bipolarity has to be the most fundamental property of the universe from which the information of the universe can be recovered and the multiverses have to be unified in a single equilibrium-based universe. Otherwise, they would be completely isolated and the negative-positive energies can’t form regulating forces of them.

The quantum reincarnation of philosophy discussed in this work claims:

1) Being and truth are not the most fundamental properties of the universe; the most fundamental property of the universe should be YinYang bipolarity.

2) *The Science of Logic* is not the logic of science. To have the logic of science, contradiction has to be replaced with bipolar dynamic equilibrium.

This paper is organized in seven sections. Section 2 provides a background review. Section 3 presents a formal theory of YinYang bipolar cosmology. Section 4 predicts a reincarnation of philosophy. Section 5 argues that science cannot replace philosophy. Section 6 discusses the relation between equilibrium, harmony and Einstein’s God. Section 7 draws a few conclusions.

2. Background

2.1. Philosophical Divide

Karl Popper is well-known for his positivist stance in

science philosophy and his sharp criticism on dialectics. He stated: “*The whole development of dialectic should be a warning against the dangers inherent in philosophical system-building. It should remind us that philosophy should not be made a basis for any sort of scientific system and that philosophers should be much more modest in their claims. One task which they can fulfill quite usefully is the study of the critical methods of science.*”

Popper was right to criticize dialectics and to warn the world “*that philosophers should be much more modest in their claims*”. However, it seems that he stopped short of pinpointing the crux of the problem in Hegel’s dialectics. His stance against holism seems to be out of date due to the new phenomena of global warming, global economy and quantum entanglement. His firm support for Einstein against Bohr on quantum theory seems to be lopsided. He overlooked the importance of the mutually beneficial interactions between science and philosophy as well as the possibility of a scientific reincarnation of a modest philosophy just as he overlooked quantum entanglement. His warning “*that philosophy should not be made a basis for any sort of scientific system*” seems to be questionable. Otherwise, the equilibrium condition of the 2nd law of thermodynamics could be violated, YinYang should be long gone, and there should no science philosophy.

It is contended that the equilibrium-based philosophy discussed in this work can be regarded a scientific reincarnation. Evidently, anyone (good or bad) can claim having truth in his or her hand to start a contradiction, a conflict or even a world war by free will (as done by Hitler) but no one except God, if God exists, can claim the possession of global dynamic equilibrium that may well be the ultimate power for the creation, regulation and evolution of being and truth. Subsequently, the key for the reincarnation of philosophy is whether we can have an equilibrium-based quantum logic that is both scientific and philosophical and can reveal the ubiquitous effect of quantum entanglement with simple logically definable causality but contradiction-free.

2.2. YinYang Bipolar Geometry and Bipolar Dynamic Logic (BDL)

YinYang bipolar dynamic logic (BDL) [7-12] shows a number of distinguishing properties. First, it is a formal logic ever defined on a bipolar quantum lattice $B_1 = \{-1, 0\} \times \{0, +1\}$ in a completely background independent YinYang geometry of negative and positive energies, where quadrant is made irrelevant and, therefore, it transcends being, truth and spacetime. This transcendence makes spacetime emergence possible—a desirable feature in quantum gravity (**Figure 1**). In B_1 , $(0, 0)$, $(0, 1)$, $(-1, 0)$, and $(-1, +1)$ stand, respectively, for eternal equilibrium, non-equilibrium, non-equilibrium, equilibrium or harmony.

BDL exhibits the properties for a scientific reincarnation of philosophy. First, its non-linear dynamic property doesn't compromise the law of excluded middle (LEM) (Figure 2) which makes BDL contradiction-free and leads to a sound axiomatization (Figure 3) [12]. Bipolar universal modus ponens (BUMP) presents an equilibrium-based non-linear bipolar dynamic generalization of classical modus ponens (MP) and provides logically definable quantum causality for bipolar quantum entanglement. Another distinguishing factor of BDL is its bipolar symmetrical property. This property makes super symmetrical bipolar fusion, fission, oscillation, interaction and quantum entanglement possible as depicted in Figure 4.

BUMP simply states that, for all bipolar equilibrium functions $\phi, \varphi, \psi,$ and $\chi,$ IF $(\phi \Rightarrow \varphi) \& (\psi \Rightarrow \chi),$ then

the bipolar interaction $(\phi * \psi)$ implies that of $(\varphi * \chi).$ With the emergence of space and time, BUMP leads to a theory of YinYang bipolar relativity [12] characterized by Equation (1).

$$\begin{aligned} & \left[\psi(a(t_x, p_1)) \Rightarrow \chi(c(t_y, p_3)) \right] \& \\ & \left[\phi(b(t_x, p_2)) \Rightarrow \varphi(d(t_y, p_4)) \right] \\ \Rightarrow & \left[\psi(a(t_x, p_1)) * \phi(b(t_x, p_2)) \right. \\ & \left. \Rightarrow \chi(c(t_y, p_3)) * \varphi(d(t_y, p_4)) \right]. \end{aligned} \tag{1}$$

In Equation (1), $a(t_1, p_1), b(t_1, p_2), c(t_2, p_3), d(t_2, p_4)$ are any bipolar agents or celestial entity where $a(t, p)$ stands for "agent a at time t and space p " (t_x, t_y, p_x and p_y can be the same or different points in time

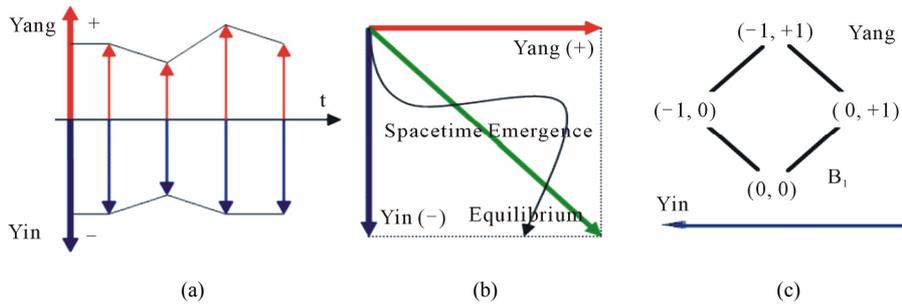


Figure 1. YinYang bipolar geometry and Hasse diagram of $B_1 = \{-1, 0\} \times \{0, 1\}.$

Excluded middle	$(x, y) \oplus \neg(x, y) \equiv (-1, 1);$	$(x, y) \oplus^- \neg(x, y) \equiv (-1, 1);$
No contradiction	$\neg((x, y) \& \neg(x, y)) \equiv (-1, 1);$	$\neg((x, y) \&^- \neg(x, y)) \equiv (-1, 1).$

Figure 2. Bipolar laws.

<p>Bipolar Linear Axioms:</p> <p>BA1: $(\phi^-, \phi^+) \Rightarrow ((\varphi^-, \varphi^+) \Rightarrow (\phi^-, \phi^+)) ;$</p> <p>BA2: $((\phi^-, \phi^+) \Rightarrow ((\varphi^-, \varphi^+) \Rightarrow (\chi^-, \chi^+))) \Rightarrow (((\phi^-, \phi^+) \Rightarrow (\varphi^-, \varphi^+)) \Rightarrow ((\phi^-, \phi^+) \Rightarrow (\chi^-, \chi^+))) ;$</p> <p>BA3: $(\neg(\phi^-, \phi^+) \Rightarrow (\varphi^-, \varphi^+)) \Rightarrow ((\neg(\phi^-, \phi^+) \Rightarrow (\varphi^-, \varphi^+)) \Rightarrow (\phi^-, \phi^+)) ;$</p> <p>BA4: a) $(\phi^-, \phi^+) \& (\varphi^-, \varphi^+) \Rightarrow (\phi^-, \phi^+) ;$ b) $(\phi^-, \phi^+) \& (\varphi^-, \varphi^+) \Rightarrow (\varphi^-, \varphi^+) ;$</p> <p>BA5: $(\phi^-, \phi^+) \Rightarrow ((\varphi^-, \varphi^+) \Rightarrow ((\phi^-, \phi^+) \& (\varphi^-, \varphi^+))) ;$</p>
<p>Bipolar Universal Modus Ponens (BUMP)</p> <p>BR1: IF $((\phi^-, \phi^+) * (\psi^-, \psi^+)) , \left[((\phi^-, \phi^+) \Rightarrow (\varphi^-, \varphi^+)) \& ((\psi^-, \psi^+) \Rightarrow (\chi^-, \chi^+)) \right] ,$ THEN $\left[(\varphi^-, \varphi^+) * (\chi^-, \chi^+) \right] ;$</p>
<p>Bipolar Predicate axioms and Rules of inference</p> <p>BA6: $\forall x, (\phi^-(x), \phi^+(x)) \Rightarrow (\phi^-(t), \phi^+(t)) ;$</p> <p>BA7: $\forall x, ((\phi^-, \phi^+) \Rightarrow (\varphi^-, \varphi^+)) \Rightarrow ((\phi^-, \phi^+) \Rightarrow \forall x, (\varphi^-, \varphi^+)) ;$</p> <p>BR2-Generalization: $(\phi^-, \phi^+) \Rightarrow \forall x, (\phi^-(x), \phi^+(x))$</p>

Figure 3. Bipolar axiomatization.

or space, respectively). An agent without time or space is assumed at any time or space.

2.3. Bipolar Quantum Linear Algebra (BQLA) and Bipolar Atom

The bipolar lattices $B_1 = \{-1,0\} \times \{0,1\}$ and $B_F = [-1,0] \times [0,1]$ have been extended to the infinite bipolar lattice $B_\infty = [-\infty,0] \times [0,+\infty]$. With B_∞ , BDL has been extended to a bipolar quantum linear algebra (BQLA) [11,12] for modeling the equilibrium, non-equilibrium and harmony properties of the negative-positive energies of Yin-Yang-n-element bipolar quantum cellular automata and bipolar atoms (Figures 5 and 6).

Interestingly, a bipolar quantum cellular automaton can be as small as an atom or as large as the universe or multiverse, where all elements have negative and positive energies connected by a bipolar link matrix [11-16]. Figure 6 (adapted from [14]) provides a matter and antimatter unification with the same quantum cellular structure in Figure 5. Dynamic equations using BQLA and their wave forms have been presented in [11-16]. Since all types of action-reaction energies are fundamentally bipolar in nature. Not only can bipolar cellular automata be applied in biological world [15,16] but also be a logical and algebraic candidate for quantum gravity [11].

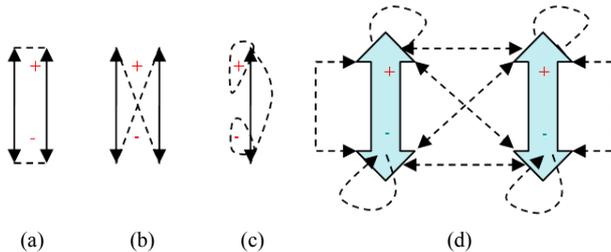


Figure 4. Bipolar relativity: (a) Linear interaction; (b) Cross-pole non-linear interaction; (c) Oscillation; (d) Two entangled bipolar interactive variables.

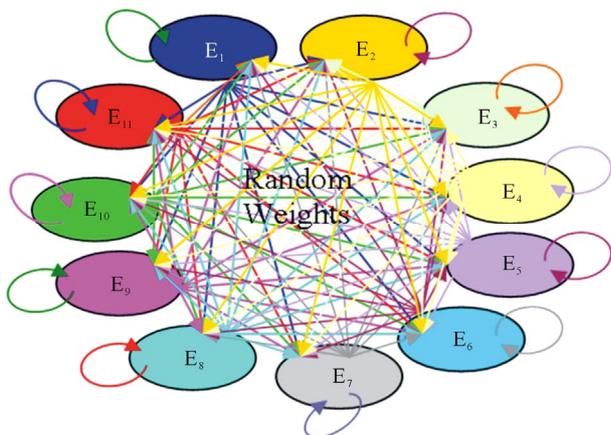


Figure 5. YinYang-n-element bipolar cellular automaton [16].

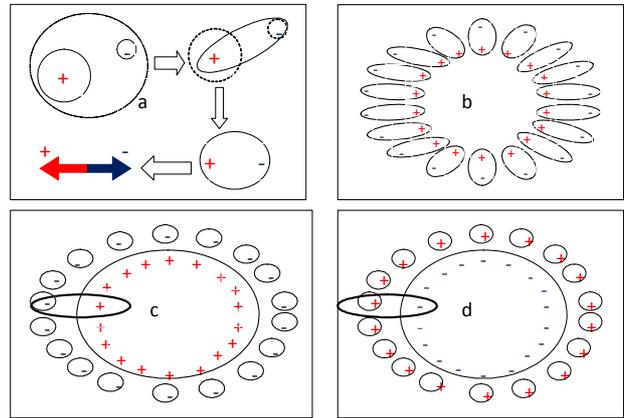


Figure 6. (a) Bipolar representation of hydrogen atom; (b) Yin-Yang-n-elements; (c) Matter atom; (d) Antimatter atom.

Moreover, it provides a basis for particles and antiparticles emitted from black holes to form matter or antimatter again to bridge a major gap in quantum cosmology.

2.4. Bipolar Equilibrium and Harmony

With BDL and BQLA, YinYang bipolar energy equilibrium and harmony of being can be logically and mathematically unified in YinYang bipolar geometry. The geometry has a Yin dimension, a Yang dimension and an equilibrium dimension (Figure 1). Harmony is defined as the reciprocal interaction of two direct opposites of one being in quasi-equilibrium with suitable oscillation amplitudes and frequencies [1,11].

3. Formal YinYang Bipolar Cosmology

3.1. A Process Model of Space and Time

The nature of space and time has long been a matter of debate in the history of philosophy. The subject focuses on a number of basic issues, including but not limited to whether or not time and space exist independently of the mind, whether they exist independently of one another, what accounts for time's apparently unidirectional flow, whether time other than the present moment exist, and what is the nature of space and time.

Most notably, Newtonian space provided the absolute frame of reference for the motion of objects; Einstein proposed the principle of relativity. The latter holds that light propagates at the same speed in all reference frames; no speed can exceed the speed of light; force felt by an observer in a given gravitational field and that felt by an observer in an accelerating frame of reference are indistinguishable. This led to the conclusion that the mass of an object warps the geometry of the spacetime surrounding it, as described in Einstein's field equations.

The physical theory of YinYang bipolar atom suggests a cyclic process model of the cosmos. Since the particles

and antiparticles emitted from a black hole [5,6] can form matter and antimatter again (Figure 6), it sets the stage for another cycle of the cyclic process. Thus, YinYang bipolar atom may lead to the unification of black hole and big bang.

While previous theories on space and time have not been supported by a quantum logic, the cyclic YinYang dynamic process model of space and time depicted in Figures 7 and 8 is supported by BDL with simple logically definable quantum causality (Note: Einstein and others proposed different cyclic universe models). Based on YinYang bipolar causality, time is not like a unidirectional river but like a go-go train on its ring-shaped railways. One cycle of the ring is depicted in Figure 7 and infinite cycles of the train are depicted in Figure 8. The train on one ring can cross to another by a random probability.

As indicated in Figure 7, each cycle of the railway has two major stations—big bang and the black. The big bang station can be marked as a Yang state or $(0,+1)$; The black hole station can be marked as a Yin state or $(-1,0)$. Traditionally, time is said to start from a big bang and stop at a black hole. But that seems to be just an illusion. Interestingly, equilibrium can result from the fusion of the Yin and Yang as $(-1,0) \oplus (0,+1) = (-1,+1)$. Here, eternal equilibrium or death state $(0,0)$ characterizes the illusive disappearance of the universe into a black hole. Moreover, the transition from Yin to Yang (or from black hole to big bang) can be characterized with the logical equation $(-1,0) \otimes (-1,0) = (-1,0)^2 = (0,+1)$.

Remarkably, the four different logical values $(0,0)$ $(-1,0)$ $(0,+1)$ $(-1,+1)$ form the YinYang bipolar lattice (Figure 1)—a logical or mathematical structure. On the one hand, the lattice is defined in a completely background independent YinYang bipolar geometry. On the

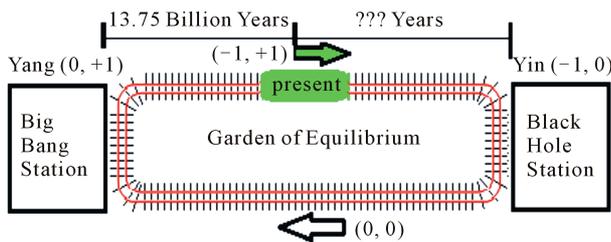


Figure 7. A cyclic process model of space and time [1].

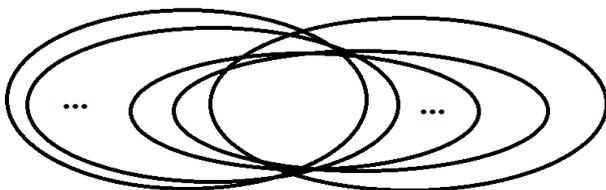


Figure 8. Infinite cycles of the time train [1].

other hand, it is actually a mathematical version of YinYang 4-images. Evidently, physics and philosophy are brought together by the logical structure.

The time train interpretation gives a logical account for time’s cyclic flow instead of unidirectional flow. Just like Aristotle claimed the Earth was the static and stationary center of the universe, human beings couldn’t sense the curvature of a huge ring-shaped time cycle.

Here we are focused on the equilibrium-based and harmony-centered philosophy. The philosophical guidance is evidently logical, systematic and rational. Since YinYang bipolar logic as a formal system has been proven a sound and complete non-linear bipolar dynamic generalization of truth-based thinking, truth, equilibrium, metaphysics and dialectics are corrected and unified into one philosophy. On the other hand, with logically definable quantum causality, relativity and quantum theory as well as philosophy and science are all brought together.

3.2. Eastern and Western Metaphysics

The Chinese Dao as Eastern metaphysics is defined as YinYang in *Yi Jing*. But Western metaphysics was later matched to the Dao; YinYang as the essence of the Dao was left out of the big picture by Western as well as Chinese modern philosophers. Two major reasons for this are: 1) YinYang lacked a formal logical basis for thousands of years; 2) being-centered and truth-based thinking has been proven most effective until mankind encountered quantum entanglement, global warming, global economic overheat and recession. With BDL, the Eastern and Western metaphysics can be distinguished and unified under dynamic equilibrium for dealing with unsolved scientific and social problems.

Equilibrium-based philosophical thinking is central in both science and philosophy. Without equilibrium-based thinking, the being-centered and truth-based Western tradition can’t connect the metaphysical Being to the physical beings because truth as a static concept can’t provide the ultimate Being a dynamic definition for revealing and regulating all beings. Consequently, after searching for more than two thousand years, Western philosophers failed to give a clear definition to Being. With the equilibrium-based thinking, all beings are revealed and regulated by the Dao of YinYang and Being as well as all beings including the universe itself finally finds its home in dynamic equilibrium (Figure 9).

3.3. Cosmological Predictions

YinYang bipolar philosophy has led to the theory of bipolar relativity which reveals the ubiquitous effects of quantum entanglement with a rich set of predictions [12].

Prediction 1. The bipolar axiomatization (Figure 3) is the most primitive (with minimal semantics) and most

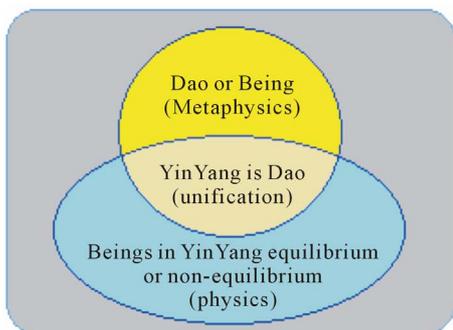


Figure 9. A scientific unification [1].

general (domain independent) equilibrium-based axiomatization of physics, life sciences and socioeconomics; any other less primitive axiomatization with added semantics (such as space, time, mass, and energy) must necessarily be less general (or more domain-specific).

Prediction 2. Let $\psi = (\psi^-, \psi^+) =$ (repression, activation) be a bipolar predicate for the abilities of regulator genomic agents [17] such as YY1 [18]; let $\phi = (\phi^-, \phi^+) =$ (repressability, activatability) be a predicate for the bipolar capacities of regulated agents; let (χ^-, χ^+) and (φ^-, φ^+) be any bipolar predicates; let a, b, c, d be any agents. YinYang bipolar quantum entanglement or BUMP is a fundamental law for equilibrium-based regulation of gene expression, mutation, and molecular interaction in bioinformatics. $\forall a, b, c, d$ we have (* and \blacklozenge can be bound to any logical or physical bipolar operator):

$$\begin{aligned}
 &1) \left[\psi(a(t_x, p_1)) \Rightarrow \phi(c(t_y, p_3)) \right] \& \\
 &\quad \left[\psi(b(t_x, p_2)) \Rightarrow \phi(d(t_y, p_4)) \right] \\
 &\Rightarrow \left[\psi(a(t_x, p_1)) * \psi(b(t_x, p_2)) \right] \\
 &\quad \Rightarrow \left[\phi(c(t_y, p_3)) * \phi(d(t_y, p_4)) \right] \\
 &\Rightarrow \left[\psi(a(t_x, p_1)) \blacklozenge b(t_x, p_2) \right] \\
 &\quad \Rightarrow \left[\phi(c(t_y, p_3)) \blacklozenge d(t_y, p_4) \right]; \\
 &2) \left[\psi(a(t_x, p_1)) \Rightarrow \psi(c(t_y, p_3)) \right] \& \\
 &\quad \left[\phi(b(t_x, p_2)) \Rightarrow \phi(d(t_y, p_4)) \right] \\
 &\Rightarrow \left[\psi(a(t_x, p_1)) * \phi(b(t_x, p_2)) \right] \\
 &\quad \Rightarrow \left[\psi(c(t_y, p_3)) * \phi(d(t_y, p_4)) \right]
 \end{aligned}$$

Prediction 3. Let $\psi = (\psi^-, \psi^+) =$ (self-negation, self-assertion) be a bipolar predicate for the mental equilibrium measures of a patient set P at the neurophysiologic level; let (χ^-, χ^+) be that of the set P at the mood or behavior level; let $\phi = (\phi^-, \phi^+) =$ (negative, positive) be a bipolar predicate for the biochemical capacities of a medicine set M for bipolar disorders; let $(\varphi^-, \varphi^+) =$

(un-excite, un-depress) be that for the effects of M at the mental level. $\forall a, b, a \in P$ and $b \in M$,

$$\begin{aligned}
 &\left[(\psi(a(t_x)) \Rightarrow \chi(a(t_y))) \right] \& \left[(\phi(b(t_x)) \Rightarrow \varphi(b(t_y))) \right] \\
 &\Rightarrow \left[(\psi(a(t_x)) * \phi(b(t_x))) \Rightarrow (\chi(a(t_y)) * \varphi(b(t_y))) \right]
 \end{aligned}$$

is a fundamental law of equilibrium-based brain and behavior, which can be applied in nanobiomedicine for psychiatric mood regulation on an individual and/or a cohort of mental disorder patients.

Prediction 4. Let $\psi = (\psi^-, \psi^+) =$ (negative, positive) be a bipolar predicate and a, b, c, d be any four antimatter and/or matter bindings or couplings, bipolar quantum entanglement or BUMP is an equilibrium-based fundamental law for scientific discovery in astrophysics or particle physics.

The next prediction is on bipolar twistor space. Roger Penrose introduced a twistor theory [19] but “No one yet knows what a quantum twistor space looks alike.” [2, p. 244].

Prediction 5. YinYang bipolar geometrical space is a minimal but most general quantum twistor space; bipolar universal modus ponens (BUMP) or bipolar quantum entanglement is a minimal but most general quantum twistor; bipolar causality and bipolar relativity is a minimal but most general twistor theory.

Prediction 6. Black hole is to a galaxy (or universe) as bipolar depression is to a dysfunctional brain; big bang is to a galaxy (or universe) as bipolar mania is to a dysfunctional brain; wormhole is to a galaxy (or universe) as bipolar mental equilibrium is to a functional brain.

Prediction 7. If the universe had been created by a big bang, the big bang must have been caused by the equilibrium or non-equilibrium of negative and positive energies of the cosmos.

Prediction 8. YinYang bipolar relativity is the simplest mathematically conceivable cosmological order—a non-linear bipolar dynamic fusion of 1) a unipolar truth-based explicate order and 2) an equilibrium-based implicate order with bipolar quantum entanglement that regulates the evolution of the explicit order.

Prediction 9. When observable mass or energy is propagated through bipolar relativity or causality the speed of the propagation is limited by the speed of light (e.g. the propagation of photon or electron); when information is propagated without passing observable mass or energy the speed of the propagation is not limited by the speed of light but by the “speed” of equilibrium-based quantum non-local connection or bipolar quantum entanglement.

Prediction 10. YinYang bipolar quantum entanglement is the source of causality for the Being of beings. All physical, social, mental, biological action and reac-

tion are fundamentally different forms of bipolar quantum entanglement in large or small scales.

Falsifiability is a must for scientific predictions. It may be argued that YinYang bipolar quantum entanglement needs experimental verification or falsification. That is, of course, correct. However, YinYang bipolar quantum entanglement or BUMP is logical. Unlike the predicted existence of monopoles in string theory, dipoles are proven physical reality. Furthermore, from **Figure 6**, it is evident that without bipolar quantum entanglement there would be no atom-atom quantum entanglement. Thus, we can assert that YinYang bipolar quantum entanglement is the most fundamental form of any quantum entanglement [11,12].

4. Quantum Reincarnation of Philosophy

4.1. Meaning of Reincarnation

Seeking the ultimate truth from the universe is not easy because the universe is not completely truthful and the ultimate Being of beings is unreachable with the truth-based approach. A key element in Leibniz truth-based metaphysics is a kind of soul-like monad through which it is said God ordained harmony into the universe. But Leibniz did not figure out why being is there but nothingness is not and he could not avoid the trap of nihilism.

While Hegel failed to provide a formal logic to back up his truth-based and contradiction-centered dialectics, he named his system *The Science of Logic* and described it verbally without forms. Nevertheless, he claimed he brought philosophy to the end with a circle. His circle, however, has no logically definable causality and his science of logic is not the logic of science.

While Steven Hawking advocated negative-positive energies he did not see the potential of YinYang bipolar dynamic equilibrium as a unifying philosophical basis. When he needed a new philosophy, he declared the death of philosophy.

Is philosophy really ended by Hegel? Evidently that is not true because, even if the truth-based, being- or contradiction-centered Western metaphysics were really ended, Eastern equilibrium-based and harmony-centered metaphysics is still in hibernation. As a key concept in *Yi Jing* and a doctrine of Daoism, Buddhism and Confucianism, harmony is advocated in both of the East and the West by friends and adversaries. For instances, following Confucianism, President Hu Jintao of China advocates social harmony; following Buddhism, Dalai Lama, the spiritual leader of Tibet in exile, advocates religious harmony for which he was awarded 2012 Templeton Prize; legendary German mathematician, logician, philosopher and sinologist Leibniz advocated harmony ordained by God through monad; Einstein believed a nature God “*who reveals himself in the orderly*

harmony of what exists”; all democratic systems are formed with checks and balances for social stability or harmony.

Evidently, regardless of their proper or improper interpretations and usage, equilibrium and harmony are the ultimate desire of human civilization. Since any being must exist in and be revealed by dynamic equilibrium, the essence of being is not truth as Aristotle and Heidegger once claimed but equilibrium and harmony whose bipolarity provides the defining property.

Indeed, even after the whole world is unified into a single democratic society, mankind will still need equilibrium and harmony. Notably, contrary to Sir Karl Popper’s stance against holism in the 20th century, Prince Charles has become a strongest advocate for holism and nature-man harmony in the 21st century. The prince starts with these alarming words for his 2010 book titled *Harmony* [20, p. 3]: “*This is a call to revolution. The Earth is under threat. It cannot cope with all that we demand of it. It is losing its balance and we humans are causing this to happen.*”

The prince has challenged the readers to reconsider the assumptions that determine how we live, and how we might change in seeking a more durable future for humankind. For the first time, he shows how the solutions to problems like climate change lie not only in technology but in our ability to change the way we view the modern world. In brief, we need new philosophical thinking to deal with the problem.

Is philosophy really dead? Evidently that is not true. When Hawking declared the death of philosophy, his many universes are still truth-based and being-centered. Since being and nothingness share the same philosophical root, Hawking like Leibniz cannot avoid nihilism. That led to his assertion “*a great many universes were created out of nothing.*” Moreover, the negative and positive energies or the Yin and Yang seem to be unavoidable for the regulation and unification of the multiverses.

To be fair, Western science and philosophy are not to blame for overlooking the Yin and Yang of nature. Chinese philosophy itself is to blame because, for thousands of years, it failed to provide a formal logical and geometric foundation to back up its cosmological claims, that also prompted Chen Ning Yang to blame *Yi Jing* for the failure of China to become the cradle of modern science.

Although philosophy perhaps will never end or die, it is a fact that no new philosophy was born since Hegel. Due to the widely accepted end or death, now we have to talk about its reincarnation.

4.2. Overcome Metaphysics

When Heidegger tried to overcome Aristotle’s “being qua being” metaphysics he could not figure out what is

the ultimate Being that reveals all beings. His search once reached the Dao [21,22] but he returned empty handed because he didn't understand what *Yi Jing* claimed "One Yin and one Yang are called the Dao." He intended to escape Western nihilism but in the end was trapped in an Eastern version of nihilism: "The Dao that can be told is not the eternal Dao; the name that can be named is not the eternal name." Although the word of Laozi has been oft-quoted and widely loved, it is actually an obliteration of YinYang, a retreat from *Yi Jing*, and a mystification of the Dao. Should Laozi be correct, Einstein's grand unification would be meaningless.

To Heidegger, even though philosophy deviated from its primordial state, it still thinks. But, according to him, science does not think. Similarly, to Him logic does not think either. In his writings Heidegger often denounced logic in a sarcastic tone. According to him, in logical reasoning, the laws of thought are replaced by the laws of logical expression. He claimed that logic was invented by teachers and not by philosophers. In his observation, Leibniz, Kant and Hegel—the three greatest German thinkers—had tried to avoid the old logical tradition but, unfortunately, they often became sacrifices of it. He claimed that thought was still stipulated by proposition in Hegelian dialectics and logic was completely framed into technology. He called the logic-only thinkers the lowest point of thinking (cf. [23]).

Unfortunately, Heidegger himself failed to overcome metaphysics. When he denounced science and logic, he stopped short of going beyond truth-based thinking. He did not realize that the crux of the problem is not science but exactly the truth-based reasoning that dominated human's positive thinking. Since truth is unipolar and static, it can't provide logically definable causality and the dynamics for the ultimate metaphysical Being to reveal all beings.

If you are not for truth you would be called a liar. Besides Richard Rorty (1931-2007) few dared to go beyond truth. In front of truth, even Heidegger had to surrender. Ironically, when Heidegger tried to overcome Aristotle's metaphysics, he reasserted truth as the essence of being following Aristotle. He evidently didn't realize that beyond truth there is still equilibrium—the only dynamic concept that can regulate the mighty universe including all the beings and truths in it. Moreover, since equilibrium is central in the 2nd law of thermodynamics, it is scientific and could be the Being of revealing.

4.3. Possibility of Scientific Reincarnation

In the money-driven technology-dominated modern world, it is extremely difficult to talk about a reincarnation of philosophy. In a typical modern university, philosophy curriculum has been replaced with truth-based logic teaching. But Karl Popper claimed that we can never

prove something true, we can only show that it is false. He deemed it the current state of science and physics, which is founded on uncertain induction from empirical facts rather than certain logical deduction from principles which correctly describe reality. However, Popper's empirical positivist view didn't go beyond truth-based thinking because any empirical certainty factor or probability is a degree of truth. As a realist, Popper took Einstein's side and firmly opposed Niels Bohr's interpretation of quantum entanglement. He overlooked the possibility of logically definable causality. Without causality any scientific view is incomplete. In contrast, Einstein believed that a logical axiomatization of physics is possible and famously stated: "Evolution is proceeding in the direction of increasing simplicity of the logical basis (principles)"; "We must always be ready to change these notions—that is to say, the axiomatic basis of physics—in order to do justice to perceived facts in the most perfect way logically"; "Pure thought can grasp reality, as the ancients dreamed"; "Nature is the realization of the simplest conceivable mathematical ideas."

Now, the phenomenon of quantum entanglement has been repeatedly demonstrated through experiments. Even though Einstein was right on a possible axiomatization of physics, it is now believed by many that Bohr came out the winner of the historical Einstein-Bohr debate on quantum entanglement—a new phenomenon that entails new philosophical thinking.

Remarkably, Hawking and Mlodinow opposed Einstein and Popper's quantum realism. They stated [4, p. 44]: "Though realism may be a tempting viewpoint, ... what we know about modern physics makes it a difficult one to defend." They also quoted quantum physics: "For example, according to the principles of quantum physics, which is an accurate description of nature, a particle has neither a definite position nor a definite velocity unless and until those quantities are measured by an observer." They concluded: "In fact, in some cases individual objects don't even have an independent existence but rather exist only as part of an ensemble of many."

What Hawking and Mlodinow are saying is that, in the quantum world, a being A may not be A or $A \neq A$ because its identity may depend on B or C. Logically speaking, the identity law $A = A$, the most fundamental law in Western philosophy and science, is shattered by quantum mechanics. Truth-based logical tradition, however, can't make any sense from this quantum phenomenon other than characterizing it as a contradiction.

Niels Bohr was the first one to bring YinYang into the center of quantum mechanics for particle-wave complementarity. When he was awarded the Order of the Elephant in 1947, he designed his own coat of arms which featured a YinYang logo (or Taiji symbol) in the center with the Latin motto "*contraria sunt complementa*" or "*opposites are complementary*".

Now we need to revisit the primordial meaning of YinYang complementarity. Such a revisit reveals that YinYang complementarity can be between any two sides of one subject. However, the essence of YinYang is that the two sides should be opposite but reciprocal poles or energies. While Bohr's particle-wave complementarity is central in quantum theory, atomic physics and chemistry, particle-wave as well as man-woman, space-time and truth-falsity are not direct opposites in the most fundamental way. Instead, particle-antiparticle and action-reaction forces are the most fundamental opposites of nature. Without the most fundamental bipolar opposites any complementarity is less fundamental. That could be why Bohr deemed quantum causality unattainable [24]. Dramatically, bipolar quantum causality is logically definable (Equation (1)).

Based on de Broglie's work, Einstein's former associate David Bohm proposed a causal interpretation of quantum mechanics [25]. Central in Bohm's interpretation is a wave function. Bohm's causal interpretation was not well received at the beginning. It was branded as "meta-physical" and "ideological" (cf. [26], p. 340). Einstein had initially encouraged Bohm on his work. Without a deep philosophical basis and a new logic, Bohm's wave function was later dismissed by Einstein as "too cheap".

With BDL, the shattered identity law $A \neq A$ is reformulated as BUMP or bipolar quantum entanglement that provides logically definable quantum causality. It states: Equilibrium variables A and B are bipolar quantum entangled if A is bipolar equivalent to B or $A \Leftrightarrow B$ in bipolar geometry. With bipolar quantum entanglement, it is natural for A and B not to have independent existence as:

1) YinYang bipolar geometry is equilibrium-based that transcends spacetime, being, and truth;

2) Any being A may exist in the same bipolar equilibrium or entanglement with another being B in another side of the universe;

3) The negative-positive energies of nature are bipolar quantum entangled from which nothing can escape.

Dramatically, a contradiction in the truth-based space-time geometry has become a sound new law in equilibrium-based YinYang bipolar geometry. The new law provides logically definable causality for the first time ever based on bipolar equilibrium, non-equilibrium, symmetry and non-symmetry. It has made bipolar quantum gravity hopeful and ubiquitous logically, physically, biologically, socially and mentally [1,7-18,27-32].

4.4. Equilibrium and Harmony vs Fire and War

Someone may quote Heraclitus and argue against YinYang equilibrium and harmony. Heraclitus famously claimed that everything is in a state of flux, nothing stays still; fire is the most fundamental element and war is fa-

ther of all, king of all. He believed that fire gave rise to everything. He regarded soul a mixture of fire and water, with fire being the noble part and water the ignoble part. He believed that worldly pleasures made the soul "moist" and a soul should, therefore, be purified to a "dry" state.

Following Hegel's suggestion, Heraclitus is widely recognized as the founding father of dialectical thinking. His prominence is partly due to the view that his prediction of fire being the most fundamental element of everything is corroborated by the big bang theory or even verified by particle-antiparticle annihilation.

Although Heraclitus is right in claiming a forever changing world, a re-examination of his fire-based philosophy can reveal its unscientific nature as we have:

1) Modern science has proven that fire is not the most fundamental element and thus Heraclitus' prediction has been falsified;

2) Fire is subject to equilibrium condition of the 2nd law of thermodynamics; the big bang has to be caused by dynamic equilibrium or non-equilibrium where fire is effect but not cause;

3) YinYang bipolarity survived the big bang and can also survive a black hole due to particle or antiparticle emission from a black hole;

4) With logically definable causality, bipolar dynamic equilibrium has to be more fundamental than fire.

Mentally speaking, it is misleading to say that soul is a mixture of fire and water, with fire being the noble part and water the ignoble. Here the founding father of dialectics seemed to have once fallen into a being-centered metaphysical dichotomy. Regardless of good or bad, the balance of self-negation and self-assertion abilities of a person is a key for mental equilibrium. Without mental equilibrium, there would be no healthy genetic mutation, no mind, no being, and no truth.

Socially speaking, although war and fire are occasionally unavoidable, the advancement of humanity is mainly due to (mankind should also strive for) bipolar reciprocal and peaceful development in equilibrium, complementarity, and harmony, not mainly due to war and fire. This is a fundamental difference between the Eastern YinYang and the Western dialectics. In another word, war and fire cannot escape global equilibrium. It is needless to say that peace and harmony are not for war and fire, but war and fire are for peace and harmony. Interestingly, Zhuang Zi (4th century BCE) said: *Fish thrive in water, man thrives in the Dao*; Heidegger sighed: *For a long time now, all too long, thinking (like a fish) has been stranded on dry land*.

5. Science Cannot Replace Philosophy

5.1. Being, Truth, Equilibrium and Harmony

Aristotle's "*being qua being*" has been central in science

as well as in philosophy. Following the metaphysical doctrine, ancient people assumed that the Earth was a static and stationary being centered in the universe; God was an exemplary being who created everything; air, water, fire, earth and ether were the fundamental beings of the universe; mental disorder like bipolar disorder or schizophrenia were caused by some ghostly beings.

Nevertheless, under the guidance of being-centered philosophy, truth-based Western science and technology have made glorious achievements. It brought mankind wealth and health. It improved the peoples' living standards in many countries. Unfortunately, the glory is associated with side effects. Global warming is believed by many a deadly one threatening the very existence of mankind. Therefore, the problem is the being-centered and truth-based positive thinking itself.

Until this day, modern science is still strictly following the "being qua being" doctrine. For instance, the many decade searches for quantum gravity resulted in strings and superstrings—imaginary fundamental beings. Despite the sharp criticisms such as "*The Trouble with Physics*" and "*Not Even Wrong*" in physics as well as "ended" or "dead" in philosophy, science is still being-centered and truth-based. Even some scientists who proclaimed "*philosophy is dead*" failed to realize that the multiverses in M-theory are still under the guidance of the "dead" philosophy.

Einstein asserted that "*Physics constitutes a logical system of thought.*" and "*the axiomatic basis of theoretical physics cannot be extracted from experience but must be freely invented*". Presumably, the light at the end of the quantum tunnel is not likely to come nearer until someone grasps the reality with pure thought to invent a philosophically different new logic with definable causality. Is that possible at all? Einstein thought so. He asserted that "*nature is the realization of the simplest conceivable mathematical ideas*"; "*pure thought can grasp reality*".

Why can't science be equilibrium-based? The answer is simple: equilibrium is not "*being qua being*". Even though no being can exist beyond equilibrium or non-equilibrium, even though the truth-based philosophical tradition has been proven inadequate for furthering scientific explorations, even though philosophy as metaphysics has been proclaimed "*ended*" or "*dead*," even though equilibrium is central in the 2nd law of thermodynamics, the truth-based and being-centered philosophical thinking is and will still be the only major guiding light as well as a major barrier of science until the reincarnation of an alternative or complementary philosophy.

5.2. M-Theory and Philosophy

Hawking and Mlodinow argued in their book *The Grand*

Design [4] that, because philosophy has not kept up with developments in modern science, particularly physics, as a result, scientists have become the bearers of the torch in humans' quest for knowledge. Therefore, they claim: "*philosophy is dead.*"

When they made their above argument, they evidently overlooked the chilly fact that modern physics is now in urgent need for the guidance of new philosophical thinking. If string theory is not testable how could the M-theory of superstrings be testable? If no geometry can go beyond spacetime, how could an M-theory of multiverses be scientific? If Einstein believed "*evolution is proceeding in the direction of increasing simplicity of the logical basis (principles)*" for physics, how could an M-theory with eleven or more dimensions be simple? Where is the definitive battleground of quantum gravity? How is quantum entanglement related to the real world? Where is the simple logical foundation that provides logically definable causality? Where is the deeper theory that can transcend spacetime, relativity, quantum mechanics and the multiverses?

As a matter of fact, the science of *The Grand Design* did not avoid the guidance of philosophical thinking. For instance, on Page 154 of the book the authors wrote cautiously: "*Though it may sound like philosophy, the weak anthropic principle can be used to make scientific prediction.*" On Page 162, they unconsciously wrote: "*It cannot be so easily explained, and has far deeper physical and philosophical implications.*" Evidently, when the authors needed to recall philosophy back into physics they forgot that they already pronounced its death on Page 5 of the same book.

Consequently, leaving God alone, *The Grand Design* stopped short of answering two deeper questions:

- 1) Do the multiverses in M-theory need to follow the same equilibrium condition of the 2nd law of thermodynamics?
- 2) Can all the truth-based and being-centered multiverses be unified under a single equilibrium-based and harmony-centered universe?

5.3. Can Science Replace Philosophy?

When new philosophical thinking is badly needed as an alternative guidance for science, especially physics, it seems that science has no way to replace philosophy:

- 1) Without new philosophical thinking we cannot have significant scientific invention.
- 2) Sometimes philosophy leads to new scientific discoveries; sometimes new scientific discoveries lead to new philosophical thinking.
- 3) Existing philosophical thinking is inadequate for solving unanswered scientific problems.
- 4) The truth-based and being-centered intensive searches

for ether, strings and monopoles have got no concrete result so far but dipoles are everywhere.

5) Physicists so far failed to apply string theory in the real world to reveal the ubiquitous effect of quantum entanglement. New philosophical thinking is needed for a new formal logical and mathematical system. BDL is the first step forward.

6) Even if the God pillar of metaphysics were indeed broken, it does not mean Western philosophy as metaphysics is completely dead because the truth-based logical reasoning of metaphysics continues to be a major pillar of modern science and even equilibrium can be regarded as holistic truth.

7) Although evolution has been proven true in biology, we still need to find out what is the driving power of mutation, natural selection and evolution. Could it be dynamic equilibrium or non-equilibrium?

8) Even if the truth-based and being-centered Western philosophy were really dead, the Eastern equilibrium-based and harmony-centered YinYang philosophy is still underdeveloped.

9) YinYang bipolar quantum entanglement can be an equilibrium-based ubiquitous regulating power of space-time, being, truth, science and philosophy.

10) Particle-antiparticle bipolarity can survive big bang and black hole, but all beings and truths are subject to observation and limited to certain spacetime.

Evidently, philosophy like science will never end or die as long as mankind is faced with unsolved problems. What it may do is hibernation followed by reincarnation or awakening. Thus, science can't replace philosophy.

6. Harmony and Einstein's God

This paper is about scientific reincarnation of philosophy, not theology. It should be remarked, however, that Spinoza (1632-1677) defined God as nature. Spinoza's God provided a living natural God. On the other hand, Leibniz claimed that things cause one another because God ordained a pre-established divine harmony among everything in the universe. Clearly, equilibrium, harmony and Spinoza's God are related.

Einstein combined the above views and famously stated: "*I believe in Spinoza's God who reveals himself in the orderly harmony of what exists, not in a God who concerns himself with the fates and actions of human beings.*" Einstein also said: "*Everyone who is seriously involved in the pursuit of science becomes convinced a spirit is manifest in the laws of the Universe—a spirit vastly superior to that of man, and one in the face of which we with our modest powers must feel humble. In this way the pursuit of science leads to a religious feeling of a special sort, which is indeed quite different from the religiosity of someone more naive.*"

Now, with YinYang bipolar relativity and bipolar quantum entanglement, equilibrium-based harmony can be logically and mathematically defined and revealed. Logically speaking, theology might need to follow Einstein and elevate God from the heaven of being and truth to the heaven of nature's equilibrium and harmony. Such an elevation would position God on a unifying higher ground above science and philosophy. That seems necessary for the returning of divinity to the *technology-dominated Godless society*. Otherwise, we human beings as a curious species may always wonder whether God as an exemplar being has to be subject to equilibrium or harmony such as mental equilibrium or harmony?

7. Conclusions

A brief review on the end and death assertions of philosophy has been presented. YinYang bipolar dynamic logic (BDL) has been introduced as an equilibrium-based logic of science (vs *The Science of Logic*). The logic is then used for an equilibrium-based cosmological interpretation and unification of matter, antimatter, space, time, big bang and black hole, relativity and quantum mechanics. With the new interpretation, a scientific reincarnation of philosophy has been predicted. Due to its central claim that YinYang bipolar quantum entanglement is the source of causality for the Being of beings, the reincarnation is named a quantum reincarnation.

The possibility and unavoidability of the reincarnation has been discussed. Symbolically speaking, if contradiction in Western dialectics is replaced with bipolar equilibrium, Being in Western metaphysics is replaced with harmony, and God is elevated from the heaven of being and truth to the heaven of nature's equilibrium and harmony, the science of logic by Hegel can be replaced with BDL—an equilibrium-based logic of science. Hegel's circle can then be replaced with the Taiji symbol (**Figure 10**), where the non-isomorphic coexistence of the Yin and the Yang of nature has been proven by dipoles and CP-violation. An immediate consequence is the falsification of Hegel's assertion of the end of philosophy.

Another consequence is that the negative and positive energies of the many universes in M-theory have to follow the same equilibrium condition of the 2nd law of thermodynamics and become one universe. This tells us that science can't replace philosophy. Subsequently, the different laws followed by the multiverses as described

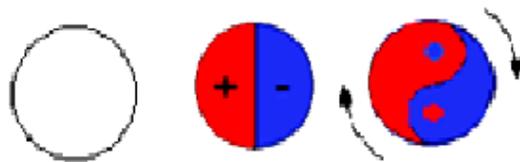


Figure 10. From Hegelian circle to YinYang logo.

in *The Grand Design* have to be unified under the same equilibrium or non-equilibrium condition. Thus, the reincarnation discussed in this work presents a modest unification of science and philosophy within equilibrium based YinYang bipolar geometry.

Although the reincarnation of philosophy is a modest result originated from YinYang bipolar quantum entanglement, its social implication could be profound and far reaching. Hopefully, the reincarnation would bring philosophy from the unbalanced ground where Thales once set his feet 2500 year ago to the firmer and balanced ground where mankind will set feet in the next 1000 years. Thales should have avoided his embarrassing fall into a well and being mocked by a servant girl. Now mankind should maintain nature-man harmony to avoid potential falls. Indeed, even after the world is unified into a single democratic society, mankind will still need social, natural, and nature-man equilibrium and harmony.

The Grand Design is concluded with these words [4, p. 181]: “*M-theory is the unified theory Einstein was hoping to find. The fact that we human beings—who are ourselves mere collections of fundamental particles of nature—have been able to come close to an understanding of the laws governing us and our universe is a great triumph. But perhaps the true miracle is that abstract considerations of logic lead to a unique theory that predicts and describes a vast universe full of the amazing variety that we see. If the theory is confirmed by observation, it will be the successful conclusion of a search going back more than 3000 years. We will have found the grand design.*”

In contrast to the above assertions, the author concludes this paper with a balanced set of words: “*It might be questionable whether M-theory is indeed the unified theory Einstein was hoping to find unless the multiverses are unified into a single one under equilibrium or non-equilibrium following the 2nd law of thermodynamics. The fact that we human beings—who are ourselves mere collections of negative-positive particles of nature with self-negation and self-assertion bipolar mental equilibrium or disorder—have revealed the bipolar nature of the laws governing us and our universe is an overlooked great discovery. But the true miracle is perhaps that YinYang bipolar dynamic logic has led us to an equilibrium based and harmony-centered unification of science and philosophy. If the unification is accepted as an alternative guiding light for mutually beneficial reciprocal interaction, it may enhance our mental equilibrium, social stability, nature-man harmony, and one day lead us to the unified theory Einstein was hoping to find. Otherwise, the vast universe full of the amazing variety that we see is likely to be forever a mystery world with God ordained equilibrium and harmony.*” [1].

REFERENCES

- [1] W.-R. Zhang, “A Quantum Dream of Red Mansion: The End of Philosophy and Its Reincarnation,” Working Book.
- [2] L. Smolin, “The Trouble with Physics: The Rise of String Theory, the Fall of a Science, and What Comes Next?” Houghton Mifflin Harcourt, New York, 2006.
- [3] P. Woit, “Not Even Wrong: The Failure of String Theory and the Search for Unity in Physical Law,” Basic Book, New York, 2006.
- [4] S. Hawking and L. Mlodinow, “The Grand Design,” Random House Digital, Inc., New York, 2010.
- [5] S. Hawking, “Black Hole Evaporation,” *Nature*, Vol. 248, No. 5443, 1974, pp. 30-31. doi:10.1038/248030a0
- [6] S. Hawking, “Particle Creation by Black Holes,” *Communications in Mathematical Physics*, Vol. 43, No. 3, 1975, pp. 199-220. doi:10.1007/BF02345020
- [7] W.-R. Zhang, “Equilibrium Relations and Bipolar Cognitive Mapping for Online Analytical Processing with Applications in International Relations and Strategic Decision Support,” *IEEE Transactions on Systems, Man, and Cybernetics, Part B*, Vol. 33, No. 2, 2003, pp. 295-307. doi:10.1109/TSMCB.2003.810444
- [8] W.-R. Zhang and L. Zhang, “YinYang Bipolar Logic and Bipolar Fuzzy Logic,” *Information Sciences*, Vol. 165, No. 3-4, 2004, pp. 265-287. doi:10.1016/j.ins.2003.05.010
- [9] W.-R. Zhang, “YinYang Bipolar Lattices and L-Sets for Bipolar Knowledge Fusion, Visualization, and Decision,” *International Journal of Information Technology & Decision Making*, Vol. 4, No. 4, 2005, pp. 621-645. doi:10.1142/S0219622005001763
- [10] W.-R. Zhang, A. Pandurangi and K. Peace, “YinYang Dynamic Neurobiological Modeling and Diagnostic Analysis of Major Depressive and Bipolar Disorders,” *IEEE Transactions on Biomedical Engineering*, Vol. 54, No. 10, 2007, pp. 1729-1739. doi:10.1109/TBME.2007.894832
- [11] W.-R. Zhang, “YinYang Bipolar Atom—An Eastern Road toward Quantum Gravity,” *Journal of Modern Physics*, Vol. 3, Same Issue, 2012, pp. 1261-1271.
- [12] W.-R. Zhang, “YinYang Bipolar Relativity: A Unifying Theory of Nature, Agents and Causality with Applications in Quantum Computing, Cognitive Informatics and Life Sciences,” IGI Global, Hershey, 2011. doi:10.4018/978-1-60960-525-4
- [13] W.-R. Zhang, “Quantum Cellular Combinatorics—An Equilibrium or Non-Equilibrium Approach,” *Proceedings of the 2012 International Conference on Bioinformatics & Computational Biology (BIOCOMP-2012)*, Las Vegas, 2012, pp. 312-318.
- [14] W.-R. Zhang, “YinYang Bipolar Atom and Quantum Cellular Automation,” 2011 *IEEE International Conference on Bioinformatics and Biomedicine Workshops (BIBMW)*, Atlanta, 12-15 November 2011, pp. 791-797.
- [15] W.-R. Zhang and S. S. Chen, “Equilibrium and Non-Equilibrium Modeling of YinYang Wuxing for Diagnostic Decision Analysis in Traditional Chinese Medicine,” *International Journal of Information Technology & Decision Making*, Vol. 8, No. 3, 2009, pp. 529-548.

- [doi:10.1142/S0219622009003521](https://doi.org/10.1142/S0219622009003521)
- [16] W.-R. Zhang, H. J. Zhang, Y. Shi and S. S. Chen, “Bipolar Linear Algebra and YinYang-N-Element Cellular Networks for Equilibrium-Based Biosystem Simulation and Regulation,” *Journal of Biological Systems*, Vol. 17, No. 4, 2009, pp. 547-576.
[doi:10.1142/S0218339009002958](https://doi.org/10.1142/S0218339009002958)
- [17] S. Vasudevan, Y. Tong and J. A. Steitz, “Switching from Repression to Activation: MicroRNAs Can Up-Regulate Translation,” *Science*, Vol. 318, No. 5858, 2007, pp. 1931-1934. [doi:10.1126/science.1149460](https://doi.org/10.1126/science.1149460)
- [18] Y. Shi, E. Seto, L.-S. Chang and T. Shenk, “Transcriptional Repression by YY1, a Human GLI-Kruppel-Related Protein, and Relief of Repression by Adenovirus E1A Protein,” *Cell*, Vol. 67, No. 2, 1981, pp. 377-388.
[doi:10.1016/0092-8674\(91\)90189-6](https://doi.org/10.1016/0092-8674(91)90189-6)
- [19] R. Penrose, “The Road to Reality: A Complete Guide to the Laws of the Universe,” Alfred A. Knopf, New York, 2005.
- [20] Charles HRH The Prince of Wales, T. Juniper and I. Skelly, “Harmony: A New Way of Looking at Our World,” Harper Collins Publishers, New York, 2010.
- [21] E. Q. Wang, “Time, History, and Dao: Zhang Xuecheng and Martin Heidegger,” *Dao: A Journal of Comparative Philosophy*, Vol. 1, No. 2, 2002, pp. 251-276.
- [22] X. Zhang, “Heidegger and Taoism on Humanism,” Asian Humanities Pr., 2003.
- [23] J. Chen, “Introduction to Heidegger’s Philosophy,” Joint Publishing Co Ltd., 1995.
- [24] N. Bohr, “On the Notions of Causality and Complementarity,” *Dialectica*, Vol. 2, No. 3-4, 1948, pp. 312-319.
[doi:10.1111/j.1746-8361.1948.tb00703.x](https://doi.org/10.1111/j.1746-8361.1948.tb00703.x)
- [25] D. Bohm, “Causality and Chance in Modern Physics,” 1961 Harper Edition Reprinted, University of Pennsylvania Press, Philadelphia, 1980.
- [26] M. Kumar, “Quantum: Einstein, Bohr, and the Great Debate about the Nature of Reality,” W. W. Norton & Company, New York, 2008.
- [27] “Fermi National Accelerator Laboratory,” Press Release 06-19, 25 September 2006.
- [28] J. Gore and A. van Oudenaarden, “Synthetic Biology: The Yin and Yang of Nature,” *Nature*, Vol. 457, No. 7227, 2009, pp. 271-272. [doi:10.1038/457271a](https://doi.org/10.1038/457271a)
- [29] W.-R. Zhang, S. Chen and J. C. Bezdek, “POOL2: A Generic System for Cognitive Map Development and Decision Analysis,” *IEEE Transactions on Systems, Man, and Cybernetics*, Vol. 19, No. 1, 1989, pp. 31-39.
[doi:10.1109/21.24529](https://doi.org/10.1109/21.24529)
- [30] W.-R. Zhang, S. Chen, W. Wang and R. King, “A Cognitive Map Based Approach to the Coordination of Distributed Cooperative Agents,” *IEEE Transactions on Systems, Man, and Cybernetics*, Vol. 22, No. 1, 1992, pp. 103-114.
[doi:10.1109/21.141315](https://doi.org/10.1109/21.141315)
- [31] W.-R. Zhang, “YinYang Bipolar Quantum Entanglement—Toward a Complete Quantum Theory,” *ICQNM’10. 4th International Conference on Quantum, Nano and Micro Technologies*, St. Maarten, 10-16 February 2010, pp. 77-82.
- [32] W.-R. Zhang, K. A. Pandurangi, K. E. Peace, Y. Zhang and Z. Zhao, “MentalSquares—A Generic Bipolar Support Vector Machine for Psychiatric Disorder Classification, Diagnostic Analysis and Neurobiological Data Mining,” *International Journal of Data Mining and Bioinformatics*, Vol. 17, No. 4, 2011, pp. 547-576.