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A Comprehensive Overview on Various Mind-Body Models

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To understand what the relation between the mind and body is, philosophers and scientists have done quite a lot of work, but their opinions are controversial and this problem is known as mind-body dichotomy. Mind and body are thought to be separated in ancient Greek and ancient India and both of the two civilizations emphasize the dominated role of mind in the mind-body interaction. However, modern sciences such as biology are based on materialism and they think that mental phenomena are entirely dependent upon brain. A series of philosophical groups focusing on the mind-body problem, such as physicalism and dualism, have been developed based on traditional views and scientific advances. In this paper, a comprehensive overview and comparison to various theoretical mind-body models are carried out and based on the relativity of simultaneity axiom we recently proposed, we concluded that mind and body should be two independent existences and any theory based on monist philosophy such as materialism, idealism and Christianity cannot satisfy the logical consistency requirement while the trialism of matter, energy and information is unnecessary.

Keywords: mind-body dichotomy, comparison, the relativity of simultaneity axiom, general system perspective, ontology, matter, energy, information, monism, dualism, trialism

Introduction

Humans have been interested and investigated the essence of life for thousands of years. There is not a completely inclusive, concise definition of life and the diverse interpretations of life have caused debate for a long time. Asking what life is could have dated from the natural philosophy of ancient Greek, but the questioning by Schrödinger opened a new era of scientific studies on this fundamental problem (Schrödinger, 1944).

From most people's perspective, life is a system with physiological function such as moving, growing and responding to external stimuli (Sagan). The core of this view depends on the concept of energy whether energy is an independent existence in parallel with matter (dualism) or energy is a property of matter (monism). In these two ontological models, information cannot be fully accounted for and the trialism of matter, energy and information was recently proposed (e.g. Gaiseanu, 2020; 2021). Life has been interacting with its environment since its inception around 3.6 billion years ago (Sagan). However, humans have no answers to the question that when and where precisely among organisms, consciousness forms. This problem was regarded as the hard

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problem of consciousness (Chalmers, 1995). Physical structure and function logically underdetermine phenomenal consciousness. Self-replication, self-organization, metabolism, autopoiesis, cognition, etc. have been regarded as features of life, whereas lifeless structures can duplicate themselves on a template too: minute fragments of a crystal are able to reproduce other crystals as seeds. Although the sophistication of a polynucleotide is far beyond a crystal structure, the physical principle is similar (Moore, 2012). Some theoretical models proposed that life continuously updates by self-organizing metabolic cycles that did not require genetic polymers, or arises from mutual catalysis among lipid like molecules of prebiotic origin, which led to the growth and cleavage of non-covalent protocellular assemblies showing lifelike characteristics (Kauffman, 1993; Segre, Ben-Eli, Deamer, & Lancet, 2001).

Despite notable advances in biology recently, we have not got a clear answer to the question that what life is (Ma, 2016). In the early age of human being, it was believed that life is a spirit or soul (Nee). This spirit, inhabiting the matter we call living (Santoro et al., 2009), works its will upon it, enduring it with perfect forms and with purpose oriented activities. Sometimes the concept of spirit was clothed in pretentious terms, such as entelechy, vital force, or mneme, yet all these still implied conscious or semi-conscious entity dominating matter. The verbal subtlety of the terms masked a naive animism.

There are many systems that have mind or consciousness—possibly animals, unicellular bacteria, and at some level maybe even individual cells that have an autonomous existence. The biologist Lynn Margulis proposed "microbial consciousness" and suggested that the "conscious cell" is the evolutionary antecedent of animal consciousness and the nervous system (Margulis, 2001). "Living systems are cognitive systems, and living as a process is a process of cognition" (Maturana, 1970, p. 4). Integrated information theory assumes that consciousness is a primary capability of physical systems with particular causal properties. It holds that consciousness is graded, common among biological organisms and exists in some lowly forms of systems. Furthermore, it states that even feed-forward networks are complex, they are not conscious, nor are aggregates such as a group of individuals (Tononi & Koch, 2015).

The invention of machinery allows inanimate matter to be fashioned into complex forms, capable of involving in wondrous activities, and some of them owns characters of living organisms. Moreover, some non-living matter attains complexity even in a state of nature. In some cases, it can give excellent reactions, which, although based on the regular principles of operation of inanimate material, simulate uncommon phenomena (Muller, 1955). Even if artificial system's behaviors are functionally equivalent to humans, and even if they display precise simulations of the human brain, they have only derived intentionality. Since genuine thought requires original intentionality, computers could never think.

Basically, the difference between a life and a lifeless object is the famous mind-body problem. The mind-body problem was formally raised by René Descartes in the 17th century and his answer was that the "substance" nature of mind and body must be completely different. Such a conception is classified as a dualist view (Skirry, 2016). In contrast, most of modern scientists believed that both these "substances" have the same essence and mind is just a property of the body (Robinson, 2020). This idea is classified as a monist view. From anciently to nowadays, many models have been proposed to address this dichotomy. The objective of this paper is to carry out a comprehensive review on various mind-body models. Based on the overview and comparison of these models, our own understanding to this problem is proposed.

What Is the Mind-Body Problem?

The mind-body problem focuses on how our mental activities are linked to physical states, processes and events (Chambliss, 2018). Along with the modern ambition of scientific understanding, the desire to understand the universe and everything in it as a unified system, the mind-body problem emerges in philosophy (Nagel, 1993). The problem actually can be traced back to very ancient times. For example, Aristotle believed that the mind is a property of the body while Plato held the view that the world of the immortal "Forms" has a "shadow", and that is the material reality including the body which contains the soul. Soul and body temporarily cooperate throughout the lifespan, but actually immortal (Robinson, 2020). In the 18th century, Kant suggested that some predetermined concepts on reality might exist in the brain, as a higher level of the perception and interpretation of the world (Brook, 2008). In the 20th century, Popper (1999) proposed that the emergence of the mind should be considered as an additional component when discussing the mind-body problem. In addition to the Western philosophy and science, there are also rich contents about the mind-body problem in oriental philosophies such as Indian Buddhism and Chinese philosophy (Capra, 1975).

In modern life science, what happens in the mind depends on the brain (Greenfield, 2002), a physical system composed of the same elements as any other. Although many things we say about the realities do not employ definitely physical concepts, the foundation is physical realities, and any true things must depend on those realities ontologically (Nagel, 1993). Consciousness might be associated with functional states of the living organisms or with behavioral dispositions or with memory (Nagel, 1993). Each functional state is assumed to be identified in terms of its role in a system controlling the operation of the creature and its behavioral response to the environment, and the functional organization is realized in the nervous system (Dennett, 1991; Lewis, 1966; Putnam, 1979).

The mind-body problem is not a single problem but a series of problems attaching to different perspectives of mind. For physicalists, the mind-body problem is why consciousness can be nothing other than a brain activity—what has been called "the hard problem" (Chalmers, 1995; Zeman, 2001). For dualists, the mind-body problem manifests itself as "the interaction problem"—how nonphysical mental phenomena communicate with physical facts, such as brain processes (Thibaut, 2018). No matter which view of the mind-body relationship you take, it is a deep philosophical problem (Castro, 2021).

Various Models to Answer the Mind-Body Problem

People have believed there is the world to come since the Old Stone Age and this contributes to the concept of soul. Souls are thought to exist in different organs in different nations. Humans have two souls in most ancient civilizations. One is the free soul, which represents character, and the other is the body soul, which enables it possible for a human to act and to be conscious (Watson, 2006). In fact, it is difficult to distinguish soul, consciousness and mind in some contexts.

Perspectives of Buddhism on the Mind-Body Relationship

Buddhism tries to separate the realm of the spirit from the material realm. Science stays on the material side of the line; human consciousness on the other side (Kasturirangan, 2009). In the Buddhist theory, consciousness corresponds to the Sanskrit word *vijnana* pointing to discernment, comprehension or perception. It refers not only to the awareness in the waking state, but also to a capability equips with living things whether or not bodies are aware of it (Ikeda, 2004).

The "nine consciousnesses" in Buddhist context provide a theoretical framework for understanding mind.

The first five of the nine levels of consciousness consist of the five senses (sight, hearing, touch, smell and taste). The sixth consciousness integrates the input from the five senses into comprehensive images and makes judgments regarding to the facts. The six ones constitute the conscious mind together. The remaining three levels of consciousness forcefully influence these first six ones and how we receive information and explain it. The seventh consciousness owns self-identity and the capacity to distinguish oneself from other individuals. It is the intuitive realm closely resembles the ego in Western psychology. In spite of a necessary factor of our identity, it could cause arrogance or insecurity to be controlled by this consciousness (World Tribune, 2018).

The *alaya*-consciousness, meaning "repository" or "residence" in Sanskrit, is the eighth level of consciousness. All the potential causes and effects from an individual's thoughts, words and behaviors over time accumulate in "karmic storehouse", which is considered to the current of karmic energy. The eighth consciousness transcends an individual and interacts with other humans' karmic energy, merging with the karmic energy of one's family and ethnic group and even with that of other living organisms like animals and plants (Ikeda, 2001). This is the reason why personal inner transformation, can change the destiny of a family and society. The first seven levels of consciousness decline throughout time and dissolve upon death, but the eighth exists continuously, accommodating the nature of one's being across the cycle of living and dying. The ninth level of consciousness is the deepest inner self, and is thought to be a pure life force and the power to live. By tapping into the ninth consciousness can create supreme value (World Tribune, 2018).

Mind-Body Relationship in Chinese Medicine

The traditional life science in China highlights the impact of mind on body. *Shen*, a crucial concept in Chinese medicine, refers to the general mental part of human life (Wu, 2002).

Chinese medicine emphasizes the role of mind and holds unique understanding of the interaction between mind and body. *Shen* to some extent is similar to central nervous system. It controls human body, makes it possible for humans to think and reflects the health status. Besides *Shen*, four kinds of neurophysiological and psychological activities are often mentioned when talking about mind. The four activities are *Hun*, *Po*, *Yi*, and *Zhi*. *Hun* is associated with subconscious, whereas *Po* is a life instinct, which is similar to sensory perception. *Hun* and *Po* are basis of *Shen*. Memory and spirit are related to *Yi* and *Zhi* respectively. Also, the two activities are capable of influencing emotion and cognition. The four ones are dominated by *Shen* (Huangdi Neijing, 2014).

According to the classic of Chinese medicine, *Huangdi Neijing*, there are five primary systems, which supports human's life and takes charge in important physiological functions. The five systems are the physical environment of the above five mental activities. Hence they are not simply equal to organs in biomedical context, though most of time they are correspondingly called liver, heart, spleen, lung and kidney. In addition to the link between the five systems and *Shen*, connection between the five systems and emotions is a critical factor in development of diseases (Huangdi Neijing, 2014).

The theory about body and mind in Chinese medicine is to some extent similar to that in ancient Mesopotamia. It is thought that organs carry different parts of mind. Intelligence is based on heart. Liver takes charge of thinking and perception. Uterus generates pity (Rooney, 2017).

In summary, the relationship between mind and body is suggested to be significant. When a Chinese medicine practitioner tries to cure a patient, he or she must consider this relationship and achieves a balance of mind and body through herbal medicine or acupuncture.

Mind and Body in Traditional Islamic Thought

Physical and spiritual/psychological categories are symbiotically related in Islam since humankind is thought to be comprised of body (*jism*) and spirit (*ruh*) (Deuraseh, 2005), and mental health is constituted by psyche (*nafs*), mind (*aql*), and heart (*qalb*) (Saniotis, 2018). In traditional Islamic thought, the *qalb* is considered to be a fundamental element of compassion, spiritual discernment and spiritual power (Saniotis, 2012; 2018).

Al-Kind îemphasized that the soul is immortal and has an origin composed of a tripartite unified substance created by God. Razi presented that the immortal soul of a human must strive to separate itself from corporeal entanglements, avoiding be reincarnated in another, possibly animal body. Abu Ali Al-Hussein Ibn Abdullah Ibn Sina, known in the West as Avicenna, explicitly posited a separated, self-conscious and immortal soul. Avicenna followed Plato in positing an essential independence of body and soul. In his view, the physical body, including the formal components, is irreconcilable with the purely immaterial soul, and hence the latter cannot be a substantial form of the former. A soul accidentally matches a specific body, occasioned by the birth of that body and its need for a central organization and sustainability principle. The soul is generated by a superior level of intelligence of the heavens having a natural intentionality, or proclivity, and exhibited by the body. The soul is individuated by the specific property of its designated body, which it strives to bring to perfection in terms of morality and intelligence. Owing to the immaterial essential, the soul does not disappear with the body death, and even retains a portion of its memory, i.e., the intelligible ideas it amassed during its previous life. Avicenna associated self-consciousness with the soul, which is not to be identified unilaterally with the rationalism (Rahman, 1952; 1958). With its virtues or vices, the immortal soul experiences continuous pleasure or pain, depending primarily on the amount of knowledge it accumulated, also on the life the person lived (Stanford Encyclopedia of Philosophy, 2012).

Mind-Body Relationship in European Civilization

Democritus from ancient Greek suggested that consciousness and thinking are functions of brain, emotion is based on heart, and liver accounts for sexual desire and appetite. Homer's Epic clarified that soul or mind identifies a living person and leaves the body when it dies. There is an underground world where the soul or mind stays after dying. Epicurus held that mind and body interacts with each other and shares the same property. In other word, both mind and body are substance. Lucretius, a Roman philosopher, also thought that mind is substantially body because disorder of any one of the two could influence the other one (Rooney, 2017).

The Pythagorean School agreed metempsychosis that soul is undying and can transfer and live in different bodies. It is the root of the concept of soul in Greek. Plato clarified that individual soul is a part of the universe soul and plays a role of medium between mind and material. A soul is fettered by a body, which is like a shell of an oyster. Plato believed a soul will live in another creature and the species depends on its previous morality. Socrates also suggested a soul is independent of a body and is undying. It acts by itself, controls a body and makes it alive. Death dissociates a soul from a body and eliminates negative impacts of a body, including happiness and pain (Xu, 2019).

Some scholars tried to explain mind through physics during Renaissance. Leibniz viewed intangible particle as the basis of body and mind. Julian, a French surgeon, argued that mind has specific physical property and its substance is the same as electricity. He did not believe that there is anything except material, let alone soul (Watson, 2006). Physicalists think that the causal chain going from a distal stimulus to the motor

response which it triggers is uninterrupted. Interference of the mind on the brain does not exist. There is no mind according to its ontological-dualist meaning (Nannini, 2018).

Functionalism, one of the varieties of physicalism, denies the separateness of mental and physical phenomena. Rather, mental phenomena are considered as functions of the brain (beliefs, desires, feelings of pain, etc.). Mind is analogous to the operation of a software package in the hardware in the brain. According to functionalism, the key characteristic of mind is the algorithmic transformation of inputs into outputs (Dennett, 1991). In this case, computers and robots are able to be conscious.

A solution of the mind-body problem opposed to physicalism is dualism. Rene Descartes developed the view that mind and matter contain different kinds of substance. The brain is a physical concept, the mind nonphysical, yet they are closely correlated with each other (Descartes, 1968). Physical events can cause mental events and vice versa. Dualism, nevertheless, fails to answer how physical and mental worlds can interact (Demertzi et al., 2009). According to dualism, without mind in the brain activity, action would not be intentional. Neurological studies demonstrate the interference by the conscious mind in brain activity during the sensor motor coordination process occurring when a voluntary action is performed (Nannini, 2018). As Fry pointed out that the fundamental problem of the origin of life lies in the tension between the principle of continuity and the difficulty of interpreting the marked distinctions between non-living and living matter, dualist mind-body model provides a simple way to eliminate this tension. When the body and the mind unify, a life is generated and when the two entities are separated, the life ceases (Fry, 2000). Mind might be possible to influence the distribution of energy, without altering its quantity (Averill & Keating, 1981). Minds can neither be created nor destroyed and it is conserved (Fry, 2000). But this dualism is not of the typical non-reductive physicalist sort, in which mental events are in some unexplained way “realized in” and supervening on physical processes (McGinn, 1989).

Overall, neuroscientists and philosophers are currently divided into two large groups. The philosophers and neuroscientists of one group opt for naturalism (Papineau, 2016), especially for a kind of naturalism oriented towards physicalism or functionalism. According to naturalism, the mind-body problem can only be solved by cooperation between the study of the brain (neurosciences) and the study of the mind (psychology and philosophy). Conversely, the other group think that the study of the mind cannot be conducted relying on the methods of natural science. To some extent it actually defends a return to dualism (Nannini, 2018).

Comparison of Mind-Body Models

As described in Section 3, many models of mind-body relations have been proposed and they are either dualist or monist, within each group, many different models exist. For dualism, there are the *qualia* (Levine, 1983), psychophysical parallelism, occasionalism, property dualism. In monism, there are behaviorism, identity theory (Smart, 2002), and functionalism (Block, 1980). For instance, Hilary Putnam (2000) developed the functionalism as a reaction to the limits of identity theory which was developed by Ullin Place (1956) and John Smart (2002) whose purpose was also as a reaction to failures of behaviorism. These philosophers believe that mental states are something material and are identical to internal states of the brain (Armstrong, 1968). No matter they adopt a reductive or non-reductive position, they cannot explain how the brain comes from and why the brain of a dead person does not work. Monist philosophers seem to have and cultivate a certain esotericism disposition about the mind-body problem (Castro, 2021). Other philosophers take a kind of epistemic approach and say that the mind-body problem is currently unsolvable, and perhaps will always remain unsolvable for

human beings (e.g., Nagel, 1974; McGinn, 1989). This can be viewed as a new mysterianism. However, quite some people do not accept this agnosticism and still try hard to solve this problem (e.g., Gaiseanu, 2021).

There is not a unified theory on the mind-body problem until now and we compare the models in this article in Table 1. Physicalism is similar to the mind-body model in Chinese medicine, and the obvious difference is whether mind interacts with body. Buddhism, Pythagorean School and dualism share the view that mind and body consist of distinct existence and almost agree on that mind lives forever. In other civilizations except Buddhism, Pythagorean School and dualism, psychological activities are based on substance and mind is based on qualia, which are supposed to be phenomenal properties. Although physicalist philosophy of mind today rejects Descartes' substance dualism, it maintains the underlying conceptual separation of mind and life (Thompson, 2004). Among all the above models only Buddhism definitely claims that mind influences objects in addition to body.

Table 1

Comparison of Mind-Body Models

Representation	Mind-body relationship	Major roles which control and determine the property of life in mind-body interaction	The continuance of mind	Range of influence of mind
Buddhism	Separate	Mind	Eternal	Transcends individual
Ancient China	Depend on each other	Both	Ceases upon death	Individual body
Ancient Islam	Depend on each other	Body	Immortal	Individual body
Ancient Roman & ancient Greek	Share the same property	Physiology/substance/body	Undying	Individual body
Pythagorean School (ancient Greek)	Separate	Mind	Undying	Individual body
Physicalism	Share physical properties	Substance/physics/body	Ceases upon death	Mind
Dualism	Closely related to each other; involve different kinds of substance	Not clear	Conserved as a non-mainstream view	Might be possible to transcends body

Our Solution to the Mind-Body Problem

Cui (2021a) introduced the relativity of simultaneity axiom that every described existence is a relative existence since the concept of existence depends on other concepts, at least its opposite or complement. If matter is defined to be an object of finite mass and finite volume in the space, according to the relativity of simultaneity axiom, the existence of matter implies the co-existence of non-matter. The non-matter can be called energy or information or soul or other names, but since energy and information have other meanings, it is better to be called mind in order to match the famous mind-body problem. The thing which enables a body of matter to possess the ability of active movement is called mind which is the essence of a life. A life with mind can generate active force to make itself move while a lifeless object can only be moved under the passive forces acted by other objects. Field concept is used to explain the force phenomena or action at a distance, but field itself is not an independent existence similar as time and space. In parallel with four passive forces of gravitation, electromagnetism, strong and weak interactions which corresponds to mass, charge, gluon and bosons, a psychic field is generated around a living creature due to the mind-body interaction (Pan & Cui, 2021). A life can decompose macro matter objects into small particles, such as molecules, atoms, protons, neutrons, electrons and even smaller subatomic particles. This process can be further down until the particles

we cannot observe. If we call the ensemble of unobservable particles as ether, then matter is made of ether or the essence of matter is ether. Human beings can accumulate ether into observed particles or large objects and decompose large objects into small observed particles or even ether. Since mind is non-matter, we cannot observe it and thus it is hard for us to assign different names to each individual. The ensemble of minds and ether are the two fundamental existences in Cui's ontology (Cui, 2021a; 2021b). Energy is a property of matter similar as mass and momentum rather than an independent existence while information can be thought to be generated by mind. Thus, the trialism of matter, energy and information (Gaiseanu, 2020; 2021) is unnecessary. As a matter of fact, if one treats matter, energy and information as three independent existences, then there are dark matter, dark energy and dark information. It needs six independent existences in order to explain the phenomena in the world we can observe. In Cui's ontology, this can be reduced to two: ether and minds. Dark matter is the invisible matter and dark energy is the energy contained in dark matter. Dark information is the information generated and used by other non-human creatures. A body with mind is categorized as a living creature while a body without mind is a lifeless object. All the consciousness phenomena and the information generation ability are attributed to the function of mind-body interaction (Cui, 2021b). Robot can only simulate the human being's consciousness phenomena but do not have the actual consciousness phenomena due to the lack of a mind. This mind-body model can explain many anomalous phenomena such as out of body experience, near death experience, mediumship, children claiming to have memories of a previous life (Moreira-Almeida & Santana Santos, 2012) and parapsychological (psi) phenomena (Cardeña, 2018).

Summary and Conclusions

In history, mind and body are thought to depend on each other in some countries, like China. Yet how mind and body interact with each other is unknown. Currently biomedical science tends to suggest that mind exists depending on brain and tries to find evidence that mind is what brain does. In other word, the basis of mind and body are matter and they can be explained in physical terms. However, this solution to the mind-body problem certainly violates the relativity of simultaneity axiom. It seems difficult to distinguish living and non-living systems, especially the living state and dead state. The source of consciousness and intentionality is another problem in this context. We try to find a different solution to the puzzles. In our opinion, mind must be non-matter if we use body to represent matter and can be interpreted as the essence of life while ether can be interpreted as the essence of matter. If living creatures and lifeless objects are the observed phenomena, then their essences are unobservable but do exist. In any process, the conservations of mass, momentum, energy and even other properties may be followed for the evolution. Based on these conservation laws, we can construct various system models to explain the observed phenomena and make prediction for the future events.

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