Article

Mathematics and Parapsychology in Ancient Greek and China, Yi and Modern Society

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Abstract: First, ancient Greek and China have the same period of great prosperity about 700-210BC. Next, ancient Greeks and Chinese Yi emphasized number, and had partiality for symmetry. Third, early Greek scholars devoted their minds to rumination, which is very similar to Chinese sit quietly, and both produce easy some parapsychological phenomena. Now research of parapsychology is propitious to improve disability problem in modern society. Fourth, Yi as an old symbolic dynamics is searched, and we propose three laws of prediction by Yi (and parapsychology, etc). Final, we discuss ancient thinking and modern science, in particular, subquark model of Eight Diagrams, and the mode of eight major planets of the Solar system, etc.

Keywords: ancient Greek and China, Mathematics, Yi, parapsychology, modern society, symbolic dynamics.

1. Historical Comparison

From space-time we compared historical miracles in total world, which are distributed basically from north latitude 35° to south latitude 25° (Chang 2007). In history the Spring and Autumn and Warring States Periods of China (770-221BC.) were developed very fast on politics, military affairs, thinking, philosophy and so on. It is just a period of great prosperity in ancient Greek, which produced many giants from Thales (624-547BC.) to Archimedes (287-212BC.), et al. Both bases are that politics

arguments derived science arguments in early Greek, and contention of a hundred schools of thought during the Spring and Autumn and Warring States Periods derived flourishing culture. *Elements (of Geometry)* was finished by Euclid about 300BC. *The Medical Classic of the Yellow Emperor (Huangdi Neijing)* is the oldest extant classic of Traditional Chinese Medicine. It is generally thought to finish about 300 BC. Not only the both scientific creams of East and West were naissance in contemporaneity, and allegedly the calendar and civilization of Maya in America began in 311BC. Moreover, Buddha and Confucius were also naissance in the same period (Chang 2007).

Lloyd is an authority on study of early Greek science (Lloyd 1970), and is Emeritus Professor of Ancient Philosophy and Science of University of Cambridge. After 1987, Lloyd study also Classical Chinese, and compared and analyzed how the different political cultures of ancient China and Greece influenced the different forms of scientific discourse in those cultures (Lloyd 1996, 2004; Lloyd et al. 2002). He has chosen fifteen of the most important and influential to be reprinted in a collection, which tackles a range of problems in ancient Greek and Chinese thought, focusing especially on science but including also medicine, mathematics, philosophy and mythology (Lloyd 2006).

2. Mathematics and Yi of Ancient Greek and China

History of mathematical universal meaning is long ago, which may trace to ancient Greek and China: Pythagoras and his number-mysticism, and Yi. Both all assume that the odd numbers correspond to yang, and the even numbers correspond to yin. Pythagoras and Plato pointed out: "All things are numbers."

Heraclitus thought that nothing is determinate except change, i.e., everything flows. Pamennides discussed the Way of Truth, and the Way of Seeming. Both are unchanging being and changeable, respectively. Plato thought existence of two worlds: changing sense world and unchanged real world.

In Chinese Yi (I Ching, or The Book of Change), all of world are composed of yin (- -) and yang (—), which are two linear signs (Yao). Yi as first classics of Chinese culture forms a theoretical and logical system. Symbolic dynamics as an important modern mathematical method is a coarse-grained way of studying complicated dynamical behavior with finite precision. It possesses universality of structures, and is widely applied in physics and modern science (Bowen 1979; Hao 1989). If yin and yang correspond, respectively, to letters R and L, so whole Yi theory as an old symbolic dynamics can translate easy a formulation of modern symbolic dynamics, i.e., yin (- -, R) and yang (—, L) (Chang 2010).

Basic characters of Yi are changing, unchanging (invariance), simple (easy), and cycle, symmetry. Ancient Greeks had also partiality for symmetry (Kitto 1991). The symmetries of Yi include:

1). Yin(- - R) and Yang(— L) symmetry ($R \leftrightarrow L$), 64 Hexagrams (Guas) classify two symmetrical parts of 32 Hexagrams, for example, The Caldron (Ding鼎) ䷰ (LRLLLR) and Initial Difficulty (Tun屯) ䷂ (RLRRRL), etc. It should correspond to SU(2) group.

2). Two Hexagrams with complete same Yao: Creative (Qian乾) ䷀ (LLLLLL) and Receptive (Kun坤) ䷁ (RRRRRR). According to symbolic dynamics, both Hexagrams are two invariant points.

3). Six Hexagrams with three replication Trigrams Yao: Thunder or Arousing (Zhen 震) ䷲ (RRLRRL), Mountain (Gen 艮, LRRLRR), Clinging (Li 离, LRLLRL), The Perilous Pit or Abyss (Kan 坎, RLRRLR), Joy (Dui 兑, RLLRLL), Gentle Penetration (Xun 巽 LLRLLR). For these six other Hexagrams in Eight Diagrams their period is all three.

4). Two Hexagrams with two replication Yao: Completion (Ji Ji既济) ䷾ (RLRLRL) and Before Completion (Wei Ji未济) ䷿ (LRLRLR). Both periods are two.

5). The up and down symmetry includes six Hexagrams: Nourishment (Yi 颐, LRRRRL) and Excess (Da Guo 大过, RLLLLR), Inmost Sincerity or Inner Truth (Zhong Fu 中孚) ䷼ (LLRRLL) and Small Persist (Xiao Guo 小过, RRLLRR), and two repetition Hexagrams (离LRLLRL) and (坎RLRRLR).

On scientific thought Lloyd proposed that two types of argumentation in early Greek are polarity and analogy (Lloyd 1966). In Chinese Yi, pair of Yin-Yang is a classical and universal polarity. Its general method is also analogy: "Anciently, when Bao-xi had come to the rule of all under heaven, looking up, he contemplated the brilliant forms exhibited in the sky, and looking down he surveyed the patterns shown on the earth. He contemplated the ornamental appearances of birds and beasts and the different suitabilities of the soil. Near at hand, in his own person, he found things for consideration, and the same at a distance, in things in general. On this he devised the eight trigrams, to show fully the attributes of the spirit-like and intelligent, and to classify the qualities of the myriads of things." Mathematical thinking of ancient Greeks influences great scientists Descartes, Kepler, Newton, Einstein, Dirac, et al., and mathematical philosophy, modern superstring theory, etc.

Plato thought that God is great geometrist, and he studied Platonic solids: regular tetrahedron, regular hexahedron (cube), regular octahedron, regular dodecahedron, regular icosahedron (Fig.1), which were described in his book *Timaeus*. From Platonic solids Kepler connected five planets in his Solar System (Dampier 1958).
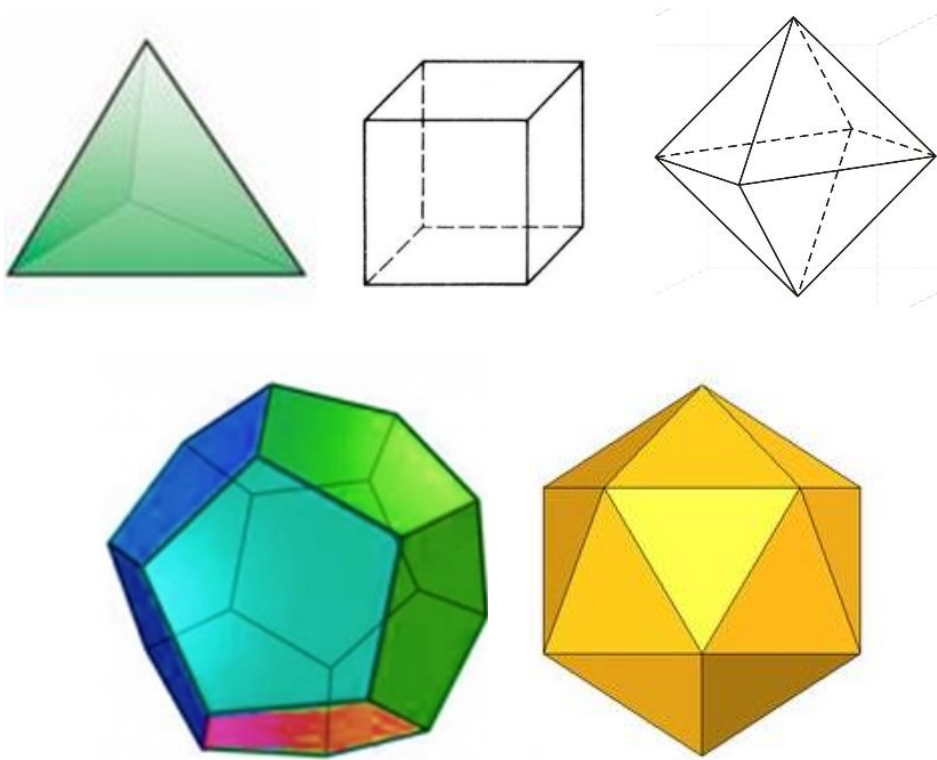
Fig. 1. Platonic solids

In Chinese Yi, the He Tu (He Map) and the Luo Shu (Luo Writing) are all some combinations of numbers (Fig. 2 and 3).
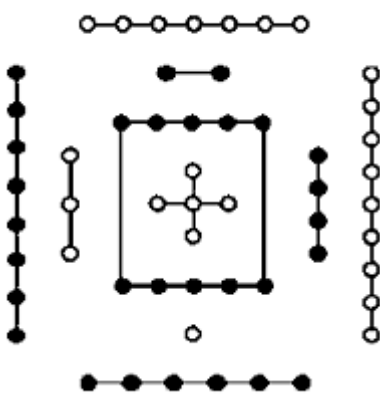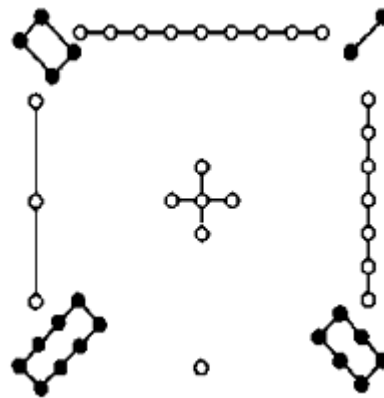
Fig. 2. He Tu (He Map)   **Fig. 3.** Luo Shu (Luo Writing)

Especially, Luo Shu is a matrix:

$$A_L = \begin{bmatrix} 4 & 9 & 2 \\ 3 & 5 & 7 \\ 8 & 1 & 6 \end{bmatrix}. \tag{1}$$

Further, we developed the Tai-Ji Figure and Yi to many layers of three-dimensional space. For example, a Tai-Ji Figure with two layers (Fig. 4) (Chang 2015b) is:
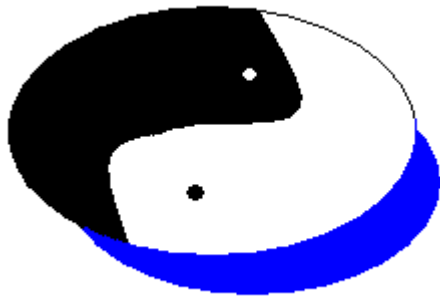
Fig. 4. A Tai-Ji Figure with two layers

Generally, we may develop the Tai-Ji Figure of many layers with increasing or changeable radii in three dimensional space (Fig. 5):
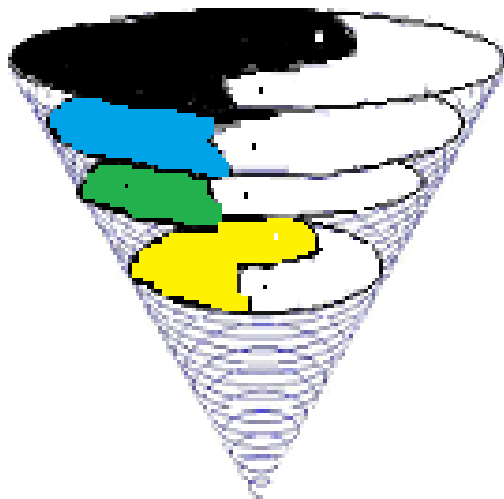

Fig. 5. The Tai-Ji Figure of many layers with increasing radii in three dimensional space

Here the interconversion between Yin and Yang forms a plane cycle. We add Dao as axes that may form the evolutions in three dimensional space. It may be applied to education, cultivate one's morality, social development, human needs, evolutional theory, microscopic structure in physics, astronomy and so on.

Taylor (1955) as a renowned Plato scholar presents deep the life and thought of this great Greek philosopher Plato. In the Academy Plato (428-348BC.) called grandfather of university taught quadrivium: geometry, arithmetic, music and astronomy. Others are trivium of arts: phraseology, rhetoric and controvert. Confucius (551-479BC.) as a great educator taught six arts: Li (Etiquette, Propriety), music, shoot an arrow, control kart, Shu-Jing (books of saints), rhetoric. Both schools possess the same and different aspects, and propagated culture. Mcewan (2011) discussed narrative reflection in the philosophy of teaching on genealogies and portraits.

Ancient Greeks believed wholeness, and all things are one object. It corresponds to unification of universe and men in Chinese culture.

3. Parapsychology of Ancient Greek and China

In ancient Greece prophets and poets took liberty of promulgating truth, because they could came directly into the Beyond, and saw some invisible things, and known past and predicted future. Their one core was Aletheia. For example, Epimetheus could have dialogue with Truth in dream. Forepart this was an efficacious language of spread truth. They included druidess, and Calchas and Mopsus in *Iliad*, and Cassandra in Troy, et al. It was related with the origins of Greek thought (Vernant 1982) and of philosophy (Detienne et al. 1981).

Early Greek scholars devoted their minds to rumination (i.e., Greek word theoria). This is very similar to Chinese sit quietly and "Chan-Ding", which produce easy some parapsychological phenomena.

Buddha could saw multi-worlds and innumerable microbe. Some magical phenomena exist in Buddhist and other religions. Leucippus and Democritus proposed atomism, in which only atoms and void are real. Democritus proposed again infinite worlds with different scales. Plato proposed two types: world of ideas is noumenon and real, and world of things is phenomena and manifestation. It is dualistic: mind and matter, soul and body, god and the world. Yan Qun (2011) discussed Plato and his thought, in which ideas include ontological, teleological and logical meanings. They are innate ideals, and are also order of all existence with simple, incorporeal, indivisible and immutable. Ideas have permanent in the mutable, immovable in the changeable, eternal in the passing away, unity in the scattered, one in the many, common in the manifold, universal in the individual, pure in the mixed, and perfect in the imperfect. Two worlds are respectively being and becoming, model and copy, absolute and relative, in super space-time and in space-time, etc.

According to parapsychology some great contributions of ancient Greek scholars were probably that they saw some phenomena, and correspond to impress some truths. It includes: some well-known precognitions from Cassandra to Oedipus, and retrocognition on description of the Atlandis and whose destroy by Plato. Socrates researched two worlds: appearance and reality. Plato proposed realm of form in *The Republic*, and the cave fable. It is similar to hue in Buddhist, which is illusory in fact. Parapsychology and supernatural powers are related with religions, especially, spiritualities of life (Heelas et al. 2004; Hunt 2005), and new religious movements (Wilson et al. 1999). Merton (1967) researched Christian mystics and Zen Masters possess deep similarity. Generally, the eastern and western mysticisms have similar characteristics: ineffability, noetic quality, transiecy and passivity (James 1912; Monk et al. 2003).

Buddhist considered that the matter was formed and composed of four essential factors: earth, water, fire and wind. The matter was not infinitely separable; it would be Emptiness at last. In Chinese Five-Elements theory, total universe is composed of metal, wood, water, fire and earth. It obeys the

rotational group of five elements, which and Yin-Yang symmetric group are the mathematical base of Traditional Chinese Medicine. Empedocles proposed four basic elements (rhizomata, stoicheion) of world: earth, water, fire and airs. Aristotle added aether. Both aspects are essentially the same. Further, Empedocles' model on Law of Fixed Proportions was indeed a talented supposition.

Anaximander (610-546BC.) proposed undefined something as basic elements. Anaxagoras (500-428BC.) discussed an old holographic theory. Yi is also an old Yin-Yang holographic theory.

In modern society disability is a cosmopolitan problem, from this introduces the special disability sociology (Barnes et al. 1999, 2003). In 2012-2016 we trained the potential of blind children in Kunming and Beijing by a method combining science and Chinese traditional Qigong and so on. We found through a period training of time, some children by touch or nose or ear can distinguish different colors, even simple figure and numbers. It is propitious to improve the life quality of blind children. In fact, some religions have many similar descriptions. Further, the method was applied to general children, and results are better. They not only can distinguish different colors, and recognize numbers, words and figures (animals in card), etc., by touch or nose or ear, and finish some ESP phenomena. Most children can achieve PK to fold scrip and break match rod or scrip in closed lockets by various imaginary hand or other tools, and even wrote few tiny words (Chinese "Mother I love you") and a figure of 'love' at match rod in closed locket by virtual pen (Fig.6) (Chang et al. 2016).

Fig. 6. Tiny words (Chinese "Mother I love you") and a figure of 'love' at match rod

Our research shown the potential of blind and general children is universal, and is independent of nation, religion and belief, etc. This may build a bridge among modern science, parapsychology, religion and various traditional cultures. Various investigations show possibly the existence of new fifth interaction (Chang 2016), high dimensional space-time or new body-mind-gods many-worlds. Three new results are related each other.

At the same time we undergo three moments for cognition of blind children: First, our knowledge is unilateralism and incompletion; next, we heartily sympathize them, indeed pity; now we discover that they possess own more chaste heart due to less be polluted by exterior world, such we

and they contact good-fellowship, which will help to cleanse our spirit, while pity is a viewpoint of superficiality and inequality. Further, it will spur us to think meaning of life and intension of happiness. Life is not, cannot and need not compare some exterior false phase. It is namely happiness that as long as we incubate self the true, the good and the beautiful, and which should be our common and able comparative pursuit in happiness (Chang 2016).

4. Yi as Old Symbolic Dynamics

Eight Diagrams have three Yao and three byte. Symbolic dynamics of 64 Hexagrams has six byte. In symbolic dynamics various symbolic sequences build the space of symbolic sequence, in which the shift operator is:

$$Ps_0 s_1 s_2 s_3 \ldots = s_1 s_2 s_3 s_4 \ldots \qquad (2)$$

Here s may be any symbol, for example, letter R or L. The shift operator P repeats k times, notes by P^k. In symbolic dynamics, if some rules or periodicity are found, we will be able to predict future from present. It is a mathematical basis of Yi as futurology. Further, we proposed three laws of prediction by Yi (and parapsychology): 1. Non-statistical law, whose results are higher than statistical and average values. 2. Fuzzy law, these predictions cannot be absolute nicety, and correspond to nonlinearity and sensity. 3. Levels law, there are bigger differences for different levels, and along with tipsters' level, and with big or small events of forecast, and with far or near of times (Chang 2012).

Applied method of symbolic dynamics, various secluded rules and periodicity in Yi may be easy discovered. For example, for King-Wen Later Heaven Sequence along counter-clockwise Creative (乾, LLLLLL) begins:

LLLLLRRRRLRLRLLLRRRRLRLR,   (3)

here long periodicity LLLRRRRLRLR appears two times. Along clockwise Creative (乾, LLLLLL) begins:

LLLRLRRRLLRRRLLLRLRRRLLR，   (4)

here short periodicity LRRRL appears three times. For Fu-Xi Before Heaven Sequence along clockwise Creative (乾, LLLLLL) begins:

LLLRLLRLRRRLRRRLRRLRLLLR，   (5)

here two different periodicities appear: middle RRRLRRRL and begin-end LLLR.

The unimodal maps in symbolic dynamics correspond to the swing of the pendulum of Yin-Yang in all the year round, and general periodicity. A process from Tai-Ji (the Grand Terminus), the two elementary Forms, four emblematic symbols, Eight Diagrams to 64 Hexagrams just corresponds to bi-period bifurcation, and go finally to chaos, whose chaos equation is:

$$X_{n+1} = 1 - \mu X_n^2. \tag{6}$$

Ancient Chinese Lao-tzu (604-531BC.) proposed: "Dao creates one, one creates two, two create three, and three create every thing." It not only is consistent with Pythagoras-Plato viewpoint, and is different with the process of Yi, and is a philosophy of three-elements. Further, Yang Xiong (53BC.-18AD.) proposed the Tai-Xuan as a new theoretical system, which is composed of three linear signs (Hua): (——, - -, and ---). This may represent the formulation of symbolic dynamics by three letters L, R and M, i.e., (—— L, - - R and --- M), which can mimic and describe heaven, men and earth in Chinese culture. It is also related with new topos theory.

Applied symbolic dynamics, we may explore expediently some aspects of the traditional culture and modern science, for example, symbolic dynamics with any letters and so on (Chang 2010). Generally, it may connect symbolic logic, and structuralism and semiotics in semiology (Barthes 1964; Eco 1976; Hawkes 1977).

5. Ancient Thinking and Modern Science

Combining Chinese traditional culture, we proposed the promotion-restraint sustainable developed pattern on the Five-Elements (Chang 2015a). An important aspect of modern society is modern science. In Chinese traditional thinking mode, Yi is a classical method of binary system. Combining Yi as symbolic dynamics, we showed expediently various rules in Yi, and exploit research for the traditional culture, for example, Tai-Xuan and Five-Element, etc. The old and modern methods compare and combine, we may enlarge thinking domain, and obtain possibly inspiration for development of modern science (Chang 2010).

For modern physics, Empedocles theory is similar to the quark model; while Anaximander and Anaxagoras theory is similar to the bootstrap model. In modern physics any matter is composed of lepton-quarks and some smaller subquarks. The simplest subquark model is the rishon model (Harari 1979), or equivalence quip model (Shupe 1979), in which first generation leptons (e, v_e) and quarks (u,d) with three colors are eight, which are composed of two elements T, V (or a^+, a^0). Assume that both correspond to R (Yin) and L (Yang), so first generation quark-lepton is:

$$e^+ = \text{TTT}, \ v_e = \text{VVV and u=(TTV,TVT,VTT)}, \ \bar{d} = \text{(TVV,VTV,VVT)}. \tag{7}$$

This will be completely the same with the Eight Diagrams composed of R and L (Chang 1988, 1989, 2009). Therefore, ii is called subquark model of Eight Diagrams. Second and Third generations of quark-lepton c, s, μ, v_μ and t, b, τ, v_τ should be different excitations of the same elements. But, in this model the construction of spins is hard. We must adopt: 1) Everything subquarks V and T and

their anti-subquarks all have spin J=1/6. 2) Or everything quark-lepton all add a particle with spin J=1/2, so it is not the simplest.

F. Wilczek, Nobel Physics Prize gainer in 2004, proposed the model with 32 dimensions based on the $|\uparrow>$ and $|\downarrow>$, and 5 elements exist (Wilczek 2008). In Yi based on the yin Yao and yang Yao, and 2^5 =32 dimensions. In symbolic dynamics it corresponds to the space with five characters composed by L and R. And the complex 32 dimensional space is namely the real 64 dimensional space.

We introduced the quantum representations on Yi. Assume that two states are quantized $|\frac{1}{2}>$ and $|-\frac{1}{2}>$, so the non-coupling represents are based on four eigen-states by complete sets (s^A, s^B) of Yin-Yang two states:

$$|\frac{1}{2}>_A|\frac{1}{2}>_B, |\frac{1}{2}>_A|-\frac{1}{2}>_B, |-\frac{1}{2}>_A|\frac{1}{2}>_B, |-\frac{1}{2}>_A|-\frac{1}{2}>_B. \qquad (8)$$

While the coupling represents are:

$$SX_{SM} = MX_{SM} (S = s^A + s^B). \qquad (9)$$

For S=0 and M=0, $X_{00} = \frac{1}{\sqrt{2}}[|\frac{1}{2}>_A|-\frac{1}{2}>_B - |-\frac{1}{2}>_A|\frac{1}{2}>_B]$ is single state.

For S=1 and M=0, ±1, $X_{10} = \frac{1}{\sqrt{2}}[|\frac{1}{2}>_A|-\frac{1}{2}>_B + |-\frac{1}{2}>_A|\frac{1}{2}>_B]$, $X_{11} = |\frac{1}{2}>_A|\frac{1}{2}>_B$ and

$X_{1-1} = |-\frac{1}{2}>_A|-\frac{1}{2}>_B$ are threefold states.

Here X_{00}, X_{10} are two entangled states. X_{11}, X_{1-1} carry through equal weight superposition, it may compose four entangled states:

$$|\psi^\pm>_{AB} = \frac{1}{\sqrt{2}}[|\frac{1}{2}>_A|-\frac{1}{2}>_B \pm |-\frac{1}{2}>_A|\frac{1}{2}>_B], \qquad (10)$$

$$|\phi^\pm>_{AB} = \frac{1}{\sqrt{2}}[|\frac{1}{2}>_A|\frac{1}{2}>_B \pm |-\frac{1}{2}>_A|-\frac{1}{2}>_B]. \qquad (11)$$

This is analogous with the Bell basis in quantum mechanics.

The entangled state (Aspect et al. 1982; Bouwmeester et al. 1997) may provide a scientific method, which may be used to the description of unification between nature and men. Combining Yi, various structures of particles and relations of the astronomical evolution are discussed (Chang 2009).

Since astronomer discovered new planets Quaoar (2002LM60) in 2002, Sedna in 2004 and 2003UB313 in 2005, we proposed that Pluto as ninth major planet is very unsuitable, whose mass is too small (Chang 2004, 2005). Therefore, the structure of the Solar system is a wonderful symmetric mode of eight major planets:

Terrestrial Planets	Mercury	Venus	Earth	Mars	Asteroids
Jovian Planets	Jupiter	Saturn	Uranus	Neptune	Kuiper Belt (including Pluto, etc)

This number is consistent completely with the Chinese Eight Diagrams.

A modern society must be democracy, and possesses freedom of speech and allows various unorthodox opinions, which probably includes some important starting points of scientific development and social progress.

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