LOGOCISM VS. DIALECTICISM:
RECOMPARISONS OF EAST-WEST LOGICS

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Abstract: Traditional Eastern logic is fundamentally different from Western formal logic. Eastern philosophy and religions have embraced many kinds of ideas in a contradictory way: holism, relativism, pluralism, inclusivism, assimilationism, and combinationism. In general, Eastern logic is closely related to nihility, metaphysics, and mysticism. It emphasizes negation, connection, interaction, change, exchange, indeterminacy, integration, transformation, and dialectical unity of opposites. Moreover, its standard methods are analogy, syntheses, metonymy, conundrum, sophistry, persuasion, exaggeration, rhetoric devices, psychological appeals, anti-scientific imagination, and even pseudo-reasoning. As a plausible and even paradoxical approach, "mystical dialetheism" could quickly meet and suit the traditional way of Eastern values, spirituality, belief system, thought pattern, lifestyle, and social-political ideals. In the most forward-looking sense, Western formal logic has been limited just on this planet and only suitable for the principles of Newtonian mechanics. For the infinite universe, traditional Eastern logic might be more convincing in explaining Einstein's relativity theory, quantum mechanics theory, quantum entanglement theory, black hole theory, redshift theory, big bang theory, dark matter, and dark energy theory, and so on. This article will examine certain mystical dialecticism of Eastern logic, mainly Indian and Chinese logic: 1. Hindu Nyáya: A "Dialecticist Logic" for Transformation of Self to Ultimate Reality (Obtaining Release from Suffering); 2. Buddhist Hetuvidya: A "Dialecticist Logic" for Transformation of All Illusory Things to the Final Enlightenment and Nirvana; and 3. Chinese I Ching: A "Dialecticist Logic" for Transformation of Heaven, Earth and Human Being.

Introduction

Bertrand Russell distinguished two impulses in the history of philosophy - the mystical impulse and the logical one. "The logic of mysticism shows, as is natural, the defects which are inherent in anything malicious." （Russell，1953, 26）H. H. Price believes that the existence of a "vast chasm" separating the two philosophical traditions, one of which "looks outward and is concerned with Logic and with the presuppositions of scientific knowledge; the other inward, into the 'deep yet dazzling darkness' of the mystical consciousness." (Price, 1957, 33-38) "It is clear that the *Nyaya-Vaisesih* thesis is a good antidote to mysticism and the ineffability doctrine. It should also remove the modern (predominantly Western) misunderstanding that Indian philosophy is invariably mystical. The business of most classical Indian philosophers was solid and down-to-earth philosophic argumentation, not the creation

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of mystical illusion or poetic descriptions of mystical experience." (Matilal, 1975, 246) Those statements seem to be simplistic, "For the existence of strong rational, logical and empiricist trends in Indian thought was well known both to nineteenth-century European logicians, as well as Orientalists and historians of logic." (Ganeri, 2008, 2) R. H. Robinson stresses that we may question the logical pattern of mystical discourse. It can be decided piecemeal by examining individual mystical texts. "I propose to examine selected passages from Sĕg-chaos [1] writings, particularly those passages that have led other investigators to believe that he considered the irrational as the gateway to the transcendental." Robinson, 1958, 102). For Socrates, to reach Truth should be through a dialectical process: I have a thesis, you have an antithesis, and through dialogue and consideration of one another's points, together we arrive at a synthesis. Dialetheism is the view that there are true contradictions or dialetheias. Dialetheists believe that for some sentence or proposition *P*, both *P* and *~P* are true. Dialetheism opposes the so-called *Law of Non-Contradiction* (LNC): for any *A*, both A and A cannot be true. Since Aristotle's defense of the LNC, the Law has been orthodoxy in Western philosophy. Nonetheless, there are some dialetheists in the history of Western Philosophy. Moreover, since the development of paraconsistent logic in the second half of the twentieth century, dialetheism has now become a live issue once more.

Dialetheism appears to be a much more common and recurrent view in Eastern Philosophy than in the West. Since Aristotle's "logos" as "rational argumentation," for Western formal logic, and even for Christian theologists, indeed a = a, a ≠ ~a, a ≠ b ≠ c ≠ d. Interestingly, for traditional Chinese logic, especially for *I-Ching* (Book of Changes) and Chinese Buddhist logic, possibly and even usually a ≠ a, a = ~a, a = b = c=d. The most popular view in China is "misfortune and fortune depend on each other, and fortune and misfortune lie in each other 禍兮福之所倚，福兮禍之所伏." (Laozi, Chapter 58)

In ancient Indian logic/metaphysics, there were four standard possibilities to be considered for any statement at that it is true (only), false (only), neither true nor false, or *both*. Buddhist logicians sometimes added a fifth possibility: none (both positions were called the *catushkoti*). The Jains went even further and advocated the possibility of contradictory values of the kind: true (only) *and* both true and false. Contradictory utterances are commonplace in Daoism. For example, Zhuangzi says that things have no boundaries with things, but for things to have boundaries, we mean "the boundaries between things." The boundaryless boundary is the boundary without a boundary. (Mair, 1994, 218) When Buddhism and Daoism fused to form Chan (or Zen, to give it its Japanese name), a philosophy arose in which contradiction plays a central role. The very process for reaching enlightenment (*Prajna*) is a process,

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[1] Sĕg-chao (Seng-chao 僧肇) was a Chinese Buddhist philosopher from Later Qin around 384-417 at Changan.

"which is at once above and in the process of reasoning. This is a contradiction, formally considered, but in truth, this contradiction is itself made possible because of *Prajna*" (Priest, 2004). The happy fish episode from the outer chapters of the Zhuangzi poses enormous difficulty for interpreters. While it may appear to surprisingly resemble the dialectic in Western philosophy, any attempt to analyze it in terms of the patterns of inference familiar to the West is often frustrated by the ostensible queerness that defies such treatment. (Han, 2012, 239)

Interestingly enough, in his speech, Tsongkhapa (1357–1419), a well-known ancient Tibetan philosopher, makes a study of the primary schools of Mahayana Buddhism, known as Vijnanavada and Madhyamika. An explanation of the Prasarigika (Dialecticist") interpretation of Madhyamika ("Centrism"). He examines "the Dialecticist elucidation of the Holy Intention" (Tsongkhapa, 2014, 288) and "Avoidance of contradiction between the (Dialicticist) system and the Scriptures." (Ibid., 345) This article will examine certain mystical dialecticism of Eastern logic, which mainly includes Indian and Chinese logic.

I. Hindu *Nyáya*: A "Dialecticist Logic" for Transformation of Self to Ultimate Reality (Obtaining Release from Suffering)

Hinduism's vast body of scriptures is divided into Śruti ("revealed") and Smriti ("remembered"). These scriptures discuss theology, philosophy, and mythology and provide information on the practice of *Dharma* (holy living). Generally, the history of Indian philosophy can be divided into three periods: The prelogical period (to the beginning of the Christian era); The logical period (1st–11th century), and the ultra-logical period (11th–18th century). "Logic developed in ancient India from the tradition of *vadavidya*, a discipline dealing with the categories of debate over various religious, philosophical, moral, and doctrinal issues." (Matilal, 1998, 2). Many Hindu intellectual traditions were codified during the medieval period of Brahmanic-Sanskritic scholasticism into a standard list of six orthodox (astika) schools (*darshanas*), the "Six Philosophies" (*ṣad-darśana*), all of which cite Vedic authority as their source. The Indian civilizations have developed the Indian orthodox (āstika) systems of thought and schools of philosophy: including Samkhya--the enumeration school; Yoga: the school of Patanjali (which assumes the metaphysics of Samkhya); Purva Mimamsa (or simply Mimamsa)--the tradition of Vedic exegesis, with emphasis on Vedic ritual; Vedanta (also called Uttara Mimamsa)--the Upanishadic tradition, with emphasis on Vedic philosophy; Vaisheshika--the atomist school; and Nyáya--the school of logic. "…the six classic systems, philosophies, or more literally 'points of view, are regarded as the six aspects of a single orthodox tradition." (Zimmer. 1951, 605). "Each school is called a darsana, which means a view of life." (Sarma, 1953, 36) "All these schools agree that the Vedas are a record of spiritual experiences and truths seen by Seers, and the work of these systems of thought is to codify, interpret, and reinforce them with logical arguments.

Logic divorced from the Vedas is repudiated; the mere pursuit of reason leads nowhere; even eminent logicians agree that reasoning occupies the second of three stages in the realization of truth: (1) listening to it as outlined in the Vedas; (2) understanding it well through the use of reason so that it may not be shaken; (3) contemplation of it." (Raghavan, 1953, 273-274) "The Nyáya and Vaisheshika are allied systems and will here be considered together." (Chatterjee, 1953, 215) "Among these schools, use is made to a varying degree of logic and inference on the one hand and scriptural authority on the other." (Embree, 1988, 299) Indian tradition also covers unorthodox (*nāstika*) systems--Buddhism and Jainism. Indian philosophy has emphasized ontology, cosmology, theology, psychology, epistemology, ethic, logic, aesthetics, etc. "Attention has often been drawn to the similarity between the Realism of the BuddhistSarvastivada School and the *Nyáya*-Vaisesika, and the resemblance of all three to the Greek Peripatetics associated with Aristotle, whose pupil Alexander invaded India at the beginning of the third century B. C." (Margaret and Stutley, 1984, 212)

In the 19th century, newly founded universities introduced Indian intellectuals to Western thought, particularly British empiricism and utilitarianism. Indian philosophy in the early 20th century was influenced by German idealism. Later Indian philosophers made significant contributions to analytic philosophy. We will discuss and compare the six schools as follows.

The first, *Samkhya*--the enumeration school. *Sankhya* was one of the six orthodox systems (*astika*, which recognizes Vedic authority) of Hindu philosophy. This Vedic school's primary text is the extant *Samkhya Karika*, written by Ishvara Krishna, circa 200 AD. This text (in *Karika* 70) identifies *Sankhya* as a *Tantra*. Its philosophy was one of the main influences on the rise of the *Tantras* as a body of literature and *Tantra sadhana*. There are no purely *Sankhya* schools existing today in Hinduism, but its influence is felt in the *Yoga* and *Vedanta* schools. They are the experiencer and the experienced, not unlike the res cogens and res extensa of Descartes. Prakriti further bifurcates into animate and inanimate realms. On the other hand, *Purusha* separates into countless *Jivas* or individual units of consciousness as souls which fuse into the mind and body of the animate branch of Prakriti. There are differences between Sankhya and Western forms of dualism. In the West, the fundamental distinction is between mind and body. In Sankhya, however, it is between the self (as Purusha) and matter (Prakriti).

The second, *Yoga*--the school of Patanjali (which assumes the metaphysics of Samkhya). Hinduism is the oldest religion that professes meditation as a spiritual and religious practice. This kind of practice may have existed among the first Indian civilizations. Vedic Hindu scriptures describe meditation techniques. There has been proof found in Indian artifacts of the history of meditation called "*Tantra*," which speaks of such practices dating back 5000 years. *Yoga* is a holy meditation. The Indo-European root: *med-*, "to measure"; Sanskrit derivation: *Medha*--"wisdom," "intelligence." Meditation can be defined as 1) Deep contemplation; 2) Close mental intention, rumination, reflection, or consideration; 3) The turning or revolving of a

subject in mind; 4) Focused, concentrated, or continued thought; 5) Solemn reflection on sacred matters as a devotional act; and 6) Self-regulation of attention, in the service of self-inquiry, in the here and now.

Hindu *Yoga* can be classified as 1) *Jnana Yoga* (including Vedanta): a practical communication with "supernatural being" through "wisdom"; 2) *Bhakti Yoga*: a practical communication with "supernatural being" through "devotion"; 3) *Karma Yoga*: a practical communication with "supernatural being" through "efforts"; 4) *Raja Yoga*: a practical communication with "supernatural being" through "mental exercises"; 5) *Hatha Yoga*: a practical communication with "supernatural being" through "sacred energy," known as *Kundalini*, which rises through energy centers known as chakras; *Surat Shabd Yoga*: a practical communication with "supernatural being" through "sound and light meditation"; 6) *Japa Yoga*: a practical communication with "supernatural being" through "mantra," which is repeated aloud or silently, *Krishna*. *Rāja Yoga* is a retronym, introduced in the 15th-century *Hatha Yoga Pradipika* to distinguish the school based on the *Yoga* Sutras of *Patanjali* from the more current school of *Hatha Yoga* expounded by Swami Swatmarama. The term was later used to describe the entirely unrelated meditation practice of the Brahma Kumaris involving the focus of one's mind and surrender to a channeled entity they believe to be the Supreme Soul. *Raja Yoga* is sometimes referred to as *Aṣṭānga* (eight-limbed) yoga because there are eight aspects to the path to which one must attend. Patanjali himself called his yoga *'Kriya Yoga'* system, known in his first sutra of the second chapter: *Tapas svadyaya ishvarapranidhanani kriya yogah* (2:1), "Discipline, insight, and devotion are the pillars of *Kriya Yoga*." It is not to be confused with the Ashtanga Vinyasa Yoga of K. Pattabhi Jois.

The third, *Purva Mimamsa* (or simply Mimamsa)—the school of the tradition of Vedic exegesis, with emphasis on Vedic ritual. Mīmāṃsā, a Sanskrit word meaning "investigation" (compare Greek ἱστορία), is the name of an astika ("orthodox") school of Hindu philosophy whose primary inquiry is into the nature of Dharma based on close hermeneutics of the Vedas. Its core tenets are ritualism (orthopraxy), anti-asceticism, and anti-mysticism. The school's central aim is the elucidation of the nature of *Dharma*, understood as a set of ritual obligations and prerogatives to be appropriately performed. The nature of *Dharma* is not accessible to reason or observation and must be inferred from the authority of the revelation contained in the Vedas, which are considered eternal, authorless (*apaurusheyatva*), and infallible. Mimamsa was intensely concerned with textual exegesis and consequently gave rise to the study of philology and the philosophy of language. Its notion of *shabda* "speech" as indivisible unity of sound and meaning (signifier and signified) is due to *Bhartrhari* (7th century).

The fourth, *Vedanta* (also called *Uttara Mimamsa*), is the Upanishadic tradition, emphasizing Vedic philosophy. Hindu scriptures constitute the core teachings of Vedanta. They do not belong to any particular Sanskrit literature period: the oldest, such as the *Brhadaranyaka* and *Chandogya Upanishads*, date to the

late *Brahmana* period (around the middle of the first millennium BCE), while the latest was composed in the medieval and early modern period. The Upanishads have exerted an important influence on the rest of Hindu Philosophy and were collectively considered one of the 100 Most Influential Books Ever Written by the British poet Martin Seymour-Smith. Vedanta is a spiritual tradition explained in the Upanishads that is concerned with the self-realization by which one understands the ultimate nature of reality (Brahman). Vedanta teaches that the believer's goal is to transcend self-identity limitations and realize one's unity with Brahman. Vedanta is not restricted or confined to one book, and there is no sole source for Vedantic philosophy. Vedanta is based on two simple propositions: 1. Human nature is divine; 2. Human life aims to realize that human nature is divine. The goal of Vedanta is a state of self-realization or cosmic consciousness. Historically, it is assumed that anyone can experience this state, but it cannot be adequately conveyed in language. The word *Vedanta* is a Sanskrit compound word which can be treated as: *Veda* = "knowledge" + *anta* = "end, conclusion": "the culmination of knowledge" or "appendix to the Veda: *Veda"* = "knowledge" + *anta* = "essence," "core,' or "inside": "the essence of the *Vedas*."

The fifth, *Vaisheshika*--the atomist school. Although the *Vaishesika* system developed independently from the *Nyáya*, they eventually merged because of their closely related metaphysical theories. However, in its classical form, the *Vaishesika* school differed from the *Nyáya* in one crucial respect: where Nyáya accepted four sources of valid knowledge, the *Vaishesika* accepted only perception and inference. Although not among Kanada's original philosophies, later *Vaishesika* atomism also differs from the atomic theory of modern science by claiming that atoms' functioning was guided or directed by the Supreme Being's will. It is, therefore, an atheistic form of atomism. An alternative view would qualify the above. The holism evident in the ancient texts mandates the identification of six different traditional philosophy environments, consisting of three sets of two pairs.

The last, *Nyáya* --the school of logic. Significantly, *Nyáya* could be the last and also the most efficient school among the six. *Nyáya* can be translated as "method," "theory of inference," "logical examination," "logical analysis," or "from premise to the conclusion." It "is not followed today as a school of religious practice, but more as a system of logic…The *Nyáya-Vaisheshika* philosophy, like many of the other Indian systems, aims at the liberation of individual self from bondage through right knowledge of reality." (Chatterjee, 1953, 215) "Nyáya…is attributed to a shadowy figure, Gautama-nicknamed Akasapada, …whose textbook, *Nyáya-Sūtras*, composed perhaps as early as 150 B.C., ……" (Zimmer, 1951, 610) *Nyáya-Sūtras*, an ancient Indian Sanskrit text, covers the following five books:

> Book I of *Nyáya-Sūtras* defines the topics, or categories, to be discussed in the volume; Book II deals with doubt, the four means of proof and their validity, and shows that there are no other valid means of demonstration; book III discusses the self, the body, the senses and their objects, cognition, and the mind; Book IV

disposes of volition, fault, transmigration, the good and evil fruits of human action, pain, and final liberation; then passes to theory of error and of the whole and its parts; book V deals with unreal objections (*jati*) and occasions for the rebuke of an oppement (*nigrahasthana*). (Ibid, 611)

The most important contribution made by the *Nyáya* school to modern Hindu thought is its methodology. The *Nyáya* represent a systematization and development of the philosophy of the early *Sūtras*. This methodology is based on a system of logic that has been adopted by the majority of the other Indian schools, orthodox or not. It is comparable to how Western science and philosophy can be largely based on Aristotelian logic. However, *Nyáya* differs from Aristotelian logic in that it is more than logic in its own right. Its followers believed that obtaining valid knowledge was the only way to obtain release from suffering. Therefore, they took great pains to identify valid knowledge sources and distinguish them from mere false opinions. Maya is thus a form of epistemology in addition to logic.

According to the *Nyáya* school, there are

1. Four sources of knowledge (pramanas): *pratyaksa* (perception), *anumana* (inference), *upamana* (comparison or analogy), and *sabda*(testimony).

2.Three kinds of cause: 1) the material or inhering cause; 2) the noninhering or formal cause; and 3) the influential or instrumental cause.

3. Five members of the syllogism: 1) *Pratuna* (the proposition); 2) *Hetu* (the cause); 3) *Drstanta* (the examination); 4) *Upanana* (the recapitulation of the cause); and 5) *Nigamana* (the conclusion.

4. Five forms of bogus cause: 1) The wandering or erratic; 2) The contradictory); 3) The unproven; 4) The counterbalanced; and 5) The untimely overgeneralization across time, or sublated. (Vidyabhushan and Sinha, 1990, 21-23)

5. Three rational arguments: 1) The cosmological argument; 2) The moral argument; 3) The argument from the authoritativeness of the Vedas; and 4) The testimony of the scriptures also proves the existence of God, the Supreme Being. (Chatterjee, 1953, 216-217)

J. Ganeri, in his edited book *Indian Logic: A Reader*, compares Eastern logic with Western logic and discusses Colebrooke's "discovery" of Indian logic, the syllogistic interpretation of Indian logic, Indian logic, and cultural stereotypes. According to him, although Indian philosophy became synonymous with the speculative, spiritual, and non-rational. "It is not, as we have now seen, that India did not have rationalist and scientific traditions……" (Ganeri, 2008, 20). Knowledge obtained through each of these can, of course, still be either valid or invalid. As a result, *Nyáya* scholars again went to great pains to identify, in each case, what it took to make knowledge valid, in the process creating several explanatory schemes. In this sense, *Nyáya* is probably the closest Indian equivalent to contemporary analytic philosophy. *The Nyáya* system searches for the truth of life and the means of knowledge, namely, inference (*anumana*). Nyáya's final purpose is to free oneself from human suffering because of ignorance. Moksha (Liberation) is through the

proper knowledge. *Nyáya* is to help people obtain the means of the proper knowledge. Nyáya is combined with the *Vaisheshika* system.

The ultimate goal of the *Nyáya* is to realize individual *moksa* (liberation) from *Karman*, escape from *samsara* (rebirth) .for this reason, the object of *Nyáya*is is to prove the validity of their views through logical examination and philosophical-theological examination and argumentation. Meanwhile, it can reject the challenges and criticism of Jainism and Buddhism. However, the logical analyses of *Nyáya* are empirical and inductive. "The *Nyáya* accepted God only as an efficient cause, the architect of the universe, and used the teleological argument to prove His existence." (Embree, 1988, 299) It is similar to Christian theologists' arguments. For example, in his *Summa Theologica,* St. Thomas Aquinas put forward five logical arguments (Five Proofs) regarding the existence of God as follows: 1) The unmoved mover; 2) The first cause; 3) The argument from contingency; 4) The argument from degree, and 5) The teleological argument.

Generally speaking, *Nyáya* is both philosophical and religious as well as rational and mystical. Its final consideration is to be free from human suffering, which is rooted in ignorance of reality. Liberation (*moksa*) is brought about through real wisdom and intelligence, and *Nyáya* is the only means to achieve this ultimate goal. Accordingly, for a long time, the logic of *Nyáya* performed an excellent service in defending against the attacks of Buddhistic atheists and nihilists, the doctrines of the existence of gods, the reality of the world, the continuity of experience, and the substantiality of wholes as distinct from parts. Later, when Vedanta took over criticizing Buddhist metaphysics, the *Nyáya*, with its realism and pluralism, directed its criticism against Advaitic idealism and monism. "As a school of philosophy, the *Nyáya* was unable to maintain a separate existence, but its methodology in logic analyses—in definition, inference, sentence, word, and meaning, etc.—came to be used by all schools of philosophy in their dialectic." (Ibid, 302)

Significantly, Indian logic, which has a long history, covers two of the six schools mentioned above of Indian philosophy, namely, *Nyáya* and *Vaisesika*. Like Western formal logic, the *Nyáya* school stresses validity/invalidity and soundness/unsoundness. Indian logic ascertains validation of knowledge either using empirical perception/observation or rationalization of inference/*syllogization*. More importantly, Indian logic can help us convert human knowledge to a computing system and verify the validity, completeness, and consistency of this knowledge system base. For this system, there are four valid means of knowledge: *pratyaksha* (perception), *anumana* (inference), *upamana* (comparison), and sound, or *shabda* (soundness or testimony). By contrast, invalid knowledge includes memory, doubt, error, and hypothetical argument.

To sum up, the final purposes of Hindu Nyāya are 1) "Logically" and "validly" to guide people step by step to achieve the "Four Purusharthas (Aims) of Human Being": From Kama (the desire for pleasure) and Artha (the materiel needs) through Dharma (the truth and moral values) finally to Moksha (the final liberation); 2. "Logically"

and "validly" to guide people to step by step to realize the "Four Ashrama (stages) of Human Being": from Brahmacharya (the student stage) and Grihastha (the household stage) through Vanaprastha (the hermit stage) finally to Sannyasa (the holy stage); 3) "Logically" and "validly" to guide people to combine Atman (spiritual self) with Brahman (ultimate reality) in order to get rid of samsara (rebirth) finally.

II. Buddhist *Hetuvidya*: A "Dialecticist Logic" for Transformation of All Illusory Things to the Final Enlightenment and Nirvana

"Hetu" means "a primary cause," or "a primary reason"; "Vidya" means "right knowledge," or "correct reasoning." "The most important topic of Buddhist Philosophy is cause and effect." (Perdue, 2014, 21) The *Hetuvidya Sastra* (*Yin Min* 因明--in Chinese）can be considered logical reasoning, debate methods, or science of reasons used by many different religious groups in early India's history. It is one of the *pancavidya-sastras*, a treatise explaining causality or the nature of truth and error. Sakyamuni Buddha had discovered many universal truths different from any religious theories and group, predominantly the Brahmans. Indeed, Buddhist logic has had a connection with Hindu logic, "We are reduced, therefore, to seek outside the schools in the Brahmanical, Buddhist, and Jain literature for hints of the origin of the logic and atomic theory of *Nyáya* and *Vaisheshika*." (Keith, 2017, 20)

Hetuvidya is one of the three original systems of logic in the world. It contains three different types: *Hteuvidya* in India, *Hetuvidya* in Tibet, and *Hetuvidya* in Center Plains. Buddhism recognizes the following five significant *vidyas*: 1) *Adhyatmavidya* (inner realization *vidya*); 2) *Hetuvidya* (causality or Buddhist logic *vidya*);3) *Sabdavidya* (sound *vidya*); 4) *Silpakarmasthanavidya* (craftsmanship *vidya*); 5) Cikitsvidya (healing *vidya*). *Hetuvidya* is often translated as the logic of right/wrong, true/false, or the law of cause/effect. Applying this logic, we may understand all past (causes) and all future (effects), all darkness (suffering) and all lightness (enlightenment), all matters and all dharma, and all countless conditional and unconditional phenomena. This logic of science is based on the final origin of heaven, earth, and all-natural things. Traditionally, this logic was basically under the control of metaphysical theology, philosophy, and ethics. However, today it can be applied to all-natural sciences, social sciences, and any possible fields.

The new Indian *Hetuvidya* realized its logical leap from inductive reasoning to deductive reasoning. In Center Plains, *Hetuvidya* developed a dialectical logic system that included "Eight Branches and Two Destinations" and explored many problems about pragmatic logic and dialectical logic. In Tibet, *Hetuvidya* gained more development in ontology, knowledge, and logic. *Hetuvidya* is not only a crystal of Buddhist wisdom but also a treasure of traditional Chinese culture. "*Hetuvidya* is the science, not the art, of reasoning…it deserves this name…since *Hetuvidya* proposes to set forth the criteria of true reasoning, not a description of any reasoning, I call it a logic and not a psychology." (Sugiura 1900, 75) Comparing the three-form reasoning

of the new *Hetuvidya* with Western logic, scholars have put forward four perspectives. Combining their strengths and shortcomings, and the examples of Hetuvidya reasoning, "the three-form reasoning should have four forms: (1) the affirmative expression of formal implication; (2) the modus ponens of hypothetical reasoning concerning sufficient conditions after universal instantiation; (3) the negative expression of a formal implication; and (4) the modus tollens of hypothetical reasoning concerning sufficient conditions after universal instantiation." (Zhang & Zhang, 2009, 631) *Hetuvidya* has developed logical reasoning from induction to deduction. Historically, *Hetuvidya* became one of the most basic thinking styles of traditional Chinese culture.

According to Bimal Krishna Matilal, both Hindu logic and Buddhist logic emphasize 1. Perception and language, such as "early *Nyāya* theory of perception." 2. Individuals, universals, and perception such as "material bodies and their atomic constituents"; "the law of contradiction and the 'delimitors'"; "universals as meanings of general terms"; and "non-qualificative perception in *Navya*-*Nyāya*[2]". 3. Early grammarians on philosophical semantics such as "early grammarians on philosophical semantics"; "the notion of 'substance'"; "'Substance' and 'quality'"; "two aspects of meaning"; "Bhartrhari's[3] definition of 'substance'". 4. Empty subject terms in logic such as "non-referring expressions in language"; "the riddle of 'non-being'"; "the status of 'example' in Indian logic"; "the *Nyāya*-Buddhist controversy"; "the epistemological significance of the controversy"; "the implicit Nyaya semantic principle"; "interpretation of existence and negation"; "the pan-fictional approach of Buddhism"; and "negation and the *Mādhyamika* dialectic." 5. Negation and the Mādhyamika[4] dialectic such as "the Mādhyamika attitude emptiness"; "two levels of truth"; "the indeterminacy of the phenomenal world"; "the paradox of 'emptiness'"; "sophistry and the semantical paradoxes"; "two aspects of negation"; and "'mysticism' and the *Mādhyamika* school". (Matilal, 2015)

Mark Siderits discusses logical and metaphysical problems, especially contradiction in Buddhist argumentation. According to him, Buddhist literature is full of statements that sound paradoxical. In *Mahāyāna sūtras*,[5] for instance, we repeatedly find claims of the form, "*x* is not *x*; therefore, it is *x*." It has led to the widespread idea that Buddhism, like some other religions, wants to point us toward a reality transcending all intellectual understanding. However, while this view of Buddhist thought may be standard, it is rejected by most Buddhist thinkers. It puts Buddhist teachings perilously close to *Advaita Vedānta*, the Indian school claiming that all is ultimately one. It also questions the idea that the Buddha taught the truth when he said that the cause of suffering is ignorance about impermanence and non-

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[2] The *Navya-Nyāya* of Indian logic and Indian philosophy was founded in the 13th century C.E.
[3] Bhartrihari (c. 450—510 C.E.) may be considered one of the most original philosophers of language and religion in ancient India.
[4] Mādhyamika is essential school in the Mahāyāna Buddhist tradition.
[5] The Mahāratnakūta *Sūtra* is one of the five major *sutra* groups in the *Mahāyāna* canon.

self. For instance, for the *Madhyamaka* school, the paradoxical-sounding statements point to get us to stop engaging in metaphysical theorizing. Siderits claims: "How, after all, does Nyaya arrive ats account of the Brahmanas? I think the method they use is best thought of as one that seeks to achieve a kind of reflective equilibrium." (Siderits, 2016, 17)

T. H. Stcherbatsky states that the Buddhist system can be considered a system of epistemological logic. Buddhist logic reveals itself as the culminating point of a long course of Indian intellectual history. Its birth, growth, and decline run parallel with the birth, the growth, and the decline of Indian civilization. He reconsiders the subject of Buddhist logic in its historical connections. The first volume contains a historical sketch and a synthetical reconstruction of the whole edifice of the final shape of Buddhist philosophy. The second volume contains the material as well as the justification for this reconstruction. Stcherbatsky discusses almost all Buddhist logical issues such as the theory of instantaneous being (*ksanika-vada*), causation (*pratitya-samutpada*), sense-perception (*pratyaksam*), ultimate reality (*paramartha-sat*), the constructed world, judgment, inference, syllogism (*pararthanumana*m), logical fallacies, negation, the negative judgment, the Law of Contradiction, universals, dialectic, and reality of the external world. According to him, under Buddhist logic, we understand a system of logic and epistemology created in India in the VI--VIIth century A. D. by two great lusters of Buddhist science, the Masters Dignāga, and Dharmakīrti. The very insufficiently known Buddhist logical literature which prepared their creation and the enormous literature of commentaries that followed it in all northern Buddhist countries must be referred to the same class of writings. It contains, first of all, a doctrine on the forms of syllogism and, for that reason, alone deserves the name of logic. A theory on the essence of judgment, the import of names, and inference are in India, just as it is in Europe, a natural corollary from the theory of syllogism. The following is an interesting "conversation" written by him on "Third Conversation. Subject - the Logic of Naive Realism and Critical Logic":

> Dignaga [6]: However, the Universe sub specie aeternitatis can be cognized only by mystic intuition. It cannot be established by logic!
> Candrakirti [7]: It can be established by the condemnation of logic! Since all logical concepts are relative and unreal, there must be another, non-relative, absolute reality, which is the Great Void. It is the Cosmical Body of the Buddha.
> (*Omitted*)
> The Realist: The external world is cognized by us in its genuine reality. Just as the objects situated in the vicinity of a lamp are illuminated by it, just so are the objects of the external world illuminated by the pure light of consciousness. There are no images and no Introspection. Self-consciousness is inferential.

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[6] Dignāga was a Buddhist logician and author of the Pramāṇasamuccaya ("Compendium of the Means of True Knowledge"), which can be considered the foundations of Buddhist logic.
[7] Candrakīrti was a Buddhist scholar of the Madhyamaka school.

The Yogacara Buddhist: There are images and there is introspection. «If we were not conscious of perceiving the patch of blue colour, never would we perceive it. The world would remain blind, it would perceive nothing». There are therefore no external objects at all. Why should we make the objective side of knowledge double?
(*Omitted*)
Kant: There must be some third thing homogeneous on the one side with the category and on the other with the object as it is given in concrete.
Dharmakirti[8]: The intermediate thing is a kind of intelligble sensation. We assume that after the first moment of pure sensation there is a moment of intelligible sensation by the inner sense which is the thing intermediate between pure sensation and the abstract concept. There is moreover between them a Conformity or Coordination.
(*Omitted*)
Vasubandhu [9]: It is the fact owing to which cognition, although also caused by the senses, is said to cognize the object and not the senses. The object is the predominant among the causes of cognition.
(*Omitted*)
Hegel: According to my Dialectical Method, Negativity is equally the essence of the objective world, which is identical with the subjective one.
(*Omitted*)
Berkley: However, to exist means to be perceived, esse est percepi [10]. The external world does not exist beside what is perceived.
(*Omitted*)
Santiraksita[11]: Yes! Pure sensation is of course non-constructive, but it is a point-instant (Kraftpunkt) which stimulates the understanding to produce its own (general) image of the thing.

We may find the elements of dialectics in Buddhism. In its early days, Buddhism regarded each of the logical alternatives as being either true or false. "Transformation of truth and falsehood is involved in the very form of the Buddhist Sutras, for they are attributed unhesitatingly in all their multitudinous variety and the voluminous extent to Shakyamuni himself. The dialectical side of Buddhism, the dynamic element, treats reality as something eternally changing and impermanent. The Essence of Buddhism in its original form possesses a logical core, and most of the elements of dialectics were present in it, similar to the early Greek philosophies. It represented the first faltering steps of dialectical philosophy." (Ding, 2012, 124)

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[8] Dharmakīrti was an Indian Buddhist philosopher who worked at Nālandā.
[9] Vasubandhu was a Buddhist monk and philosopher from Gandhara.
[10] "to be is to be perceived."
[11] Śāntarakṣita was one of the most critical thinkers in the history of Indian and Tibetan Buddhist philosophy.

To sum up, the final purpose of Buddhist *Hetuvidya* is: to guide people step by step to understand, practice and realize Buddha's basic teachings "logically" and "reasonably" as follows: 1. the "Four Passing Sights: the old man, the sick man, the dead man and the monk"; 2. the "Three Signs of Being (or Three Marks of Life): anicca-impermanence, anatta-non-souls, and dukkha-suffering"; 3. the "Four Noble Truth: *dukkha*, the causes of *dukkha*, the end of *dukkha*, and eightfold path, which includes 1) the "Five *Skandhas* (aggregates): *rupa*-forms, *vedana*-sensations, *samjna*-perceptins, *sankhara*-mental activity and *vijnana*-consciousness; 2) the "Twelve *Nidānas* (causal chain): *avidya* undamental ignorance, *sankhara*-formation, *vinnana*-consciousness, *namarupa*-name and form, *salayatana*-sense faculties, *phassa*-contact, *vedana*-feeling or sensation, *tanha*-craving or thirst, *upadana*-clinging or grasping, *bhava*-becoming or worldly existence, *jati*-birth or becoming, and *jaramarana*-old age and death; 3) Ten Commandments of Buddhism: "do not destroy life," "do not take what is not given you," "do not commit adultery," "tell no lies and deceive no one," "do not become intoxicated," "eat temperately and not at all in the afternoons," "do not watch dancing, nor listen to singing or plays," and "wear no garlands, perfumes or any adornments"; 4. the "Three Refuges or Jewels: Buddha, the *Dharma*, and the *Sangha*"; 5. "Eight-fold Path": *Samma ditthi*-right understanding, *Samma sankappa*-right thought, *samma vaca*-righ speech, *Samma kammanta*-right action, *samma ajiva*-right livelihood, *Samma vayama*-right effort, *Samma samadhi* -right mindfulness, and *samma sati*-right concentration. Through the understanding and practice of all the above teachings, a person could be reached the 'Enlightenment" and "Nirvana" finally and "logically."

III. Chinese *I Ching*: A "Dialecticist Logic" for Transformation of Heaven, Earth, and Human Being

I Ching or *Yijing* 易經 (*The Book of Changes*) is one of the essential classic books in Chinese history. As the editor of this book, Confucius states: "If you could live several years longer and study *I Ching* at the age of 50, you would not make any serious mistakes." (*Analects: Shuer* 17) In the West, *I Ching* or *Classic of Changes*, "is best known through the translation done by the German missionary Richard Wilhelm (1873-1930)." (Shaughnessy, 2014, 1) In his foreword to the English version of *I Ching* translated by Richard Wilhelm, C. G. Jung claims: For more than thirty years, "I have interested myself in this oracle technique, or method of exploring the unconscious, for it has seemed to me of uncommon significance. I was already fairly familiar with the *I Ching* when I first met Wilhelm in the early nineteen twenties; he confirmed for me then what I already knew, and taught me many things more…The Chinese mind, as I see it at work in the *I Ching*, seems to be exclusively preoccupied with the chance aspect of events. What we call coincidence seems to be the chief concern of this peculiar mind, and what we worship as causality passes almost unnoticed." (Jung, 1993, Foreword) "Over time, the *Changes* came to have pride of

place among these divination methods, being used by even one such as Confucius. If we can believe our traditional literary sources, Confucius and his followers provided a humanistic rationale for this essentially spiritual practice. They succeeded in transforming the *Changes* into an explanation of the cosmos and a guide for human behavior." (Ibid., 284)

L. W. Knowlton and C. Phillips describe logic models' structures, processes, and language as a robust tool to improve the design, development, and implementation of program and organization change efforts. They distinguish between two types of logic models: theory of change and program and attempt to build and improve theory of change logic models. (Knowlton and Phillips, 2012, 5, 16-21) *I Ching,* one of the oldest Chinese books, belongs to this "change logic models." A. Ramon considers *I Ching* (*The Book of Changes*) "the logic of chance." He believes intuition and precognition exist, suggesting that the deepest part of the human mind has access to a quantum level beyond space and time. "Every *I Ching's* response is perhaps a symbolic representation of an answer from that part of the mind. After all, since the answers and the response are simultaneous events, it's possible that they are meaningfully linked, according to Carl Jung's *principle of synchronicity*." (Ramon, 2011, 20)

E. A Hacker discloses a practical guide to personal and logical perspectives from *I Ching*. For him, many see in *I Ching* an expression of holistic philosophy, a philosophy that views the world in terms of interacting opposites; these opposites do not war with one another but complement one another from a dynamic whole. "Also found in the *I Ching* is a cyclical view of process which opposes the linear view so rampant in our modern civilization. As cycles in nature, so are there personal, social, and political cycles." (Hacker, 1993, 1) His discussion includes the traditional and scholarly theories regarding the origin of *I Ching*, the trigrams and their attributes, the translations of the names of the hexagrams, nuclear hexagrams and their classification, the problem of the textual sequence of the hexagrams, various ways of using the *I Ching* as an oracle, probability and the hexagrams, hexagram stories, hexagram cycles, and hexagram flowers. (Ibid., 2) Over the last three thousand years, *I Ching* has been a source of inspiration for philosophers, politicians, mystics, alchemists, and sorcerers, as well as scientists and mathematicians. And now, evaluators. "We became interested in how the *I Ching* or *the Book of Changes* might influence the way in which we evaluators think about Theories of Change. It occurred to us that perhaps, in some small way, this article could help achieve Carl Jung's desire to harmonize the Oracle of the *I Ching* with accepted scientific cannons." (Russon and Russon, 2010, 194)

In J. Needham's *Science and Civilisation in China: Volume 7, The Social Background; Part 1, Language and Logic in Traditional China*, C. Harbsmeier provides a deeper and more detailed Chinese logic study. For his entire project, Needham had initially been listed some factors that he felt formed part of the social background enabling or disabling the rise of science. These included the geography of China, fiscal and economic circumstances, language, logic, concepts of time, the role

of religion, the consequences of class attitudes, competition, nature and man, and many others. According to this Harbsmeier's special contribution, the interest in Chinese grammar is old in Europe. However, Chinese logic, on the other hand, was very late to attract attention. China was regarded as a predominantly Confucian country, and logic was not seen to play a part in Confucianism. "The binary 'logic' of *I Ching* (*The Book of Changes*), did arouse the early curiosity of logicians like Leibniz, but neither Leibniz nor his successors in the field of formal and philosophical logic over the next 250 years knew anything of the indigenous Chinese logical tradition." (Needham and Harbsmeier, 1998, 21). For this reason, Harbsmeier examines "the history of the study of classical Chinese language and logic in the West," "logic features of the classical Chinese language," "Chinese logical concepts and practice," "Chinese logical theory," "Chinese Buddhist logic," and so on. Joachim Kurtz makes a distinction between "Chinese logic" and "logic in China," and classifies Chinese logic into 1) as classic philology; 2) as Buddhist logic; 3) as European logic; and 4) as an archival curiosity. (Kurtz, 2011, 289-327)

J. W. Freiberg points out: In ancient China, the format operating orthodoxy was state-sanctioned Confucianism. The laws, institutions, and the people who worked in them were Confucian. It was the religion and philosophy of those who owned and managed, and policed, that is, of the ruling class. Taoism, in contrast, was the religion and world view of the radical intelligentsia and was for the most part consonant with the popular natural-spiritual world view of peasants and artisans and provided over and again throughout Chinese history and ideology for rebellion. "This is why it is necessary to see the relationship between state-Confucianism and Taoism as one of dialectical class opposition, which in turn helps explain why the struggle of these social forces occurred not only on the level of ideology (world views, philosophy, religion, literature) but also with concrete reference to the political process (legislation, administration and violent conflict)." (Freiberg 1977, 175)

The Western mainstream philosophers reject the so-called theory of contradictions to recognize the Aristotelian principles of non-contradiction and the excluded middle. Chinese ways of dealing with seeming contradictions result in a *dialectical* or compromise approach— retaining essential elements of opposing perspectives by seeking a "middle way." On the other hand, European-American ways deriving from a lay version of Aristotelian logic result in a *differentiation* model that polarizes contradictory perspectives to determine which fact or position is correct. "Empirical studies showed that dialectical thinking is a form of folk wisdom in Chinese culture: Chinese preferred dialectical proverbs containing seeming contradictions more than did Americans. Chinese were also found to prefer dialectical resolutions to social conflicts, and to prefer dialectical arguments over classical Western logical arguments. Furthermore, when two apparently contradictory propositions were presented, Americans polarized their views and Chinese were moderately accepting of both propositions." (Peng and Nisbett, 1999, 741)

Dialectical thinking should be examined from a cultural-historical perspective. Different dialectic forms are articulated as ideal types, including the Greek dialectic, the Hegelian dialectic, the contemporary German negative dialectic, the Chinese dialectic, and the Indian negative dialectic. "These influential cultural products in the history of the East and the West articulated as ideal types, serve as constellations that could facilitate further empirical studies on dialectical thinking. An understanding of the complexity of these constellations reveals the pitfalls of investigating dialectical thinking without an appropriate conceptualization of the research target." (Wong, 2006, 239)

Interestingly enough, some scholars gave the Dialectical Self-Scale questionnaire and ten pairs of opposing opinions to high school and university students of Japanese, Chinese, and British nationality. They asked them to fill in the questionnaire, rate how strongly they agreed with each opinion, and rate how wise it is to think dialectically. The questionnaire scores were higher among Easterners than Westerners and higher among university students than among high school students. However, the results of opinion agreement indicated that the dialectical tendency was stronger among the Chinese and British than among the Japanese. Furthermore, however, Japanese participants judged Dialect Thinking as wiser than Chinese and British did, and Chinese university students believed it was wiser than Chinese high school students. "We propose that this effect is attributed to Marxist education in China." (Zhang, 2015, 771)

IV. Leibniz-Bouvet Correspondence on *I-Ching*

Early in life, Leibniz developed an interest in China, corresponded with Catholic missionaries there, and wrote on questions of theology concerning the Chinese. Surprisingly he believed that he had found a historical precedent for his binary arithmetic in the ancient Chinese lineations or 64 hexagrams of the *Yijing*. "This, he thought, might be the origin of a universal symbolic language. A hexagram consists of six lines atop one another, each of which is either solid or broken, forming a total of 64 possibilities, while a grouping of only three such lines is called a trigram [cova]. Leibniz lists the eight possible trigrams in his exposition on binary arithmetic, juxtaposed with their binary equivalents."[12] In one of his early letters to Bouvet, Leibniz wrote, "I am not very concerned with the metaphysical usage of the characters of Fu Xi and others of the sort, for I have a totally different idea of the true characteristic which would serve equally to express thoughts and to guide them, and would be as a living logic." [13]

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[12] Lodder, Jerry M. Binary Arithmetic: From Leibniz to von Neumann. binaryI.dvi (nmsu.edu).
[13] "13 December 1707, Leibniz to Bouvet," *Leibniz-Bouvet Correspondence*, Translation and Annotations by Alan Berkowitz and Daniel J. Cook. Letters | Leibniz-Bouvet Correspondence (swarthmore.edu).

Bouvet responded as follows: "I speak here only of the numerical table to which you join the double geometric progression, something which the Chinese chose as the simplest of all and which contains the most perfect harmony. And in order to show you, Monsieur, that this table, without changing anything in it, is the same as the system of the *gua* [i.e.,卦] or small lines of Fuxi, the prince of the philosophers of China. [14] At this point, Alan Berkowitz and Daniel J. Cook point out: Bouvet refers to the 64 hexagrams (*gua*) of the *Yijing*, which he will introduce presently (AA I xx: N 319). The word 卦 *gua* (diagrammatic linear figures) is also used for the eight trigrams, which Bouvet discusses. Bouvet would have learned that Fuxi was China's first emperor, albeit somewhat relegated to a mythological or at least legendary period. As Bouvet has mentioned in earlier letters and will expound upon more fully later in this letter, Fuxi was credited with the invention of the *gua*, and the first Chinese writing, i.e., characters. In addition to the original Chinese sources for his information about Fuxi, "Bouvet likely would have followed the brief description provided by Martini in his *Sinicae Historiae* (pp. 11-13), and so would have dated the reign of Fuxi to begin in the year 2952 BCE, the date provided by Martini. For Bouvet, Fuxi 伏羲 is at the center of his Figurism, the key to sourcing the Patriarchs in early Chinese texts, as he sustains in this correspondence and elsewhere (see below in this letter for Bouvet's analysis of his name)." [15]

Leibniz's 1703 paper contains a striking application of binary numeration to the ancient Chinese text of divination, the *Yijing* (*I-Ching* or *Book of Changes*).[16] In his paper, entitled "An Explanation of Binary Arithmetic Using only the Characters 0 and 1, with Remarks about its Utility and the Meaning it Gives to the Ancient Chinese Figures of Fuxi." Leibniz claims,

> What is surprising in this calculation is that this arithmetic of 0 and 1 contains the mystery of lines of an ancient king and philosopher named Fuxi, who is believed to have lived more than four thousand years ago and whom the Chinese regard as the founder of their empire and of their sciences. There are several figures of lines that are attributed to him; they all go back to this arithmetic. But it is enough to place here the so-called figures of the eight Cova [trigrams], which are basic, and to add to these an explanation which is manifest, so that it is understood that a whole line — signifies unity or one, and that a broken line – – signifies zero or 0.[17]

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[14] "Letter I: 4 November 1701, Bouvet to Leibniz," *Leibniz-Bouvet Correspondence*, Translation and Annotations by Alan Berkowitz and Daniel J. Cook, p.4. Letters | Leibniz-Bouvet Correspondence (swarthmore.edu).

[15] Ibid., p.4-5.

[16] Leibniz, G. W., "Explication de l'arithm´etique binaire, qui se sert des seuls caract`eres 0 et 1, avec des remarques sur son utilit´e, et sur ce qu'elle donne le sens des anciennes figures Chinoises de Fohy," Memoires de l'Acad´emie Royale des Sciences, 3 (1703), 85–89.

[17] Ching, J., and Oxtoby, W. G. 1992. *Moral Enlightenment: Leibniz and Wolff on China*, Steyler Verlag, Nettetal, p. 81–86.

Leibniz sent this account of his binary system to the Reverend Father Bouvet, the famous French Jesuit living in Peking. He stressed, "my manner of counting by 0 and 1, and it was all he needed to recognize that this holds the key to Fuxi's 4 figures. So, he wrote to me on November 14, 1701, sending me the great figure of this princely philosopher which goes to 64. " [18] Bouvet began a study of the *Yijing*, viewing this text as the possible missing link between the two religions. [19] It was from this Jesuit priest that Leibniz received the hexagrams attributed to Fuxi, the mythical first Emperor of China and legendary inventor of Chinese writing. In actuality, the hexagrams are derived from the philosopher Shao Yong's (邵雍 1011–1077) *Huangji jingshi shu* (皇極經世 *Book of Sublime Principle* Which Governs All Things Within the World). Shortly after receiving Bouvet's letter containing the hexagrams and Bouvet's identification of a relation between them and binary numeration, Leibniz submitted for publication his 1703 paper "Explanation of Binary Arithmetic" [20]

Joachim Bouvet （1656-1730） contributed a lot to introduce *I Ching* 易經(*Book of Changes*) to the West historically and significantly. In Beijing, the French priests took the upper-level route, tried their best to get close to the emperor, and were ordered to write by the emperor. Their own religious, philosophical, scientific knowledge and ideas studied ancient Chinese scriptures and formed a unique ideological system, thus bringing *I Ching* Studies into a period of development with cross-cultural significance. As the founder of the "Solitude School," Bouvet established image theory's theological and philosophical system directly benefited from the *Book of Changes*' systematic study. In 1697, Bouvet gave a lecture in Paris on *the Book of Changes*. He regarded the *Book of Changes* as the same reasonable and perfect philosophy as Plato and Aristotle in his speech. He emphasized: Although (I) this proposition cannot be regarded as our Jesuit missionaries' view, this is Because most of the Jesuits still believe that the book "*I Ching*" is full of superstitions, and its doctrine has no solid foundation... I believe that I am fortunate enough to find a reliable way for everyone to understand Chinese philosophy's correct principles. Chinese philosophy is reasonable, at least as perfect as the philosophy of Plato or Aristotle. I want to prove the truthfulness of various confusing representations in the book "The Book of Changes." The Book of Changes contains the philosophical principles of Fu Xi 伏羲, the first creator of the Chinese monarchy and the first Chinese philosopher. Besides, apart from China's understanding of how consistent our religion is with its ancient and reasonable philosophical originality, I do not believe there is any way in this world that can better urge the Chinese people's minds and hearts to understand our sacred religion.

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[18] Ibid., p. 81–86.
[19] Swetz, F. J., "Leibniz, the Yijing, and the Religious Conversion of the Chinese," Mathematics Magazine, 76, No. 4 (2003), 276–291.
[20] Ching, J., Oxtoby, W. G., Moral Enlightenment: Leibniz and Wolff on China, Steyler Verlag, Nettetal, 1992, p.44.

Joachim Bouvet even believed that the "Book of Changes" and ancient Chinese history expressed Christian doctrines in the form of "prophetic predictions." Before leaving Europe and returning to China in February 1698, Joachim Bouvet wrote a letter to Leibniz, talking about the "Book of Changes" and briefly narrating his Chinese history views. After returning to China, Joachim Bouvet studied Chinese classics more seriously and maintained correspondence with Leibniz. In a letter from Joachim Bouvet to Leibniz in November 1700, he highly praised the "Book of Changes" as the source of all science and philosophy in China, even higher than the science and philosophy in Europe at that time. He mentioned that the second chapter of "*Shuogua* 说卦" reads: "Heaven and earth are positioned, mountains and mountains are ventilated, thunder and wind are thin, water and fire do not match each other, and gossip intersects. The inverse number is also".

Bouvet placed China's origin three to four thousand years before the 18th century and called Fuxi the first legislator. He believes that there are many similarities between ancient Chinese people's knowledge more than 4,000 years ago and Western sages' knowledge. In February 1701, Leibniz introduced Bouvet in detail his invention of binary mathematics and systematically listed a comparison table between binary numbers and decimal numbers. In November of the same year, Bouvet mentioned binary issues in his reply to Leibniz and attached a map of Fuxi's 伏羲 64 hexagrams. He emphasized that the principle on which Leibniz's binary system is based is precisely the principle on which the science of ancient numbers in China is based and compared the *Yangyao* 陽爻 "—" to the "1" in the binary system; he compared the *Yinyao* 陰爻 "- -" "Is likened to "0". This letter from Bouvet convinced Leibniz that binary is inherently related to the *Book of Changes* and that binary is a completely correct and significant invention.

V. A Brief Comparison between Chinese Logic and Western Logic: Aristotle vs. Mozi

In ancient times, there were different trends in logical thinking between China and the West. The ancient Western logic pays more attention to the scientific spirit, while the pre-Qin 先秦 logic pays more attention to the humanistic moral spirit. Therefore, the pre-Qin logic has an ethical tendency under the practical function of political ethics. Moreover, this ethical tendency affects the validity and universal applicability of the pre-Qin induction model in the broad sense of argumentation. The characteristic of pre-Qin logic thought and method is "*Tuilei* 推類(reason by analogy)." According to Mozi 墨子 (470 BC – 391 BC), a thinker of the pre-Qin period and founder of Mohism，"the difficulty of classification lies in the size of (name)" (*Mo Zi · Jing Xia* 《墨子·經下》) In the historical and cultural atmosphere of talking about "class or category 類" and using "category" in the pre-Qin period, it became a thinking argumentation pattern of quoting and evidencing. The origin of the method of analogy

is essentially a problem with the origin of Chinese characters. Under the background of the unification of Chinese characters' semantics and pragmatics, the spirit of name rectification and the sense of reasoning further enhanced the characteristics of ancient Chinese ideas and ways of thinking. From the perspective of historical and cultural causes, we should comb the most essential "category" systematically and thoroughly: how it integrates and develops through the seven links of "animal name and its characteristics, sacrificial name, similarity or resemblance derived from the characteristics, good name, race, type, method or rule," and becomes the most basic concept of naming, rhetoric, and inference in pre-Qin logic.

Tuilei 推類（reason by analogy）includes analogy and induction. "*Mobian (*墨辯)" put forward "to live by the past, grow by reason, behave by analogy," which is a classic generalization of the principle of analog. Among them, "words based on categories (辭以類行)" means that all inferences always start from categories. In *Xiaoqu* (小取), many kinds of concrete theories, such as Bi 辟, Mou 侔, Yuan 援, Tui 推, are also carried out in the way of Tuilei. Therefore, Mohism regards "taking by category and giving by category (以類取，以類予)" as the basic argumentation principle. Xunzi 荀子（310 BC-235 BC）, on the other hand, put forward the method of "using the category to measure category (以類度類)" and thought that "category is not contradictory, although it has been the same for a long time (類不悖, 雖久同理)." In his view, things of the same kind have the same essence, so they can "know far from near (以近知遠)" and "know ten thousand from one (以一知萬)." The objective things are complex, some things are similar on the surface but different, and some things are very different on the surface but have the same essence. Moreover, "the difficulty of pushing categories lies in the size of categories (推類之難,說在類之大小).". In this way, people tend to make mistakes in pushing categories because they "do not know the categories," At the same time, there may be problems in all kinds of conclusions. Therefore, we must be cautious in inference, and we cannot use all kinds of theories blindly and rigidly. *Lu's spring and Autumn Annals*（呂氏春秋）and *Huainanzi* (淮南子) enumerate a lot of examples, which further shows that the conclusion of Tuilei is not necessarily proper. It generalizes the propositions of "It is not necessary to infer the category (類固不必可推知)" and Category is not necessary (類不可必推), thus developing the Mohist thinking about *Tuilei*, and thus turning to the study of causality of specific things. [21]

As an instrument of argumentation and reasoning in political ethics communication, the pre-Qin model of analogy has the following characteristics. Firstly, its effectiveness emphasizes the pragmatic principle, which is the generalized effectiveness under imagery thinking guidance. Secondly, the pre-Qin model of analogy is extensible and universal based on "usefulness or applicability." Therefore,

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[21] Peng Yilian, *Logic Dictionary,* Shanghai Dictionary Press, 2004.

it has become a reasoning tool for effective communication and reasoning in the historical process. Finally, the spiritual association and intuition derived from historical experience or life experience are the source of the effectiveness of the deduction model's generalized argumentation, and the belief that can "reflect the present" is the driving force of its universal application. It is because, 1) it pays more attention to the practical utility of thinking tools in the debate of political and ethical issues, which is a kind of "working logic," without the metaphysical tradition in the development of Western philosophy and logic; 2) it lacks the abstraction of language and the support of scientific development; 3) it is the connotative "external connection," which pays more attention to image and holistic understanding; 4) is that its creators do not regard the discovery of thinking tools as their historical mission. [22]

Ancient Greek philosophy focuses on natural existence, social existence, supernatural/superhuman existence, self-existence, and relationships. Starting from Aristotle, the ancient Greek philosophy system has included Metaphysics (ontology, cosmology, theology, and Psychology), natural philosophy, epistemology, logic, ethics, aesthetics, methodology, and social and political philosophy. Apart from the overall conceptual framework of Western philosophy mentioned above, from a particular research object's perspective, traditional Chinese Confucianism has no consciousness or emphasizes most of the above contents in practical operation, although some aspects are also involved. If we follow Western logic and the Western model as the norm, it will be difficult for the East and the west to reach a consensus. Early missionaries in China realized this problem, so they tried to start with Confucian classics. [23]

As we all know, the early Mohists carried out the earliest scientific research in China should. For example, they wrote papers on logic, optics, and mechanics. Unfortunately, Mohism did not continue as a complete text pedigree after the Han Dynasty, but Daoist classics preserved some Mohist texts. Chen Rongjie pointed out: the primary concern of ancient and modern Chinese philosophy has always been ethical, social, and political issues. Metaphysics developed when Buddhism spread from India to the East posed a solid challenge to Confucianism. Therefore, most Chinese philosophy schools discuss such metaphysical issues as God's universality, time and space, material and spirit either without discussion or occasionally based on ethics.

Moreover, the relevant discussions have always been unsystematic and rarely based on hypothesis and logic analysis. Chinese philosophy focuses on a better life and society rather than systematic knowledge, avoiding abstraction and generalization. Therefore, the contribution of Chinese philosophy to the world is limited in terms of

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[22] Zhang Xiaomang, "What are the Characteristics of Pre-Qin Logic", *Social Science Journal*, No. 1698, p.5, (March 23, 2020)
[23] Dou Yabin, "Investigation of Confucian Studies at Harvard and Columbia Universities," *Chinese Culture Forum*, No. 12, 2017.

metaphysics according to the theoretical basis and strict logical standard on which Western philosophy relies.

Matteo Ricci once bluntly commented: the only profound philosophical science that China is familiar with is moral philosophy. However, in this respect, they have caused fallacies. It seems that instead of understanding things, they are confused. They do not have the concept of logical rules, so they do not consider the internal relations among the subject branches when dealing with some ethics teachings. In the early and middle stages of the eastward spread of Western learning, the missionaries' role and significance were as follows: first, the introduction of modern science, mathematics, technology, technology, and medicine into China; second, from the perspective of "earth circle theory" and "cartography," the introduction of geographical concepts and knowledge of all countries in the world into China; third, the introduction of the concepts and algorithms of astronomy and calendar into China The establishment of the lunar calendar; the introduction of Western Social Sciences, humanities and art disciplines, and their concepts into China; the introduction of modern western educational concepts, methods, and systems into China; and the introduction of Western thinking mode and scientific methodology centered on logos/logic into China. Although there are many obstacles, Chinese culture's strong assimilation ability eventually absorbed all the positive results of Western learning to the East.

In the 16th and 17th centuries, Jesuit missionaries in China introduced western science and astronomy into China and translated Euclidean geometry into Chinese. In 1601, Matteo Ricci was approved by Zhu Changluo 朱常洛 (1582-1620), the emperor of Ming Guangzong, to enter Beijing, which made his mission in China more extensive. After arriving in Beijing, Ricci cooperated with Xu Guangqi 徐光啟(1562-1633), a minister of the Ming government who later converted to Christianity, to translate science books. The first book translated by Xu Guangqi is *the Elements of Geometry*, published in 1607. In 1690, Joachim Bouvet and others began to teach geometry and mathematics to Kangxi systematically. The course arrangement was first to teach "principles of geometry" and then teach astronomy and calendar, medicine, chemistry, pharmacy, and another western scientific knowledge. Kangxi was very serious. After listening to the lecture, he wrote exercises and drawings and questioned them at any time. After a study period, the effect is very significant; the Kangxi Emperor could understand geometry, related laws, and proofs. Then Kangxi learned the French mathematician Ignace-Gaston Pardics (1636 – 1673) applied and theoretical geometry. The Emporer Kangxi 康熙 also tried to practice the operation of mathematical instruments. Joachim Bouvet （1662-1732） and Jean-François Gerbillon （1654–1707）, compiled Manchu's practical geometry outline; later, they compiled Manchu's lecture notes into volumes and translated them into Chinese, which Kangxi himself approved. The Manchu version of *The Elements* of Euclid 几何原本 is now stored in the Palace Museum, while the Chinese version is included in

the book *Mathematical Essence* 数理精蕴.According to F. Liu and J. Zhang, Aristotle's logic, especially the well-known "syllogistic," is often considered the first systematic formation of fundamental logical issues. The Stoic school then made a further contribution through the development of propositional logic. This tradition of formation has had an unparalleled impact on Western thought's history, with remarkable similarity in Aristotle's topics to Frege and Russell more than two thousand years later. Removing some camouflage, many of these issues are still of significance to our agenda today. Indeed, this tradition has led to the flowering of both traditional and modern logic in the West. "Logical themes occur in many philosophical works in ancient China, such as the oldest text *The Book of Changes*, the work by the dominant Confucian school, and the texts of the sophists. However, "perhaps the greatest relevance and significance to logic is found in the school of Moism, founded by Master Mozi 墨子, who lived during the fifth century BCE. Mozi was the first to challenge Confucianism by making reasoning the core of intellectual inquiry. The Moist school was very influential during the warring State period (479-221 BCE)." (Liu & Zhang, 2010, 605)

Jingmei Yuan, a comparative logician, discusses how Aristotelian logic was introduced to China via three editions of the translation of Euclid's *Elements*, Matteo Ricci and Xu Guangqi, *Jihe Yuanben Books 1-VI*, 1607; Alexander Wylie and Li Shannan, *Jihe Yuanben Books 1-XV*, 1865; and Lan Jizheng and Zhu Enkuan, *Jihe Yuanben*, 2003. Making the Chinese understand Aristotelian logic is a long and challenging process. The traditional Chinese logic is the practice's logic; it studies how to distinguish a strong argument from a weak one in a changing world instead of a world with the pre-fixed order. The latter is the presumption of Aristotelian logic. Chinese logic discerns how to define a thing in associations instead of the relations of terms determined by a hierarchical system of classification of genus and species. Again, the latter is a characteristic of Aristotelian logic. A vital feature in Chinese logic is pragmatism. For Chinese scholars, gaining pragmatic/practical benefits is inseparable from logical reasoning, including mathematics.

Studying the relations among particular objects or concrete concepts is much more attractive to Chinese logicians and mathematicians than studying how to purify universal terms or abstract concepts from particular objects. These differences are why the Chinese first recognized Aristotelian logic through the study of the geometry book, *Jihe Yuanben*, instead of the study of Aristotle's work on logic, such as *Mingli Tan* (Francisco Furtado and Li Zhizao, 1631). A translation of Aristotle's *Categories* was not popular among the Chinese even until the last century.

Yuan analyzes why the Chinese prefer to accept Aristotelian logic by learning geometry instead of Aristotle's *Categories*. She explores the bridge that communicates Jesuits' and Chinese mathematicians' logical thinking in the first *Jihe Yuanben*. Her standpoint is that the logical gap between Aristotelian and Chinese logic has existed since Ricci and Xu started their translation. However, they applied the rule of "指 *zhi*, Pointing Out" in Chinese logic or "Ostensive Definition" in

Aristotelian logic in *Jihe Yuanben Book I-VI*. They added many diagrams to illuminate the basic geometry definitions. Li Shannan carried on this work in doing the entire *Jihe Yuanben Book I-XV*. Pointing out or ostensive teaching of concepts establishes an association between a Chinese geometrical term and an object. It brings the universal or abstract terms (which are lacking in Chinese logic) in Euclid's *Elements* down to earth. The Pointing Out rule functions as the bridge in continuing the discourse between Aristotelian logic and Chinese logic. Though the Pointing Out rule has severe limitations, making Aristotelian logic a "Chinese-Aristotelian" logic, applying this rule is the starting point of teaching the traditional Western way of thinking in China. After four hundred years, the third edition of *Jihe Yuanben* carries the mission of representing the essence of Euclid's *Elements* and reintroducing Aristotelian logic to the Chinese. It is also an attempt to overcome the limitations caused by the Pointing Out rule or the influence of traditional Chinese logic. My conclusion is that the discourse between two different language games,[24] ike children studying essential words, starts with pointing out or ostensive teaching. The Pointing Out rule brings the hope of mutual understanding, though not wholly. This case study of the Chinese translations of Euclid's *Elements* represents the path of how the Chinese may accept Aristotelian logic little by little. It also shows the potential possibilities of communication between the two language games.

In Yuan's Examination, though no Chinese understood Aristotelian logic initially, *Jihe Yuanben,* as a mathematical text and source of logical training, became more and more popular in China over the last four hundred years. Today, the logic system of geometry that *Jihe Yuanben* introduced is still the crucial foundation of the high school texts in China（Lan and Zhu, 2003, 650）. By contrast, studying Aristotelian logic itself is still considered as difficult work. If the Chinese could accept the logic in *Jihe Yuanben*, why did they ignore Aristotelian logic itself for so many years?

Suppose this ignorance was caused by a gap between Chinese logic and Aristotelian logic. How could it be possible that the gap exists between Chinese logic and Aristotelian logic, but not the Aristotelian logic in Euclid's *Elements*? Yuan argues:

> …it is a fact that there is a gap between Chinese logic and Aristotelian logic, and this gap exists also between the logic in Chinese mathematics and that of Euclidean mathematics. However, in working this book, *Jihe yuanben*, the Jesuit and Chinese

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[24] Yuan uses this term in a Wittgenstein sense. Wittgenstein treats language as a coordinate system. He calls the whole of language, consisting of language and the actions into which it is woven, the "language-game" (Wittgenstein, *Philosophical Investigations*, p. 5e7). He thinks that in different logical coordinate systems, analogous to different geometries, "it is as impossible to represent in language anything that 'contradicts logic' as it is in geometry to represent by its coordinates a figure that contradicts the laws of space, or to give the coordinates of a point that does not exist" (Wittgenstein, Tractatus, 3.032, p. 11).

mathematicians found a "bridge," or a common rule, which both Chinese and Aristotelian logicians and mathematicians accepted. This rule is 指 *zhi*, Pointing Out/Ostensive Definition. This rule functioned as a bridge that links the two different language games and made the discourse possible. When the language games went beyond the mathematical content introduced by *Jihe yuanben*, such as in the field of pure theoretical Aristotelian logic, the rule failed to function. No bridge links the discourse between the language-game players. In other words, Chinese logicians failed to locate the certain kind of the Aristotelian terms, categories, propositions and even syllogisms in their own logical system, such as using universal terms or universal propositions. This resulted in the unsuccessful introduction of Aristotelian logic to China. In following, I shall take Ricci and Xu's *Jihe yuanben Books I-VI* as an example to analyze the gap between Chinese and Aristotelian logic and demonstrate how rule, 指 *zhi*—Pointing Out, functions. (Yuan, 2012a, 84)

Yuan attempts to improve understanding between Moist and Aristotelian logic on analogy. She argues that Chinese logic can neither fit the Aristotelian deductive framework nor completely fit the Aristotelian inductive framework. One of the important reasoning skills that ancient Chinese logicians applied is analogical reasoning. Having examined thirteen Moist analogical propositions in a Moist text, the *Da Qu* (大取) from the perspective of finding rationales (*li* 理) among things, Yuan conclude that if the rationales can be found in a changing world, then Chinese logicians seek for the "beauty of creative thinking" in the process of argumentation. (Yuan, 2012b, 404–423)

J. S. Rošker provides an examination of classical Chinese logic. This term referred to ancient discourses developed before the arrival of significant external influences and flourished in China until the first unification of China during the Qin Dynasty (221 BC). In his article, taking as its premise that logically implies both universal and culturally conditioned elements, the author describes the historical background of Chinese logic, the main schools of Chinese logical thought, the current state of research in this area, and the crucial concepts and methods applied in classical Chinese logic. The close link between Chinese logic and the Chinese language is also stressed. (Rošker, 2015, 301-309)

Truth and Falsehood are both whatever, and simultaneously NOT so, rather than not." - Alf the Poet (quoted from a post in alt. Buddha. short. fat. guy). According to the *Kalama Sutta*, the Buddha once visited a small town called Kesaputta in the kingdom of Kosala. The inhabitants of this town were known by the common name Kalama. When they heard that the Buddha was in their town, the Kalamas paid him a visit, and told him: "Sir, there are some recluses and brahmanas who visit Kesaputta. They explain and illumine only their own doctrines, and despise, condemn, and spurn others' doctrines. Then come other recluses and *brahmanas*, and they, too, in their turn, explain and illumine only their own doctrines, and despise, condemn, and spurn others' doctrines. But, for us, Sir, we have always doubt and perplexity as to whom among these venerable recluses and brahmanas

spoke the truth, and who spoke falsehood (Warren, 1896, 284).

Chi-Tsang 吉蔵 (Jizang 549-623) was one of the key Chinese Buddhism figures who systematically examined the dichotomy of truth and falsehood. For him, if we harbor the distinction between Buddhist and non-Buddhist and dwell upon the division between Mahayana and Hinayana, we fall into the falsehood of one-sidedness and lose sight of the true principle. Only the simultaneous allaying of the thoughts of Buddhist and non-Buddhist and the concurrent subduing of the ideas of Mahayana and Hinayana are known as the true principle. Actually, "Refutation of Falsehoods" is equivalent to "Revelation of Truths." Continuously, falsehoods are innumerable, and truths are also of many kinds. For those reasons, those with acquisitiveness are false and have to be refuted; those ideas without acquisitiveness are true and have to be expounded. (Liu, 1993, 649-673). Chi-Tsang has the following key points on truth and falsehood: 1) So-called conventional truth and ultimate truth are two different ways of looking at the "same" things and can be found in anything. These two truths are not exhaustive of all truths, nor are they two fixed sets of truths. If the higher truth is considered to stand for certain determinate or absolute essence, it will become a "lower" or "ordinary" truth. Truth can be higher or lower, and whether it is high or low depends on one's mental condition. The denial of dualistic and non-dualistic metaphysics is the ultimate truth. (Chi-Tsang, 1984, 90-91). 2) So-called truth cannot be a right understanding of something real in the world. No truth is "really true." It is the accurate manifestation or description of Being, Nothingness, or some other things. (Ibid., 97-98) 3) Originally, there was "nothing to affirm, and there is not now anything to negate." So-called "true" and "false" are equally empty; they do not stand for any essence or self-existing thing. A right view is called "right" because all views are abandoned. If it were accepted as a "view," it would become a "wrong" view that ought to be rejected. (Chi-Tsang, 1852, 6, 7, 11,14)

According to Hsueh-Li Cheng, for Chi-Tsang, the act of knowing, the knower, the object to be known, the distinction between the subject and the object, truth, and falsity are all empty. (Cheng, 1981, 380) The metaphysical problem of Being and Nothingness is related to the epistemological issue of truth and falsity, for metaphysical speculation is concerned with whether ontological assertions about the world are true or false. When Chi-Tsang critically examines Being and Nothingness, he has an interesting analysis of the nature of truth and the concepts of "right" and "wrong." He contends that all things, including Being and Nothingness or "right" and "wrong," are empty. "Since all truths and falsities are empty, it makes no sense to dispute whether a certain metaphysical assertion 'is' or 'is not' true. This refutation of metaphysics is different from the refutation of metaphysics by contemporary Western positivists, for it neither makes a 'true' statement about the world nor finds a 'meaningful' assertion about sense experience or anything". (Ibid. 372) In his teaching of Twofold Truth on three levels, Chi-Tsang states whether truth is high or low depends upon one's mental condition. (Ibid, 379)

For Zen Buddhism, there is ultimately no distinction between truth and falsehood. Hui Neng 慧能 who was the founder of Zen Buddhism, says: "The confused pronounce (*Prajna*) with their mouths; the wise live it in their minds. When it is merely pronounced, there is at that very moment a falsehood; when there is a falsehood, it is not a reality. When *Prajna* is lived in every thought of yours, this is known as reality. Those who understand this truth understand the truth of *Prajna* and practice the life of *Prajna*. Those who do not practice it are ordinary people. When you practice and live it in one thought of yours, you are equal to the Buddha….He who has an insight into this truth is free from thoughts, from recollections, from attachments; in him there is no deceit and falsehood." (Hui Neng, *Tan Jing* I, 26-27)

> For Chinese Buddhism, the character "假 *Jia*" means all empirical things are merely unreal, impermanent, temporal, relative, phenomenal, and fallacious. There are the nine views: 1) the three fundamental propositions (三諦 *San Di*): emptiness or void (空 *Kong*)，falsehood or unreality (假 *Jia*) and the mean or middle (中 *Zhong*); 2) the empirical combinations without permanent reality (假合 *Jia He*); 3) the unreal names for all things or nothing which has a name of itself (假名 *Jia Ming*); 4) the world of unreal names (假名世間 *Jia Ming Shi Jian*); 5) the unreal reality (假實 *Jia Shi*); 6) the unreal ego (假我 *Jia Wo*); 7) the unreal being (假有 *Jia You*); 8) the unreal forms (假色 *Jia Se*); and 9) the unreal observation (假觀 *Jia Guan*). All of these Buddhist views are applied in *A Dream of Red Mansions*. (Ding, 2012, 125-125)

Yi Zhuan (*Commentary on the Book of Changes*) claims:

> The Master said: 'The sages make their emblematic symbols to set forth fully their ideas, appointed the trigrams and hexagrams to show fully the truth and falsehood (of things), appended their explanations to give the full expression of their words, and changed (the various lines) and made general the method of doing so, to exhibit fully what was advantageous. They (thus) stimulated (the people) as by drums and dances, thereby completely developing the spirit-like" (character of *Yi*) (Section I of *Xi Ci of Yi Zhuan*).

For Chinese Daoism, Dao can be concerned as "being within all things" as full of contradictions. Dao encompasses the contradictions and, at the same time, supersedes them. Dao has been an ancient formulation of dialectical synthesis. Concerning Daoism, being both encompassing the contradictions and yet superseding them is called *Wu-Wei* (actionless-action). According to Daoism, all is one, such as good and evil matters and true or false. Like Buddhism, Daoist relativism stresses that certain things are neither true nor false, and all true and false, good and bad, right and wrong, and beautiful and ugly are relative.

We may find the following Chinese thought patterns: 1) Interpenetration of reality and illusion (the idea of true and false producing one another)—"Truth

becomes fiction when the fiction's true"; 2) Juxtaposition of Confucian, Buddhist, and Daoist views; 3) Alternation of scenes (situations growing out of one another)—e.g., action and stillness, excitement and boredom, elegance and baseness; sorrow and joy; separation and union; prosperity and decline; contrasts often emphasized in chapter heads; 4) Contrastive combination or unified opposition of different functions, structures, characters, although some are mirror images of one another.

VI. Jin Yuelin -- the Pioneer of Modern Chinese Logic

The pioneer of modern Chinese logic is Jin Yuelin 金嶽霖(1895-1984). In 1920, when Russell visited China, Jin received a doctorate from the University of Columbia in the United States and went to Britain at the end of 1921 for further study. It was during this period that he fully accepted Russell's philosophy.

Mou Zongsan 牟宗三（1909-1995）, a well-known Confucian philosopher, thinks that Jin's logical efforts are "admired" and "benefited a lot." He says that he is "the person who likes reading his articles most," and that his book logic (1937) is "Rare works in China" and "the best reference book and text book." [25] After the debate of materialist dialectics, formal logic was wrongly criticized and suppressed. [26] In China, where dialectics was so powerful, Jin could still maintain this independent and consistent attitude;[27] we should say that he stands firm as a rock in mid-stream. Jin's "independent and consistent attitude" persisted until the 1950s. The following examples can prove this. After 1949, Tsinghua University invited Ai Siqi 艾思奇（1910-1966）, a famous orthodox Marxist philosopher, to give a speech in the Department of Philosophy for the first time. He openly opposed formal logic. Jin wisely refuted Ai in his thanks, saying that Ai's criticism of logic was logical. Later, there was a whole university discussion. Some students demonstrated Jin's perspective on the "Democracy Wall," openly defended formal logic, and were treated as "incorrect speech." However, Jin's noble academic quality and upright academic style are widely spread, and it is still a good story. [28]At the same time, Mou also pointed out that Jin still did not strictly abide by this attitude in practical application, so "the most important thing is that Jin Yuelin did not get the dichotomy

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[25] Mou Zongsan, "A Brief comment on Jin's Logic," *Philosophy Weekly*, on January 29, 1932.

[26] Please refer to 1) *A History of Chinese Logic* (Modern volume), edited by Li Kuangwu, Lanzhou, Gansu People's Publishing House, 1989, Chapter 3; 2) *On the History of Modern Chinese Logic*, edited by Li Jidong, Doctoral Dissertation of Nankai University, 1997; 3) Werner Meissner, *Philosophy and Politics in China: The Controversy over Dialectical Materialism in the 1930s*, Part III. 12, Stanford University Press, Staford, California, 1990.

[27] See Wang Yutian, "Miss My Beloved Teacher, Mr. Jin, "edited by Liu Yuyu, memories and recollections of Jin Yuelin, Chengdu, Sichuan Education Press, 1995 edition, pp. 200-201.

[28] Mou Zongsan, "One Year of Philosophical Circles and Discussion on this Jouranl", *Guangzhou Republic Daily · Philosophy Weekly*, issue 43, June 24, 1937.

right." [29]Besides, Jin has not yet perfected his interpretation of various topics in logic. In particular, Jin has no system to speak of; his *logic* is "not a good system book, right classic book," which makes Mou "quite disappointed." [30]At this time, Jin's *On Dao* 論道 (1940) and *On Knowledge* 知識論 had not yet been written. [31]No wonder Mou was disappointed. In later years, Mou commented on Jin, saying that he "solved some logical problems," but he talked more about his philosophical thought than Zhang Dongsun 張東蓀(1886-1973）, a well-known Chinese philosopher, his evaluation was also higher than that of Zhang. [32] Mou thought that Jin "has much research on empiricism and realism (the so-called new realism at that time), especially Hume's thought. His analytical ability is powerful, and his articles can touch the level of philosophy. He can find the problem himself and analyze it. In this respect, he is better than Zhang, who can only narrate other people's thoughts, not when he is looking for problems. "According to this evaluation, Jin is indeed a real philosopher, but Zhang will be lower. Mou pointed out, Jin is only limited to "the British and American ideas, and no further work can be done." [33] On the whole, Mou evaluated Jin's logic and philosophy. His achievements in logic were higher than Zhang. However, his theory of knowledge was certainly not much. Mou once said: "He is the first scholar in China who is more proficient in western logic, and he is not very layman in the training of western philosophical theory of knowledge."[34] All of the above is related to the fact that Mou may not have seen the book *On Knowledge* written by Jin. From Mou's life, he criticized Jin the most and accepted his ideas the most.[35]

When studying at the Southwest Associated University, Yin Haiguang 殷海光 (1919-1969) once asked Jin, "which school is the truth?" Jin did not give a positive reply. He said thoughtfully, "those who are excited by the so-called spirit of the times

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[29] Mou Zongsan，"A Brief Comment on Jin's Logic," *Guangzhou Republic Daily· Philosophy Weekly*, No. 22, January 29, 1936.

[30] Ibid.

[31] Mou Zongsan said in his article "The Theory of Cause and Effect at Awareness and the Theory of Possibility at Knowledge" published in 1937: "This is a new trend of the theory of truth. In China, Mr. Jin Yuelin spoke in great detail, but he has not yet published it." It shows that Mou knew that Jin was writing epistemology at this time, but it had not been published, so Mou did not read this book. Although Jin's *On Knowledge* was completed in the 1940s, it was not officially published until 1983. Whether Mou had read, it is not known. As for Jin's *On Dao*, it is estimated that Mou had read it, at least partially, because the book was published as a single paper first, and relevant comments had appeared in Mou's works. Please refer to Mou's *Model of Logic*, Hong Kong, Commercial Press, 1941, P. 382.

[32] Mou Zongsan, *Times and Feelings*, Taipei, Ehu Publishing House, 1984, P. 127.

[33] Ibid.

[34] Mou Zongsan, *Characteristics of Chinese Philosophy*, Taipei, Student Book Company, 1974, p. 6.

[35] Wang Xingguo, "Mou Zong's Three Comments on Modern Chinese Philosophy," *Cultural China*, Canada, March and June 2000, Vol. 7, No. 1-2, No. 24-25.

may not be reliable or lasting." Yin asked again, "what is a more lasting and reliable thought?" Jin said: "After a long time of efforts to think out of things, such as Hume, Kant, Russell, and other ideas." [36]

Jin once described the beginning of his academic career as follows: his first interest in philosophy was in the summer of 1919. He studied the history of political thought with T. H. Green (1836–1882) . He remembers the first time he felt the appreciation of reason at that time, and within a year or two, if he could say that he had some ideas, his thoughts seemed to be wandering along the path of the so-called "idealism." When he studied in London in 1922, two books greatly influenced him: Russell's *Principles of Mathematics* and Hume's *Treatise*. "I did not understand the book of Russell at that time, but it made me think that philosophy does not have to rely on big topics. Even the concepts commonly used in daily life can profoundly analyze, and this profound analysis is philosophy. Since then, I have focused on analysis and gradually separated from green ideologically. " [37] Jin said that his book *On Dao* has the defect of new wine in old bottles, that is, many concepts in traditional Chinese philosophy, such as *Wuji* 無極, *Taiji* 太極, *Ji* 幾, *Shu* 數, *Li* 理, *Shi* 勢, *Qing* 情, *Xing* 性, *Ti* 體, and *Yong* 用, are introduced into *On Dao* and reinterpreted with the analytical method derived from Russell. He reached a state of intoxication with precise analysis. Xu Zhimo 徐誌摩（1897-1931) once had a vivid description: "Mr. Jin Yuelin has such a hobby, in addition to eating big watermelon, which is to pick up a noun's hair and patiently hold it in his hand. He cannot eat for a while, but the thick hair is disgusting, so he has to split it, but it is so hard that he can only choose a few improvised words. He uses half of them to throw cotton balls. In his hands, he peels off some mud, wipes off some dirt, and rubs off some poison to show their true colors to save ordinary careless people from regarding ivory as dog bones or dog bones as ivory. This idea is not easy to advance without a clear understanding of knowledge. We should apply for Mr. Jin's hair-splitting work." [38]There is a popular anecdote, which is in line with Jin's temperament. When he was a teenager, he thought there was something wrong with the Chinese saying, "money is like dirt, friends are worth thousands of golds." He said that if these two sentences are taken as the premise, the logical conclusion should be "friends are like dirt."

The publication of Jin's *Logic* marked that he became "the first person in China who understands modern logic" and "the first person in China who understands and introduces modern logic to China." Feng Youlan 馮友蘭（1895-1990）once commented that Jin used logical analysis to create the philosophical system of his famous ontological work *On Dao*, "written in the form of logic." He wrote them one by one, and a logical proposition represented each one. "His other epistemological

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[36] Yu Shicun (Ed.), *Extraordinary Tao: Chinese Discourse from 1840 to 1995*, Social Science Literature Press, 2005.
[37] Jin Yuelin: *On Tao*, China Renmin University Press, pp. 3-4.
[38] Xu Zhimo: *Morning News supplement*, No. 59, August 23, 1926.

masterpiece, *On Knowledge*, solves the problem of "the difference and relationship between the common and the different," thus "the fundamental problem of epistemology and logic." It is the special knowledge of Jin. Therefore, "Jin Yuelin is the first person who developed epistemology and logic in China." Feng himself also used the method of logical analysis to create the philosophical system of "new Neo Confucianism 新理學". He pointed out that "philosophy is introduced from logic"; according to logic, a common noun is a class name, which has two aspects of connotation and denotation. Connotation is common, and denotation is special. The relationship between them is not only the relationship between "one" and "many" in Greek philosophy but also the relationship between "one principle and one difference" in song and Ming Daoism. When this truth is clearly understood, the main concepts of Neo Confucianism will be available. After having these concepts, we can confirm them with Daoism's words in the Song and Ming Dynasties: "continue to speak" rather than "follow to speak."

Zhang Dainian 張岱年（1909-2004）evaluated: since the introduction of Western learning to the East, the combination of Chinese and Western philosophy has been an inevitable trend. The most famous thinkers in Contemporary Chinese philosophy are Xiong Shili 熊十力（1885-1968）, Jin Yuelin, and Feng Youlan. The three theories all show the integration of Chinese and Western philosophy. "In Xiong's philosophy system, nine-tenths of the 'Chinese' and one-tenth of the 'Western'; Jin's philosophy system can be said to be nine-tenths of the 'Western' and one-tenth of the 'Chinese'; Only Mr. Feng's philosophical system can be said to be 'half in the Chinse' and 'half in the western,' which is a relatively complete integration of China and the West. " [39]

According to the chronology of Jin, on the eve of the lunar new year in 1956, Mao Zedong 毛澤東 (1893-1976) invited Jin to dinner and said to him, "mathematical logic is still useful, and we still need to do it. I hope you will write a popular pamphlet, and I will read it. "Another important thing that Yue Lin said before he died. Once, Mao Zedong met with Jin and asked if he was interested in studying Marx's Capital's logic. Jin replied, "I am interested, but I do not understand political economy. I am afraid it is difficult to study it." At this time, Mao Zedong laughed and said with a Hunan accent: "it seems that every other line is like a mountain!" [40]

At the commemorative meeting of the 110th anniversary of the birth of Jin, the Chinese philosophical circles received many comments from the guests, including such a paragraph: since the late 1950s, Jin has been doing an important thing, that is, cleaning up and criticizing Russell's philosophy. Russell is one of the most influential

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[39] *Interpretation of Feng Youlan, the Volume of Scholar Studies*, edited by Dan Chun, Shenzhen Haitian publishing house, 1998, p. 3

[40] Hu Jun, *A Study of Jin Yuelin's Thought*, Appendix, a Chronology of Jin Yuelin, Social Science Press, 2004.

representatives in modern western philosophy. There are many things worth learning from in his philosophy, but the system of Russell's philosophy is idealistic, no matter in the early or late stage. Russell was once a teacher of Jin, whose philosophy was greatly influenced by Russell. To clean up and criticize Russell's philosophy is to clean up and criticize his thoughts. Jin is the most qualified to criticize Russell's philosophy because he is one of the few Chinese scholars who understand Russell's philosophy. In China, he is the most prominent authority to study Russell's philosophy. In the postscript of Russell's philosophy, Feng Qi 馮契（1915-1995）said that this book is the essential work of Jin after becoming a Marxist. He also said: "it is a comment by an outstanding contemporary Chinese philosopher on an outstanding contemporary western philosopher. This comment is the crystallization of the author's years of exploration and thinking. It is profound and full of wisdom. Therefore, if people want to understand and study Russell's philosophy and Jin's philosophy, they can draw nutrition from it and get inspiration." This comment is to the point. In his preface to the book, Zhou Liquan pointed out that Jin's book was influenced by the "left" viewpoint, which is a fact. However, looking at the whole book, Mr. Jin's criticism of Russell is not simplified. The valuable part of Jin's work is that he has sorted out the highly complicated Russell's philosophy and revealed its basic framework and its most essential things. As Feng Qi said, the book uses Marxist philosophy to study some fundamental problems in epistemology and logic and puts forward creative opinions, which marks that Jin's philosophy in his later years has experienced a leap and reached a new height. [41] It is the most valuable part of Russell's philosophy.

It has been commented that among Mr. Jin's disciples, Shen Youding 沈有鼎, Yin Haiguang 殷海光, Wang Hao 王浩, and Feng Qi 馮契 were the best four. The author of this book had some academic contact with three of them: Shen, Wang, and Feng. From personal experience, at least most of them agree with this comment. During the conversation, Mr. Jin also talked about a few comments about Peking University and Tsinghua University, which the author cannot remember. Later, he read one of his recollections, which said: "a leaf withers, late autumn is coming, the season is like this, and the fashion has changed. Before the period mentioned above, young people began to sing the following sentence: "Peking University is old, the normal university is poor, Tsinghua and Yanjing can attack.". The fact is that Peking University and Normal Universities are both Chinese and local, while Tsinghua and Yanjing are foreign. It has long been a fashion to attach importance to foreign affairs while neglecting China.

Shen Youding (1908-1989) is a philosopher who founded "Shen's paradox." He is familiar with English, German, French, Russian, Greek, Latin, Sanskrit, and other languages, can also give lectures in several languages at the same time, and has a deep understanding of ancient Chinese philosophy, such as Confucianism, Daoism,

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[41] Xing Bensi, "Speech at the 110th Anniversary of the Birth of Mr. Jin Yuelin."

Buddhism, Mohism, and the Logicians；and Western philosophy, such as Aristotle, Kant, Russell, Wittgenstein, Gödel Husserl. Shen studied logic at Harvard and got a master's degree. His teachers include A. N. Whitehead (Russell's teacher), Schaeffer (logician), and W. V. O. Quine (Wang Hao's later supervisor). However, after finishing his master's degree, he went to Europe to learn from Husserl and Heidegger to become a philosophy doctor.

Mou Zongsan recalled that he held a logic seminar at Jin Yuelin's home one year before the Anti-Japanese War. The seminar's theme was Russell's "axiom of reducibility," and the speaker was Zhang Suiwu 張遂五, who graduated from Tsinghua University. Zhang talked about it, but he did not understand. Later, Mr. Shen Youding suddenly came out and said that this axiom is equal to "The universal proposition is equal to the product of infinite individual propositions." He did not explain it in detail, so naturally, everyone did not understand it. At that time, Jin Yuelin also said, "I seem to understand your words first, but I do not understand them later." Shen, as usual, frowned and shook his head, indicating that he was in doubt. Since no one could understand, the discussion had to end in vain. Mou commented afterward that "although Mr. Shen's sentence has its origin, it is not the direct and pertinent meaning of the axiom, but the extended meaning. If you do not have a thorough understanding, it is no use just saying that. If you can understand it thoroughly, it is not to the point. It was the "summit" meeting of Chinese logic circles at that time. However, for Russell's "axiom of reducibility," even Jin, the great master of logic, could not understand it. It seemed that only Shen could know why. However, he understood that "in fact, he is still in a state of being meaningful but unspeakable."

Wang Hao (1921-1995) was a student of Jin Yuelin and Shen Youding at the Southwest Associated University of China. In the Chinese academic circles, he was the most professional, in-depth, and successful philosopher in studying Russell's mathematical logic and philosophy. In his later years, Mou Zongsan recalled that Jin led the Department of Philosophy at Tsinghua University in terms of logic. Shen was the second generation, Wang Xianjun was the third, and Wang Hao was the fourth. When he was in high school in 1935, Wang Hao got *logic* written by Jin Yuelin by chance. About 80 pages of it introduced the contents of Volume I of Russell's famous book *Principles of Mathematics*. He felt that these contents were both attractive and easy to understand. Therefore, he thought: We should first try to learn the more accessible mathematical logic to prepare for the later study of dialectics. When he was a freshman, he attended Wang Xianjun's symbolic logic class and systematically studied the first volume of *Principles of Mathematics*. Wang Hao had the ambition to establish a unified philosophy when he was young, but he gave up later. He also criticized Russell, saying that he should make more significant contributions to philosophy with his intelligence. Wang Hao was the founder of machine theorem proving. The program he wrote in the summer of 1958 on IBM-704-704 proved all the theorems of first-order logic in Russell's Principles of Mathematics in only nine minutes.

In 1988, in his book *Beyond Analytical Philosophy -- Doing Justice to What We Know,* Wang Hao introduced the ideas of Russell, Wittgenstein, Carnap, and Quine, who are the analytical philosophy representatives, give them careful analyses and intense criticism. Wang's main argument is that their philosophy cannot provide the basis for human beings' existing knowledge, especially mathematics knowledge. Because the author was very familiar with these four people's works and directly contacted some of them, his criticism was profound. P. Strawson commented: philosophers' primary and profound interest in Wang Hao's book is that it records the views of a brilliant, outstanding, and keen philosopher on the development process of the so-called analytical or Anglo-American philosophy in this century. Wang Hao's book is a rich and fascinating contribution to the history of modern philosophy and meta-philosophy. Wang Hao was awarded the first milestone award at the extraordinary annual meeting of automated theorem proving, co-sponsored by the International Joint Conference on artificial intelligence and the American Mathematical Society. This meeting was held in Denver in 1983 to recognize Wang's pioneering contribution in mechanical proof of mathematical theorems.

Conclusion

Traditional Eastern logic is fundamentally different from Western formal logic. Eastern philosophy and religions have embraced many kinds of ideas in a contradictory way: holism, relativism, pluralism, inclusivism, assimilationism, and combinationism. In general, Eastern logic is closely related to nihility, metaphysics, and mysticism. It emphasizes negation, connection, interaction, change, exchange, indeterminacy, integration, transformation, and dialectical unity of opposites; and its standard methods are analogy, syntheses, metonymy, conundrum, sophistry, persuasion, exaggeration, rhetoric devices, psychological appeals, anti-scientific imagination, and even pseudo-reasoning. As a plausible and even paradoxical approach, "mystical dialetheism" could quickly meet and suit the traditional way of Eastern values, spirituality, belief system, thought pattern, lifestyle, and social-political ideals. In the most forward-looking sense, Western formal logic has been limited just in this planet and only suitable for the principles of Newtonian mechanics; for the whole infinite universe, traditional Eastern logic might be more convincing in explaining Einstein's relativity theory, quantum mechanics theory, quantum entanglement theory, black hole theory, redshift theory, big bang theory, dark matter and dark energy theory, and so on. This article will examine certain mystical dialecticism of Eastern logic, which mainly includes Indian and Chinese logic.

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