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Re-examination of the Two-Body Problem Using Our New General System Theory

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It is well-known that philosophical conflicts exist among classical mechanics, quantum mechanics and relativistic mechanics. In order to use the framework of general system theory to unify these three mechanics subjects, a new general system theory is developed based on a new ontology of ether and minds as the fundamental existences in the world. The two-body problem is the simplest model in mechanics and in this paper, it is re-examined by using our new general system theory. It is found that the current description of the classical full two-body problem is inappropriate since the observer and the measurement apparatus have not been explicitly considered. After considering these, it is actually a three-body problem while only the special case of the Kepler problem is the two-body problem. By introducing the concepts of psychic force and psychic field, all the possible movement states in the two-body problem can be explained within the framework of classical mechanics. There is no need to change the meanings of many fundamental concepts, such as time, space, matter, mass, and energy as done in quantum mechanics and relativity theory. This points out a new direction for the unification of different theories.

Keywords: two-body problem, new general system theory, gravitational field, psychic field, classical mechanics, quantum mechanics, relativity theory

Introduction

In classical mechanics, the general two-body problem is to predict the motion of two massive objects with respect to an absolutely fixed coordinate system, as shown in Figure 1. The problem assumes that the two objects only interact with each other. The only force that affects each object arises from the other one, and all the other objects in the universe are ignored. Thus, the system is treated as an isolated system of two bodies interacting with each other. However, in the description of the general two-body problem, three coordinate systems are often used and this problem is referred to as the full two-body problem (F2BP) by many people (Hou & Xin, 2018). If the two bodies are abstractly viewed as two point particles, then this is the simple two-body problem or the classical two-body problem (Goldstein, Poole, & Safko, 2002). This problem is mathematically expressed by Newton's laws or other classical mechanics principles, and various solutions are given in many books and papers (Goldstein, Poole, & Safko, 2002; Arnold, Kozlov, & Neishtadt, 2006;

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Scheeres, 2012; Hou & Xin, 2018; Luo, 2020).

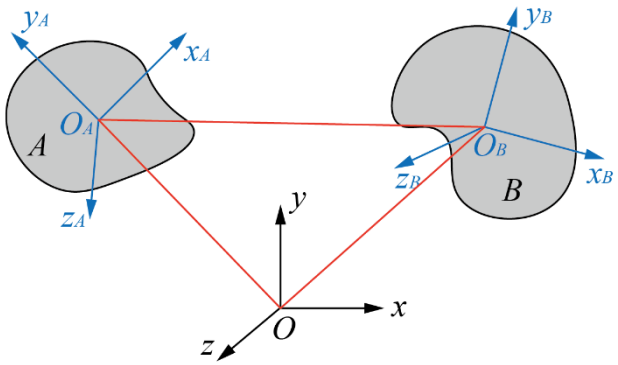

Figure 1. The classical full two-body problem (illustration from Hou & Xin, 2018 by redrawing).
Notes. O-xyz is inertial frame of the observer, O_A-$x_Ay_Az_A$ is body-fixed frame of object A, and O_B-$x_By_Bz_B$ is body-fixed frame of object B.

The two-body problem in astronomy is very interesting in understanding the relative motion between two celestial bodies, and it was later discovered that this model can be used to explain many other phenomena. The two-body system has been studied extensively in physics, such as the Kepler problem (Hasegawa, Robnik, & Wunner, 1989; Prince & Eliezer, 1981; Arnold, 1989), Rutherford experiment (Rutherford, 1911; Herron, 1977), Bohr model (Bohr, 1934; Fetter & Walecka, 2003; Olszewski, 2016), and so forth. Based on the Newtonian mechanics, the trajectory of a particle in a two-body system is a conic section when angular momentum is a constant (Goldstein, Poole, & Safko, 2002). However, the evolution of the two-body system under the influence of torque is still not properly understood yet, which is very interesting and complicated. Luo (2020) introduced a new equation derived from the Newtonian equation to extend the study of a two-body system under the influence of torque, and this new equation turns out to be a Sturm-Liouville equation.

By re-examining the implicit assumptions made in the description of the full two-body problem as indicated in Figure 1, we can find that the current problem description is based on the following implicit assumptions, and some of these assumptions are unrealistic.

1. The concepts of time, space, matter, mass, force, body, particle, coordinate system, etc. and their measurement units of seconds, meters, kilograms, and Newtons have already been defined by scientists and agreed among human beings. The definition of each concept and measurement unit involves the participation of scientists, and they are subjective in nature although the purpose of these concepts and theories is to describe the movement and behaviour of objective objects. Furthermore, this model can only be used to study the movement of an object relative to the observer, but not the origin of bodies and lives since it implicitly assumes that both lifeless bodies and our human beings (acting as observers) exist. In the classical two-body problem, all these concepts follow classical mechanics, but in quantum mechanics and relativity theory, the meanings of many basic concepts, such as time, space, matter, mass, energy, and field have changed. Thus, in order to present a unified general system theory, it is necessary to redefine these fundamental concepts.

2. From a system point of view, the present system shown in Figure 1 includes at least the observer at point *O* together with the measurement apparatus, object A, and object B. In Figure 1, point *O* is assumed to be an absolutely fixed and massless point which is at rest while both object A and object B are moving. This assumption has been used from Newton's time and also implicitly used by Einstein in his development of

relativity theory (Schaf, 2014), but is obviously unrealistic and violates our common sense and observation. An observer, such as a person with measurement apparatus can only live on celestial bodies, like the earth or other space vehicles. He cannot stay in an empty space. Thus, at point *O*, it must have mass. In that case, it is a three-body problem rather than a two-body problem. So for a real two-body problem, the first body should be the earth or other planet or space vehicle which carries the observer and the apparatus, and only one body is allowed for the study. The Kepler problem (Goldstein, Poole, & Safko, 2002) is a real two-body problem while the full two-body problem is actually a three-body problem. Furthermore, if the observer is fixed on the earth, then the absolute motion of the earth can never be known within the system. So, the assumption of the existence of an inertial coordinate system is also unrealistic, or it is a big simplification by ignoring the influence of the earth's motion, such as rotation on the trajectory measurement of the object studied. The validity of this assumption or simplification is certainly a problem that needs to be investigated.

3. Newton's laws or more general conservation principles of classical mechanics are used to establish the governing equations for the system. In this process, it is implicitly assumed that the motion of any object is governed by some fundamental laws, and the solution is derived under these assumptions. This is totally based on Newtonian ontology and epistemology. While we agree with Newtonian epistemology, it is well-known that Newtonian ontology has been discarded. Newtonian epistemology was also discarded in orthodox quantum mechanics (Bohr, 1934), but not in Bohmian mechanics (Oriols & Mompart, 2019). In Newtonian ontology, the universe is composed of matter and God. God created the world, in which there are lifeless objects, plants, animals and human beings. Later, the concept of God was discarded, and in that case, how the force came from cannot be explained. In order to answer this question, people, such as Einstein, assigned a different meaning to the concept of energy, and let energy play the role of force creator (Einstein, 1916). Many people have pointed out this change (Adler, 1987; Okun, 1989a, 1989b; Wong & Yap, 2005; Hecht, 2009). We intend to keep the original definition of matter and define mass as the fundamental property of matter, while momentum and energy are other derived properties of matter (Cui, 2021a).

4. In classical mechanics, the influence of the measurement process either from the apparatus or the operation of the apparatus by the observer has never been considered. In quantum mechanics, this kind of influence has been specifically emphasized, but all influences are attributed to the apparatus but no particular mention to the observer. Without the explicit consideration of the observer, the impact of information cannot be studied. If the same concepts and considerations are adopted, then it may be possible to unify the three disciplines of mechanics: Newtonian mechanics, quantum mechanics and relativistic mechanics. This is why we think it is important to clearly describe the ontology and epistemology of a scientific theory (Cui, 2021b).

The purpose of our research in this direction is to unify the above mentioned three mechanics disciplines, and the basic idea for this unification is the application of general system theory. It is our belief that every problem we encounter can be viewed as a system and it can be treated by the procedures described in the general system theory (Bertalanffy, 1968). Since Bertalanffy did not do much work on ontology, different theories have to be employed for different scales, which are conflicting with each other in nature (Whitaker, 2006). Recently, we proposed a new ontology of general system theory (Cui, 2021b), and thus renamed this theory as the new general system theory (NGST). The purpose of this paper is to re-examine the two-body problem based on this new ontology.

What Is the New General System Theory?

The general system theory was developed by Bertalanffy and many others in the 1920s-1970s (Bertalanffy, 1968; 1972) with the main emphasis on the following aspects: from objects to relationships, from quantity to quality, from substance to pattern, from closed system to open system, from linear performance to nonlinear performance (Capra, 1996). However, it did not pay much attention to the philosophical foundation of this theory, while the new general system theory (Cui, 2021a; 2021b) supplemented this deficiency.

Fundamental Concepts

In the development of new scientific theory, it must be clear about what science and its criterion are. Through our research, it is found that universal consensus does not exist. So, let us introduce our definition and criterion first.

Science. Science is a set of clearly defined and logically consistent knowledge about the structure and behavior of the natural and social systems obtained by watching, measuring, and doing experiments in the form of testable explanations and predictions about the system we can observe within the world we are living (Cui, 2021a). In this definition, we particularly emphasize that science can only study the system that we can observe which is of finite nature both in time and space. Thus, Cui (2021a) automatically gave up the possibility for a theory of everything (TOE) for the whole universe which is out of human beings' observation and untestable. However, a TOE for the world we can observe is possible. This belief already reflects our personal selection to the philosophical questions related to ontology and epistemology which will be introduced in the "Ontology" and "Epistemology" sections respectively.

Scientific criterion. How to judge a theory to be scientific or not, people have attempted to build some criteria but no universally agreed one is available. Cui (2021a) re-formulated his dynamic criterion for a scientific theory based on a system thinking approach and proposed that a general scientific theory should have clear definitions, logical consistency, and unfalsified axioms.

In the definition of science, we can find that in order to define science, we need to define many other concepts, such as time/space, system, knowledge, structure, behaviour, etc. Some of these concepts are given as follows:

Space-time. "Space and time are the framework within which the mind is constrained to construct its experience of reality" (Kant, 2002). Basically, we adopt the definitions of time and space given by Kant, and they are compatible with classical mechanics but not with the relativity theory. Time and space are concepts created by human beings and should not be treated as physical existences like lifeless objects and lives. We should not study the origin of time and space. Furthermore, from this definition, we can find the fact that time and space can only be defined after the existence of mind and reality.

Matter. Any object or particle of mass is called matter (Cui, 2021a).

Ether. The essence of matter is defined as ether which represents an ensemble of unobservable quanta (Cui, 2021a).

Mind. The essence of a life is defined as a mind (Cui, 2021a) which enables the body of matter to possess the ability of active movement or vital force. So, all the self-abilities of living creatures are attributed to minds and with this definition, the difference between living body and dead body can easily be explained. Otherwise, people need to create some new words, such as self-organization, self-regulating, dissipative structure, autopoiesis etc. in order to describe the living bodies.

Life. A life is a body of matter with a mind.

Lifeless object. A lifeless object is a body of matter only.

In our ontology, every object we can observe is created by lives, that is, each life has parent(s) and every lifeless object (created object) has creator(s). This can avoid the creator problem, such as God created the world and created from nothing problem, such as the Big-Bang Theory.

Energy. The word energy designates a key concept in modern physics, but as pointed out in the famous Feynman lectures on physics (Feynman, 1964; Feynman, Leighton, & Sands, 2006) that present-day physicists do not know what energy is. This is because there are various kinds of energy: kinetic, elastic, thermal, gravitational, electric, magnetic, nuclear, chemical, etc. (Bunge, 2000). Every particular concept of energy is defined in a given chapter of physics. While in classical mechanics, energy is a property of matter in parallel with the other properties, such as mass, position, velocity, and momentum, it was gradually turned into an independent existence in parallel with matter after Planck (1901; 1914) explained the black-body radiation and Einstein (1905) explained the photoelectric effect. Nowadays, in quantum mechanics and relativity theory, matter and energy are always treated as two independent existences. In order to explain the accelerated inflation of the world we can observe, another two existences of dark matter and dark energy have been introduced (Arun, Gudennavar, & Sivaram, 2017). However, after more than 70 years search of dark matter, there was no discovery. Furthermore, based on these four independent existences, information-related phenomena cannot be explained. Some philosophers and scientists suggested that information is another independent existence parallel to matter and energy, and a trialism of matter-energy-information was proposed (Gaiseanu, 2020). Following the same logic as dark matter and dark energy, there should also be dark information. Thus, there are six independent existences. This is very different from the original materialism as a monistic philosophy.

Do we really need six independent existences in order to explain the phenomena we have observed? Based on the relativity of simultaneity axiom proposed in our new general system theory (Cui & Kang, 2020; Cui, 2021a), the answer is no. We believe that only the two fundamental existences of ether and mind are adequate to explain all the phenomena we observe. We agree with Bunge (2000) that "energy is a property, not a thing, state, or process" (his corollary 2). Schaf (2014) also eliminated the need of dark matter and dark energy to explain respectively the galactic gravitational dynamics and the accelerated expansion of the universe using his space dynamics.

Information. Information is any message generated by lives and used for communication purposes. It can be divided into concepts/definitions, data, statement, theory, and knowledge.

Knowledge. Knowledge is a familiarity, awareness, or understanding of someone or something, such as facts (descriptive knowledge), skills (procedural knowledge), or objects (acquaintance knowledge). By most accounts, knowledge can be acquired in many different ways and from many sources, including but not limited to perception, reason, memory, testimony, scientific inquiry, education, and practice. The philosophical study of knowledge is called epistemology (Wikipedia).

System. According to Bertalanffy (1968), a system is a group of interacting or interrelated entities that form a unified whole. A system is delineated by its spatial and temporal boundaries, surrounded and influenced by its environment, described by its structure and purpose, and expressed in its functioning. This definition obviously relied on the definitions of time and space.

General system theory. Systems theory is a science which has the comparative study of systems as its object. For several decades (Bertalanffy, 1968; Chen & Stroup, 1993), some scientists, philosophers and

mathematicians believed that all sciences concerned with systems should have a formal correspondence or logical homology in their general principles, and even in their special laws and have been working to construct an exact theory capable of unifying the many branches of the scientific enterprise. The product of this effort—general system theory (GST)—is seen to provide a powerful framework for understanding both the natural and the human-constructed world. General system theory is fundamentally an approach to engaging change and complexity. It is a logico-mathematical field, the subject matter of which is the formulation and deduction of those principles which are valid for "systems" in general. There are principles which apply to systems in general, whatever the nature of their component elements or the relations or "forces" between them. General system theory is a logico-mathematical discipline, which is in itself purely formal, but is applicable to all sciences concerned with systems. Its position is similar to that, for example, of probability theory, which is in itself a formal mathematical doctrine but which can be applied to very different fields. The significance of the general system theory may be characterised in different ways (Bertalanffy, 1972).

Therefore, a complete general system theory includes the following three aspects (Bertalanffy, 1972):

1. The first aspect is systematic science and mathematical systems theory. That is, the scientific theoretical study of various concrete scientific systems, as the fundamental theory applicable to all (or certain) kinds of systems, requires the use of precise mathematical language to describe the various systems.

2. The second aspect is system technology, which involves the content of system engineering and focuses on the practical application of system thinking and methods in solving various practical problems.

3. The third aspect is system philosophy, the study of the science of system theory, or the nature of systems, namely the study of ontology, epistemology and methodology of systems, the study of the relationship between humans and the world, values and humanism, so that the system theory can obtain the status of philosophical methodology.

Ontology

What is a system made of? How large is the maximum system? Why does the system always move and change? How small is the minimum particle? Does non-matter stuff exist? These are the ontological questions.

Ontology is sometimes referred to as the science of being. The current problem in modern science is that different ontologies are used to explain microscopic, macroscopic, and cosmic phenomena. Cui (2021a; 2021b) specified an ontology which can cover phenomena ranging from microscopic to macroscopic and cosmic.

The first question related to the ontology is what it is like to the universe. Cui (2021a) used two-valued logic and proposed the relativity of simultaneity axiom as follows:

> **TOE-A1: The relativity of simultaneity axiom:** There is no such thing as a perspective-independent existence. Every described existence is a relative existence since the concept of existence depends on other concepts, at least its opposite or complement. (Cui, 2021a)

Based on this axiom, our description of existences should always be paired and they are relative and simultaneous. There are two types of existence: One is the real existence no matter whether it is matter or non-matter, and the other is the existence created by human beings for the description of the real existence. Time, space, mass, rest, temperature, entropy, and information all belong to the second category of existence (Cui, 2021b).

In order to answer how large the universe is, there are basically two choices: finite and infinite. It is obvious that selecting infinite can avoid further questions, such as how large it is and what is the center of the

universe, since the universe is beyond the observation scope of our human beings. Such questions can never be answered in a scientific framework if we choose finite. Then, the second axiom is introduced (Cui, 2021a):

> **TOE-A2: The infinite universe and finite world axiom:** The universe is defined as the largest system our human beings can imagine and it is of infinite nature both in time and space. The world is defined as the largest space-time our human beings can observe and it is of finite nature both in time and space. (Cui, 2021a)

The relation between universe and world defined by Cui (2021a) can be illustrated in Figure 2. From the definition of system as introduced in the section of "Fundamental Concepts", a system needs to have two space-times: one is the space-time for the system itself (the world), and the other is the space-time for the outside environment of the system (the universe outside the world). Therefore, science can only study the system within the world we can observe rather than the whole universe, and according to TOE-A1, in order to explain the origin of the world, we must assume the pre-existence of the universe.

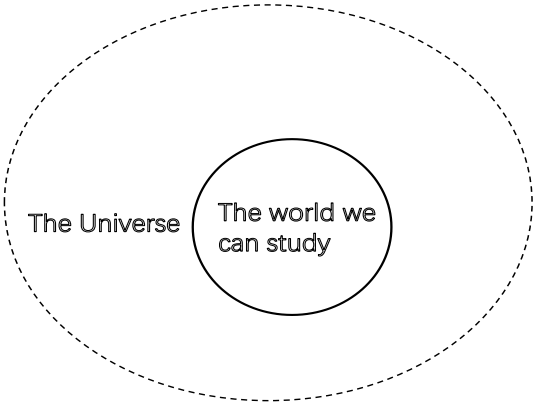

Figure 2. A schematic representation of the concepts of universe and world (Source: Cui, 2021a).

According to TOE-A1, the existence of matter with finite mass and volume implies the co-existence of non-matter without mass and does not occupy space (Cui, 2021b). This comes from four definitions of matter, mind, life and lifeless object given in the section of "Fundamental Concepts". Ether and minds are the two fundamental existences of everything in the world we can observe. TOE-A1 can solve the "creator" problem in materialism (Sarfati, 1998) and "creating some matter from nothing" problem in idealism (Cui, 2021b). The following axiom is derived from observation through logical induction (Cui, 2021a).

> **TOE-A4: The particle generation and annihilation axiom**: Lives can accumulate ether into particles and decompose particles into ether. (Cui, 2021a)

In our ontology, mass is the fundamental property of matter while the active force called psychic force which is generated by a life is the fundamental property of mind-body interaction. Mass is invariant and energy is just a property of matter similar as mass, momentum, and others, while information is thought to be generated by mind. Cui (2021b) suggested not studying the properties of mind directly since it is beyond the scope of our human observation, but we can study the properties of living bodies which are the interactions of mind and body.

The mind-body problem is a debate concerning the relationship between thought and consciousness in the human mind, and the brain as part of the physical body. In the same way to explain the four passive types of forces related to matter (gravity, electromagnetism, weak interactions, and strong interactions) by the concept

of field, we assume another field called psychic field also exists, and we can use this field to explain many parapsychological phenomena (Moreira-Almeida & Santos, 2012; Cardeña, 2018).

Epistemology

Is a system operated with laws or randomly? If with laws, can we reveal these laws? These are the epistemological questions.

Cui (2021a) proposed through logical deduction that we have to assume that all the systems or everything in the world we can observe is operated with causality law (TOE-A6), and the mission of scientists is to reveal these laws, and we can use these laws to predict the future. Without that belief, scientific research is a paradox. The causal-effect axiom is expressed as follows:

> **TOE-A6: The causal-effect axiom:** Every object in the world, including living creatures, is governed by the causal-effect law. That is, each effect should have causes and each cause will have effects (Cui, 2021a). In another way, this axiom can be expressed as: everything in the world, such as events and actions do not arise *de novo* but are always preceded by other causal factors.

Different from the Copenhagen school who claim that there are some properties in the micro-world which we can never know, Cui (2021b) recommends being open-minded. There may exist some other observation methods, such as meditation which can be used to better observe the behaviour of minds and ether. We humans are agnostic to the universe but knowable to the world. By assuming the pre-existence of the universe and its infinity of space-time, we can study the origin of the earth, moon, sun, solar system, Milky Way, or any system of finite space-time. However, we must accept the fact that our ability to reveal the causality law is limited, as suggested by the limited ability axiom:

> **TOE-A3: The limited ability axiom:** The ability of a human being to know the universe is limited due to the infinite nature of the universe and finite nature of a human being, such as its life span. (Cui, 2021a)

Although mind is continuous, the knowledge learned in one term of life will not be automatically remembered in the next term of life. Thus, the ability of a human being to know the universe is limited, but the ability of a human being to know a particular world can be continuously accumulated.

From TOE-A2 and TOE-A3, we can derive the General Uncertainty Principle (GUP).

> **TOE-T1: General uncertainty principle (GUP):** If a human being wants to know something clearly, he needs to attribute all the uncertainty to something else, such as the complement of that thing. (Cui, 2021a)

For example, if we want to know the operational rules about the world, we need to attribute the uncertainty to the universe. If we want to know the properties of matter particles, we need to attribute the uncertainty to minds. If we need to know the properties of minds, we may attribute the uncertainty to meditation. If a person is enlightened through meditation, he is still unable to claim he knows everything in the universe. Thus, the whole universe is always agnostic to us. That is the fundamental essence of this general uncertainty principle. Heisenberg's uncertainty principle is just a special case of this GUP.

What methods can be used to reveal the laws, how many methods exist and how to represent the laws? These are the methodological questions. In general, these methods can be divided into two categories: deterministic and probabilistic. In the past, they are regarded as in conflict in nature, but we think this conflict can be unified (Cui, 2021a). Due to the existence of uncertainty, the representation of knowledge will follow the accuracy-correctness balance axiom.

TOE-A5: The accuracy-correctness balance axiom: Accuracy and correctness are in conflict in the sense that the more accurate the representation of a statement, the higher the information content, but the less likely it is to be correct. (Cui & Blockley, 1990)

The purpose of knowledge representation in any scientific theory should be as accurate as possible under the condition of correctness.

Summary of Philosophical Foundation

In summary, in this ontology, the universe itself is an entity which exists forever and it has lifeless objects and lives that we observed and defined. We human beings are only one type of lives in the universe. Through our feeling, we find everything is in movement and change. For communication among our human beings, we have developed languages and assigned many names to the objects we have seen. To describe things, we use at least one pair of concepts. For example, the first division is human beings and non-human beings called nature. The theory for the nature is philosophy, and the theory for human beings is religion, and before that, it was a theory of everything for the whole universe. The first model of the universe is finite and earth-centered, and the second model is also finite but sun-centered. The latest Big-Bang model is semi-infinite but there are also infinite models for the universe. Based on TOE-A1, we select universe for infinity and world for finite, and select agnostic for universe and knowability for the world operation. Later, more sciences, including mathematics, were developed from philosophy, while the scope of philosophy was greatly reduced. Furthermore, scientific approaches are used to study human beings, and more social and life sciences are developed. Now it is the time to extend the general system theory to the theory of everything for the world we can observe rather than the whole universe. This is based on the realization of the limit of scientific approaches which can only be confined to the world we can observe rather than the whole universe. A system is a general concept for every problem we encounter, but we decompose the complex system into simpler components. We should not forget the emergent properties that occurred through the interactions among components. A general picture of the system decomposition is shown in Figure 3, the emergent properties occurred through the mind-body interactions or entanglement of minds. With that model, the general system theory can be regarded as a theory of everything. In some cases, the emergent properties produced by the interactions between components can be ignored, and this is René Descartes' reductionist approach and the previous Newtonian mechanics. In quite a lot of situations and especially for those systems which contain living creatures, the emergent properties cannot be neglected. By fully considering these emergent properties, the general system theory is basically a theory of everything. Basically the exchange between system and the environment are two things: matter and information. Matter exchange leads to the exchange of energy. Information exchange can be transmitted through traditional means, such as through vehicles or physical waves or through the entanglement between two minds or among multiple minds. The new means of the information transmission through entanglement should be the focus of current information science.

Whether a unified TOE is possible or not is a philosophical question. In a two-valued logic system, people can either choose yes or no. After the acceptance of the Heisenberg uncertainty principle (Heisenberg, 1927; 1930) and the orthodox quantum mechanics, currently most people in the scientific community intend to believe that it is impossible to construct a TOE (Jaki, 1966; Schmidhuber, 1997; Dyson, 2006; Hawking, 2002; Feferman, 2006; Robertson, 2000; Weinberg, 2011) while few people intend to believe it is possible and make the claim that they have constructed a TOE (De Aquino, 2012; Shen, 2013; Lee, 2019; Cui & Kang, 2020). Of course, none of these TOEs have been accepted by the scientific community.

However, Cui's opinion is that while a TOE for the whole universe is really impossible since it is out of the observation of our human beings, whether a TOE for the world we can observe exists or not is a philosophical problem and it depends on the choice of scientists. If all scientists select impossibility and give up the study, then TOE will never be born. However, if some scientists select to believe the possibility of TOE and make continuous efforts to construct the TOE, it is possible to be created. The development process of every scientific theory has followed that path. Any claim about the impossibility of future events is fundamentally an over claim, and it could be right or wrong. It is beneficial for the development of science if one selects yes while it prevents the scientific development if all the people select no. Furthermore, he has offered the following reasons to support his belief on yes for TOE (Cui, 2021a).

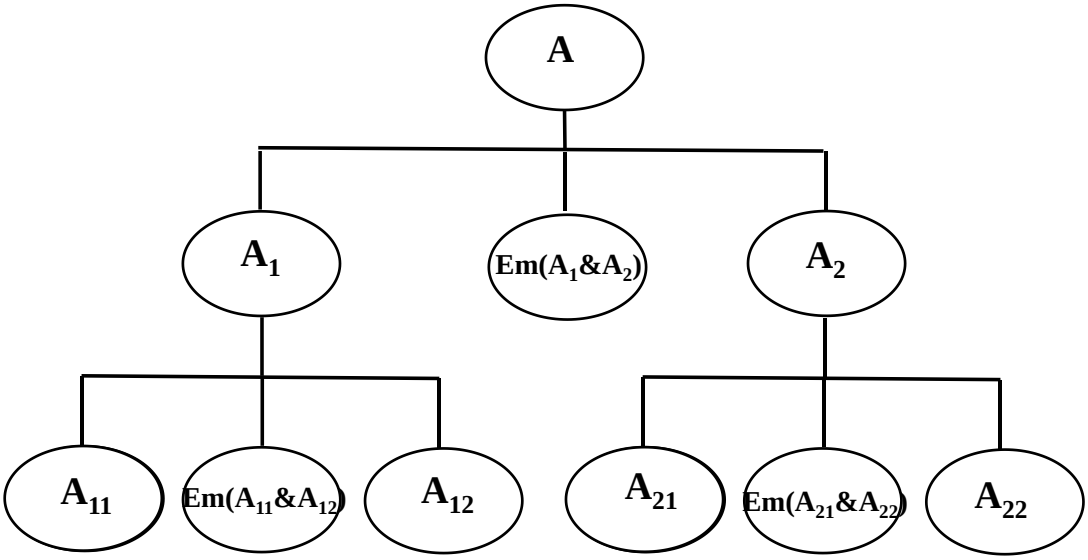

Figure 3. A schematic diagram for general system decomposition (Source: Cui, 2021b).

1. System is a very general concept and every problem we encounter can be modeled as a system.

2. The universe is a whole entity; all the objects within the universe have interactions with each other.

3. Theory is a construct of human beings. For a given system, the general system theory (GST) can always be employed to construct a mathematical model for the system. Currently we have classical mechanics for macro systems, quantum mechanics for micro-systems, and relativistic mechanics for cosmic systems. The only problem existed is that the three theories are based on different axioms and there are some contradictions among these axioms.

4. Unification has made progresses. After the occurrence of Einstein-Bohr debate (Whitaker, 2006), many progresses in the unification direction have been achieved. String theory (Zwiebach, 2004) and M-theory (Duff, 1996) are two examples which have been accepted by the mainstream of scientific community as the potential candidates of TOE while others are just their own claims (De Aquino, 2012; Shen, 2013; Lee, 2019; Cui & Kang, 2020).

5. The consequence of yes is better than no. Firstly, as pointed out earlier, selecting yes is more beneficial for the development of science. Secondly, if many theories are used to handle different systems, the contradictions and paradoxes existed among these theories cannot be resolved. Thirdly, in order to completely resolve the "tool" problem of science, science is a tool and it could have good and bad effects (Mao, 2019), we

need to construct a TOE by unifying religion, philosophy and science. This is possible within the dualist mind-body model while it is hard in the monist philosophy. Without the cause-effect law for human behaviour, the altruism has no philosophical foundation, and this is the root of many social problems (Kurzban, Burton-Chellew, & West, 2015). Thus, the main task of science is to reveal this cause-effect law for everything in the world we are living in, especially the cause-effect law for human behaviour.

Comparison With Other Theories

Through our study, we found that the main problem of the conflict among three theories of classical mechanics, general relativity theory and orthodox quantum mechanics is due to the philosophical belief of the proposers in the selection of answers to ontological and epistemological questions. The ontological question is what the world is made of, and the epistemological question is whether the world is operated with deterministic rules. Table 1 provides a comparison between answers by three schools of scientists and us.

Table 1

A Comparison for the Answers to Ontological and Epistemological Questions

Proposer/Theory	The ontological question (what is the world made of?)	The epistemological question (does the world operate with deterministic rules?)	Comments from NGST's standpoint
Newton and other scientists/Classical mechanics	The world is made of matter in the form of fundamental particles. Mass is the fundamental property of matter. The universe of time and space together with us human beings were created by God, and it already exists. The world is just a part of the universe.	The world operates with deterministic rules, and we human beings can reveal these rules. Newton's laws of motion and universal gravitation, as well as the various conservation principles re-expressed by these laws, are the ultimate rules for the operation of the world.	Monism of matter only (materialism) cannot explain the origin of fundamental particles and the origin of various types of forces. God has to be introduced to explain some unexplainable phenomena. We agree with them that the universe always exists, the world is a part of it, and the world is operated with rules. Whether the rules are deterministic or probabilistic depends on the information we can obtain.
Einstein and other scientists/Special and general relativity theory	The world is made of matter in the form of mass particles and non-mass particles (energy waves). Mass is not the fundamental property of matter, and it varies with velocities. The universe of time and space was born in a Big-bang from singularity. There is no need to introduce the concept of God in science and there is no ether. Mind is a function of brain. The world is the same as the universe.	The world operates with deterministic rules and we human beings can reveal these rules. Newton's laws of motion and universal gravitation, as well as the various conservation principles re-expressed by these laws, are only valid at speeds far below the speed of light. When the speed of an object approaches the speed of light, general relativity theory must be used.	It seems to accept the monism of matter only, but the meanings of matter and energy as well as other concepts of time, space, field, world and universe have undergone great changes. This is contrary to our direct experience that concepts, such as time, length, and mass defined by us will not vary with the velocity. In order to explain the inflation of the universe, many new existences, such as dark matter and dark energy have to be introduced. Furthermore, information is hard to explain with matter and energy, so the ontology of the world is unclear, and many paradoxical problems can be found in the Big-bang model.

Table 1 to be continued

Bohr and other scientists/Orthodox quantum mechanics	The micro-world is made of matter in the form of energy waves. When a measurement or an observation is made, particles are formed. It did not make any statements about the macro world and the universe.	The micro-world operates randomly and we human beings can only reveal some statistical rules using probability theory. In particular, particles are formed only due to the disturbance of observation and measurement. Otherwise, matter is in the form of energy waves, and micro-particles have no trajectory.	It only applies to the micro-world, and the theory is very different from the classical mechanics of the macro world and the relativity theory of the cosmic world. There will be jumps in operation rules due to the scale, which is contrary to our experience and observations. Furthermore, it is counterintuitive that subatomic particles are formed due to the observation and they have no trajectory. Many scientists, such as Einstein, de Broglie, Schrödinger, and Bohm are not satisfied with this version of interpretation, and there are many other interpretations for quantum phenomena. It is our position that its claim that the micro-world operates randomly is an overclaim, which violates the foundation of scientific research.
Cui and his colleagues/New general system theory or theory of everything	The world is made of ether and minds. Ether is the essence of matter and in the form of unobservable particles. Observable particles are accumulated from ether by lives, and minds are the non-matter sprits which represent the essence of lives. A life is a body with mind. Mass is the fundamental property of matter. The universe of time and space as well as various forms of living creatures and lifeless objects has always existed. Science can only study the origin of a world that we humans can observe, and it is only a finite part of the universe space-time.	Since human beings can never observe the whole universe, any theory about the universe is pseudoscience due to its untestable nature. In a system model, the whole universe outside the system is always the environment of the system we are studying, so the actual influence of the environment on the system is unknowable. However, if we assume that all the properties of living creatures or lifeless objects follow the locality axiom, then if the system boundary is large enough, the influence of the universe on the system can be ignored. Thus, all the knowledge is of relative nature. Furthermore, in order to define something, we need to have at least its complement. The existence itself is a relative existence. Thus, we define the essence of matter as ether and the essence of life as minds. Both ether and minds can never be created nor destroyed, and they follow the conservation laws. Every object (a living creature or a lifeless object) in the world we can observe operates with rules and we human beings can reveal these rules. Whether these rules are expressed in a deterministic or probabilistic format depends on the information available to us.	This philosophy is basically one school of Buddhist philosophy. It can unify the two opposite opinions, such as monism and dualism, determinism and indeterminism, and agnosticism and knowability. By giving up the origin of the whole universe, we can explain the origin of a particular world. It can overcome all the problems encountered in the above three theories.

Two-Body Problem in the Framework of New General System Theory

As suggested by Cui (2021a), the general procedure for using GST to solve a practical complex problem can be described as follows:

1. To construct the system model by defining the system to be studied and its environment.
2. To apply mathematics to derive the governing equation for the system's performance.
3. To establish the boundary conditions and the initial conditions.
4. To solve the mathematical model.
5. To interpret the mathematical solution to its physical properties of the system.

In this section, we would like to solve the two-body problem by using the above procedures.

System Modelling

Let us consider a system to be studied composing of two bodies with masses M and m, and then the universe outside these two bodies constitutes the environment of the system. Suppose the influence of the environment on this system is negligible, then we can regard it as an isolated system. In order to construct a real two-body problem or the Kepler problem as described in the Introduction, there must be an observer as well as the measurement apparatus, and the observer and the apparatus must be fixed to one of the bodies. Furthermore, the observer is clear about the concepts of time, space, particle, matter, mass, position, velocity, force, etc. Otherwise, the problem is either meaningless or does not exist. Newtonian mechanics has never considered the observer and the apparatus, while quantum mechanics explicitly considered the apparatus and implicitly considered the observer, which together form the measurement problem (Maudlin, 1995). When solving the problem, we also implicitly assumed the correctness of Newton's laws. Therefore, this model cannot be used to study the "creator problem".

Assume that the observer is us human beings and the mass M is the earth, then we human beings stand on a fixed point of the earth to study the movement of the mass m due to the gravitational attraction from the earth. The mass M of the earth contains the observer and the apparatus. In order to construct a general model, we first treat both the earth and mass m as living bodies with minds. Therefore, there is a psychic force between the earth and mass m due to the entanglement of minds. Let us take the earth as the frame of reference, as shown in Figure 4.

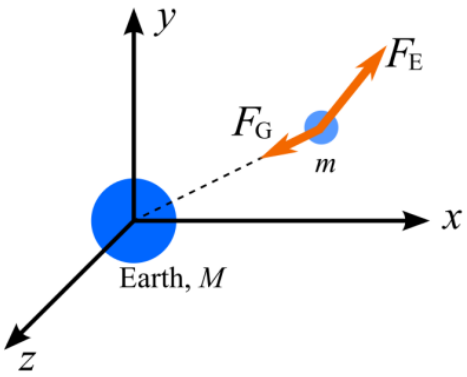

Figure 4. An illustration of the general two-body problem (the Kepler problem).

Note. One mass particle on an earth-fixed coordinate system, F_G: Gravitational force, F_E: Psychic force from the entanglement of two minds.

Governing Equation

According to Newton's second law, the governing equations for the movement of the mass m can be expressed as:

$$\begin{cases} m\ddot{\boldsymbol{x}} = \boldsymbol{F}_{Gx}(\boldsymbol{x},\boldsymbol{y},\boldsymbol{z},t) + \boldsymbol{F}_{Ex}(\boldsymbol{x},\boldsymbol{y},\boldsymbol{z},t) \\ m\ddot{\boldsymbol{y}} = \boldsymbol{F}_{Gy}(\boldsymbol{x},\boldsymbol{y},\boldsymbol{z},t) + \boldsymbol{F}_{Ey}(\boldsymbol{x},\boldsymbol{y},\boldsymbol{z},t) \\ m\ddot{\boldsymbol{z}} = \boldsymbol{F}_{Gz}(\boldsymbol{x},\boldsymbol{y},\boldsymbol{z},t) + \boldsymbol{F}_{Ez}(\boldsymbol{x},\boldsymbol{y},\boldsymbol{z},t) \end{cases} \quad (1)$$

where F_G is the gravitational force on mass m due to its interactions with mass M. The two dots on top of the x, y and z position vectors denote their second derivative with respect to time, or their acceleration vectors. F_E is the entanglement force due to two minds in the two bodies. The entanglement force can be used to explain any possible movement between the two living bodies otherwise the two bodies will always move toward each other due to the gravitational attraction.

According to Newton's law of universal gravitation (Newton, 1846), the attraction force F_G between two masses of M and m is

$$\boldsymbol{F}_{Gr} = \frac{GMm}{\boldsymbol{r}^2}, \quad (2)$$

where r is the distance between the centers of their masses and G is the gravitational constant. The direction of the force F_{Gr} is along the centers of the mass M and m. As to the psychic force F_E from the entanglement of two minds, its direction and magnitude can be varied by both minds. Of course, there is no method available now to calculate this force and their mechanisms will be explained in the section of "Interpretation".

We can also use other methods, such as Lagrangian mechanics or Hamiltonian mechanics instead of using Newton's second law to derive the governing equation, the results should be the same.

Boundary and Initial Conditions

Basically, if the boundary and initial conditions (including both position and velocity) are known, the trajectory of the mass m can be predicted at any time of t. In this two-body problem case, as a hypothetical isolated system, we do not need to consider its boundary condition, but only its initial conditions.

Since Eq. (1) is a set of second-order partial differential equations, the analytical solution cannot be easily calculated. In the following section, we will discuss various solutions under different special conditions.

Various Special Solutions

In one-dimensional space. For simplicity, let us first consider one-dimensional movement, as shown in Figure 5. The governing equation of Eq. (1) can be simplified as follows:

$$m\ddot{\boldsymbol{x}} = -\frac{GMm}{\boldsymbol{x}^2} + \boldsymbol{F}_E(\boldsymbol{x},t) \quad (3)$$

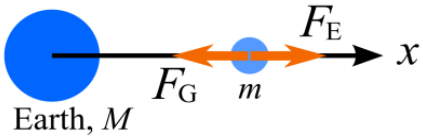

Figure 5. An illustration of the general two-body problem in one-dimensional space.

Case 1: If no psychic force exists, that is, $\boldsymbol{F}_E(\boldsymbol{x},t) = 0$, then the mass m will move toward the earth and finally they will merge together. This trajectory is a line, but its speed will depend on the initial positions x_0 and

velocity v_0. Their position $x(t)$ and velocity $v(t)$ are independent of the mass m, but even in this simple case, no analytical solution can be found.

When the distance between the surfaces of the earth and mass m is negligible when compared to the radius of the earth, then it becomes the free fall motion with a uniform acceleration g that is common in our daily life. There are many practical examples of this case; the mass m could be any object with zero or other initial velocities pointing to or away from the center of the earth, such as an apple falling from the apple tree, or an iron ball falling from the Leaning Tower of Pisa with an initial velocity pointing to the earth center, or a bullet shot towards the sky with a direction away from the earth center.

Case 2: If the psychic force is always counterbalancing the gravitational force, and the initial velocity is in parallel with the force, then $x = x_0 + v_0t$. The mass m will be in uniform motion either toward the earth or away from the earth.

Case 3: If the psychic force is a non-zero positive constant C, then it will approach to the stability point $x^* = \sqrt{GMm/C}$.

In two-dimensional space. In the case of two-dimensional space, as shown in Figure 6, let us use the (r, θ) coordinate system. Then, in the r direction, the equation is similar as Eq. (3).

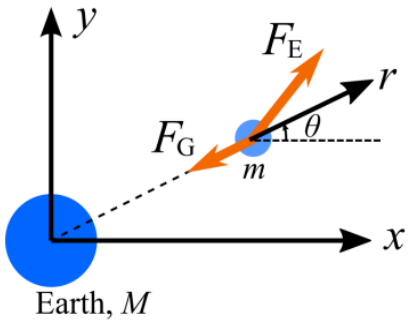

Figure 6. An illustration of the general two-body problem in two-dimensional space.

The most prominent example in this case arises in astronomy for predicting the trajectory (orbit or escape from the orbit) of a body, such as a satellite, planet, or asteroid. As stated in the Introduction, the trajectory of mass m is a conic section (solution to the Kepler problem) when angular momentum is a constant, and the earth is at one of the focal points. With different initial conditions, there could be three types of conic section as the hyperbola, the parabola, and the ellipse, while the circle is a special case of the ellipse.

In the case of the psychic force being the centrifugal force, the mass m will rotate around the earth if the initial velocity is perpendicular to the force. This is the case to explain why some of the man-made satellites with carefully calculated orbits are rotating around the earth in a circular trajectory. But as we know, as a natural satellite of the earth, the moon is rotating around the earth with an elliptical orbit, which is a more common orbit shape. That is because when solving the two-body problem, we assumed it is an isolated system, but in fact it is not. The gravitational force from other planets and stars in the universe as the environment of this system will inevitably have an impact on the system, although it may be very small when compared to the internal force within the system, it is still sufficient to change the shape of its obit from a perfect circle to ellipse. The greater the influence of the environment on the system, the greater the deviation of its orbit from the circle. The most intuitive example is the orbital parameters of different planets in the solar system. As we

know, Jupiter is the largest planet in the solar system, and its gravitational influence is also the largest. As the closest planet to Jupiter, the orbit of Mars around the sun deviates the most from a circle. The man-made satellite that maintains a circular orbit actually requires us human beings to fine-tune its orbital parameters to counteract the influence of the environment.

If the initial velocity v_0 of the mass m is too small to escape the gravitational action of the earth, then the trajectory is a parabola, such as a falling object toward the earth with initial velocity, or an asteroid hitting the earth. Otherwise, if the initial velocity v_0 is large enough, or it is accelerated during the orbiting by either a sudden influence from the environment or the psychic force within the system, then the trajectory of mass m will be a branch of the hyperbola and fly away from the earth. Such examples are very common in asteroid orbits.

In three-dimensional space. The most general case of the two-body problem is a three-dimensional problem, and it is convenient to discuss this problem using a spherical coordinate of (r, θ, ϕ). In the case of psychic force being the centrifugal force, the analytical solution exists, and the mass m is rotating around the earth in a theoretical circular trajectory. However, considering the influence of the environment on the system in the actual situation, such as the moon as mass m, its three-dimensional trajectory around the earth is based on the two-dimensional elliptical orbital plane, and slightly swaying into the third dimensional space.

Interpretation

In Newtonian mechanics, the centrifugal force is an inertial force. Newton's first law states that a body continues in its state of rest, or in uniform motion in a straight line, unless acted upon by a force, which is also called the law of inertia (Newton, 1846). Newton discovered this law but did not explain the cause of inertial.

Some scholars (Haisch, Rueda, & Puthoff, 1994; Haisch & Rueda, 1997; Rueda & Haisch, 1998) claim that inertia should not be understood in the context of gravity theory but a consequence of electromagnetic interactions of the electrical charge of elementary particles with the hypothetical quantum mechanical "zero-point" vacuum fluctuation electromagnetic field. However, Woodward and Mahood (1999) refuted that such claim is untenable since it cannot mimic the universal coupling of gravity and inertia to the stress-energy-momentum (i.e., matter) tensor, and believe that inertial forces are gravitational forces, as the principle of relativity and their universal coupling to mass-energy demand. Meholic (2002) proposed that inertia could be the natural response of space-time to a moving gravitational source, and gravity can exist without inertia, but inertia cannot exist without gravity. So far, there is no unified conclusion.

Based on the ontology of our new general system theory, we propose that the inertia force is caused by mind-body interaction and it is a type of psychic forces. It is neither a form of gravitational force in Newtonian mechanics and relativity theory, nor the "zero-point" vacuum energy in quantum mechanics, but a form of psychic force from entanglement of minds and mind-body interactions. After such interpretation, the applicable scope will be broader. For example, in the two-body motion of the moon orbiting around the earth, which is dominated by gravitational force, it is fine to interpret the inertial force as a certain kind of gravity. However, there are similar two-body orbiting motions in the microscopic world, and a typical example is an electron orbiting around the nucleus. In this case, the electromagnetic force plays a dominant role and the effect of gravity is negligible, but the inertial force still exists, and the expression is the same as that of the moon orbiting the earth. Then, it is obviously inappropriate to use gravity to explain the inertial force at this time; at least it must be explained by a force comparable to the electromagnetic force on the microscopic scale. The

claim of the "zero-point" vacuum energy in quantum mechanics also has similar scale issues. The theory we proposed that the psychic force is the essence of centrifugal force can explain various situations in different scales well.

In addition, our theory can explain more. Many examples on the cosmological scale have already been cited in the section of "Various Special Solutions", so we will not repeat it here. But in fact, since the minds of our human beings and the celestial bodies are not on the same scale, it is relatively difficult for us to understand their minds. If we take an example on the daily scale that we humans are used to, for example, the mass m is a swing fixed to a point on the earth with a certain initial velocity. If we humans as an observer are also standing on the earth near the swing and considering the swing as a lifeless object, that is, the psychic force between the earth and swing is zero, then the solution of its trajectory is a simple pendulum problem, which is easy to solve. However, if it is an individual who is swinging on a swing, then the role of psychic force from mind-body interaction of this person must be considered, and the trajectory of the swing is determined by the human minds. This is why in the section of "Various Special Solutions", we can only give a special solution when the psychic force is zero or when its value is the same as the inertial force, because so far, we do not know how to calculate the psychic force. On the microscopic scale, Bohr used the semi-classical-semi-quantum theory to explain the two-body model of the electron orbiting the nucleus as above mentioned, but he could not explain why the electron in steady orbit does not emit electromagnetic radiation and why an electron will jump between orbits. If it is explained by the psychic force, this problem will not exist. The psychic force can be influenced by all the other matters in the universe in addition to its own mind-body interaction, so the movement of electron in an atom can have many possibilities from the disturbance of the experimenter and it can run steadily on the orbit or jump between orbits. At this time, if there is an observer on the nucleus, then the system is similar to the cosmic two-body system of the earth and moon, except that the dominant force is changed from gravitation to Coulomb's force, which is a real two-body problem. But in reality, the observer is us humans, and obviously we cannot put the apparatus on the nucleus or electron, so it is actually a three-body problem, and the effect of the observer and apparatus cannot be ignored.

In order to explain the action at a distance, the field concept is introduced for each body. For example, if the earth has only two kinds of existence, mass for matter and mind for non-matter, then the earth will generate two fields around it, the gravitational field due to the mass and the psychic field due to the mind-body interaction of the earth. If the moon is located in these two fields of the earth, then it will be subjected to a gravitational force F_G and a psychic force F_E from the earth. Similarly, the earth is also located in the two fields of the moon and thus subjected to another two forces from the moon with the same magnitude but opposite direction. In the past, there is never a clear explanation why the centrifugal force exists between the earth and moon and keeps the moon from rotating around the earth in a predictable trajectory. If we interpret both the earth and moon having minds and thus psychic force exists between these two objects, then the existence of centrifugal force can be attributed to mind-body interaction. The spin movements of the moon and the earth can only be attributed to psychic force since other four types of forces will not induce such types of movement. Of course, the minds of the earth and the moon are very different from the minds of living creatures.

In order to understand the functions of the psychic forces, let us discuss the following three-body problem. On the earth fixed coordinate system, the earth together with the observer and the measurement system is denoted as object A, and there are another two objects B and C on the same ground. In order to simplify the problem, let us build another coordinate system on the ground, and at the initial state, the observer A and B are

both located at the origin while the distance between B and C is L meter. The illustrated figure is shown in Figure 7. If the movements of B and C are confined in the *x* direction, the gravity of these two objects is always balanced by the support force from the ground and these two forces can be ignored. Now let us discuss the following several cases.

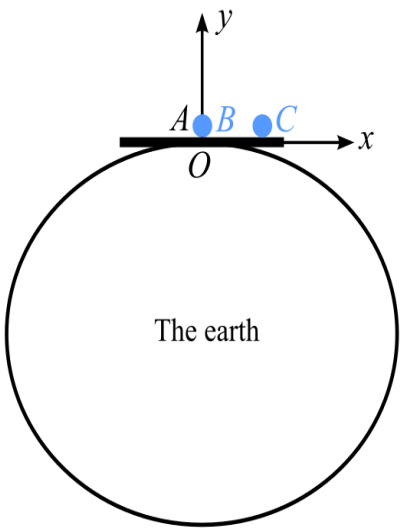

Figure 7. Simplified three-body problem (A is a body including the earth, the observer and apparatus; B and C are two bodies under study).

Case 1: B and C are two lifeless objects; B is pushed by the observer to move and collide with C. Before collision, the initial velocity of B is v_{10}, then after collision, both B and C's movement can be calculated. The action force from B to C, $F_{B\to C}$, can be calculated. This is a typical classical mechanics problem and the psychic force of A to B acts as the initial condition to this system problem.

Case 2: B is a person and C is an object. If B is running to C and hitting the object C with his fist, the hitting force $F_{B\to C}$ can be calculated from the movement of C. This force is generated by the interaction of mind B and body B, and its direction and magnitude can be changed by mind B. Thus even with the same running speed of B at the moment of hitting C, the movement of C could be very different and this influence is attributed to the function of mind B. At the moment, we cannot calculate accurately the force $F_{B\to C}$. That is the difference between B of an object without mind and B of an object with mind.

Case 3: Both B and C are two persons. If B is running to C and hitting the person C with his fist in the same way as in case B, the action force *F* from B to C can also be changed by mind C. For example, when C observes that B is coming towards him and wants to hit him, he moves his position, and thus there could be no force on C from B if he does not let B touch him. If C does not move and prepares his fist against B, then the actual hitting force *F* could be the sum of $F_{B\to C}$ and $F_{C\to B}$. If C does not move and also does not want to hit back, by changing his body shape and his stiffness, the actual force hit on the body of C could also be changed. This is our life experience. With our dualist mind-body model, all the situations can be explained while the materialist mind-body model cannot explain the situations in Cases 2 and 3.

Currently we do not know how to measure the strength or magnitude of psychic force or field, but if we can, the magnitudes of psychic field from minds at different scales will vary a lot, that is, by different orders. Therefore, compared to the mind with stronger psychic field (e.g., human being), the mind with much weaker

psychic field (e.g., a desk) is negligible. Then, we can say, compared to human beings, the desk is a lifeless object. However, if compared to a mind with similar psychic field (e.g., a chair), then the desk and chair are all living objects. Minds at the same or similar levels can communicate with each other through psychic force or field; we call it the entanglement of minds. Of course, much work is needed to solve the issues of how to measure and control the psychic force.

Extension to *N*-Body Problem

If we consider a system of three celestial bodies, such as the earth, the sun, and the moon, we can also construct our coordinate system fixed on the earth, and then the trajectory of the moon and the sun can be predicted. The problem is schematically shown in Figure 8 and described as follows:

$$\begin{cases} m_1\ddot{X}_1 = F_{G10}(x,y,z,t) + F_{G12}(x,y,z,t) + F_{E10}(x,y,z,t) + F_{E12}(x,y,z,t) \\ m_2\ddot{X}_2 = F_{G20}(x,y,z,t) + F_{G21}(x,y,z,t) + F_{E20}(x,y,z,t) + F_{E21}(x,y,z,t) \end{cases} \tag{4}$$

In Eq. (4), all the forces and positions X_1 and X_2 are vectors, while x, y, z, t are scalars.

These are six dimensional partial differential equations and, in general, only numerical solutions can be sought.

Since the classical solutions have been well proved by experiments, the corresponding centrifugal forces can be assumed from the entanglement forces between two bodies. However, if the two bodies are replaced by two animals or two human beings, the psychic forces could be very different. This leaves enough space to explain various phenomena. Of course, how to measure and control the psychic forces is the main challenge for using this ontology. It is our belief that since we specifically study this problem, progress can be achieved. Otherwise, the unification of different theories is very difficult since they are based on different ontologies and concepts.

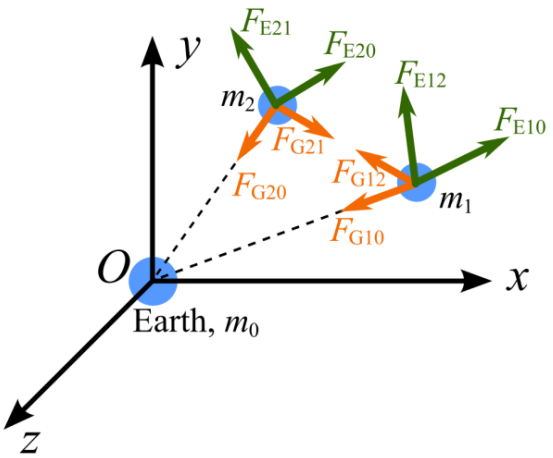

Figure 8. An illustration of the general three-body problem.

Note. Two mass particles on an earth-fixed coordinate system, F_G: gravitational force, F_E: psychic force from the entanglement of two minds.

Summary and Conclusions

The two-body problem is the simplest problem of mechanics from a system point of view and it is very valuable for the understanding of fundamental concepts and models for complex systems. In this paper, the classical description of the two-body problem is re-examined based on our recently proposed new general

system theory and some new discoveries are made. The main conclusions from this research can be summarized as follows:

1. It is found that the current description of the classical two-body problem is inappropriate since the observer and the measurement apparatus have not been explicitly considered. Without considering these, this problem is unrealistic or meaningless, and by considering these, it is actually a three-body problem while only the special case of the Kepler problem is a real two-body problem.

2. Since the observer and the measurement apparatus must be fixed on a massive body, such as the earth, the observer will never know the absolute movement of the platform that hosting the observer, such as the earth. Thus, the movement of any massive body is a relative movement. The absolute rest only exists in our minds. The assumption of the existence of inertial frame used in classical mechanics, quantum mechanics and relativistic theory is actually unrealistic. We should try our best to avoid the use of this assumption in the problem-solving process. With this in mind, considerable changes need to be made to these three mechanics.

3. Currently, the explanations of some new phenomena, such as wave-particle duality, black body radiation, and photoelectric effect are all based on the revision of some fundamental concepts, such as time, space, matter, mass, and energy. By doing this, the original ontology of monist materialism is blurred, and a total of six independent existences (matter, energy, information, dark matter, dark energy, and dark information) have to be introduced in order to explain all the phenomena we have observed. Based on our recently proposed axiom of the relativity of simultaneity, they can be reduced to two: ether and minds.

4. Based on this new ontology of ether and minds, the origin of the world we can observe can be easily explained by giving up the explanation to the origin of the whole universe. This is because all knowledge is also of relative sense and every time a pair of concepts has to be used in order to describe something or define a concept. In order to know something (e.g., the finite space-time of the world), we have to attribute the uncertainty to its concept of compliment (the infinite space-time of the universe). This principle is called general uncertainty principle and every scientific theory should follow that principle. In this new ontology, each force will correspond to an entity. While the known four types of forces (electromagnetic force, gravitational force, strong force and weak force) are caused by matter and passive, a new force caused by mind-body interaction called psychic force is introduced which is active. By introducing this new active force, all the possible movement states in the two-body system or N-body system can be explained within the classical mechanics framework. There is no need to change the meanings of many fundamental concepts, such as time, space, matter, mass, and energy as done in quantum mechanics and relativity theory. Thus, the future research focus should be the proof of the existence of psychic force and how to measure and control the psychic force (Ombre, 2015). Of course, these issues are very challenging. It is our belief that since we study these problems specifically, progress can be achieved similar as many other developed theories. Otherwise, the unification of different theories is very difficult since they are based on different ontologies and concepts. This points out a new direction for the unification of different theories.

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