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Article

From Observer to Agent: On the Unification of Physics and Intelligence Science

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Abstract: Research shows that observers and agents, as key concepts in physics and intelligence science respectively, exhibit profound intrinsic consistency. Based on this understanding, we propose and construct Theory of Universal Intelligent Evolution, known as Omega Theory, which offers an innovative exploration of Theory of Everything (ToE) from the perspective of intelligence science. Within the framework of Omega Theory, this paper unifies the research subjects and dynamic mechanisms of physics and intelligence science, revealing that the intelligence level of the observer is the fundamental source of the differences among classical mechanics, relativity, and quantum mechanics. Furthermore, this paper proposes that core concepts such as subjectivity and objectivity, determinism and uncertainty, as well as time and space, are inherently related to the intelligent state of agents and Universe.Omega Theory consists of three core models: Standard Agent Model, General Model of Agent Evolution, and Intelligent Universe Evolution Model. Standard Agent Model serves as a foundational axiom, defining the unified structure and functional framework of agents, and it is the cornerstone of the theory. Building upon this, we derive General Model of Agent Evolution and Intelligent Universe Evolution Model. Omega Theory posits that the fundamental units of Universe are agents, and that the entire universe is itself an agent. Matter is a special manifestation of agents, and each agent continuously evolves between the states of absolute zero intelligence and omniscience and omnipotence, driven by two intelligent forces that are derived from the theory.To validate this theory, we have designed a thought experiment in the "Experimental Universe 1," where classical mechanics, relativity, and quantum mechanics experiments can be simultaneously conducted. By adjusting the intelligence level of the observer, we observe that different physical theory scenarios emerge in succession as the observer's intelligence level changes.

Keywords: Theory of Everything; Theory of Universal Intelligent Evolution; Omega Theory; Physics; Intelligence Science

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1. Introduction

Since the 21st century, artificial intelligence has rapidly developed, exerting a broad and profound impact on various fields of human society, while also driving intelligence science to become one of the most active areas of scientific research. The history of science and technology shows that when emerging technologies have a significant impact on human society, they often lead to major breakthroughs in scientific fields. As a result, exploring whether advances in intelligence science can lead to new and significant scientific developments has become a highly relevant research topic.

Physics, aimed at revealing the laws of nature, has evolved its main thematic line from classical mechanics through relativity to quantum mechanics [1]. Since the last century, physicists have tirelessly pursued the construction of a Theory of Everything（ToE）, seeking to integrate all natural phenomena and cosmic laws, including intelligence and consciousness, within a unified theoretical

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framework. A key goal has been the unification of classical mechanics, relativity, and quantum mechanics, as well as bringing the four fundamental forces under the same theoretical umbrella [2,3]. Currently, string theory and loop quantum gravity theory represent the primary research directions towards this ToE. However, these theories still face numerous challenges, such as the introduction of additional spatial dimensions and the difficulties associated with experimental verification [4].

The pursuit of a Theory of Everything not only challenges physics and cosmology but also requires interdisciplinary integration across mathematics, life sciences, intelligence science, and philosophy. Our research has revealed that advances in intelligence science offer a critical opportunity for constructing a ToE. This breakthrough is primarily manifested in the continuity and unity between the observer and the agent.

Observers and agents are central concepts in the fields of physics and artificial intelligence. Throughout the development of physics, the role of the observer has evolved from a passive onlooker in classical mechanics to an active observer in relativity, and further to an active participant in quantum mechanics. These major theoretical breakthroughs are closely related to a deeper understanding of the observer's role [5,6]. However, the importance of the observer in physics and its intrinsic mechanisms remain challenging issues, sparking extensive debate [7–9].

The agent is a core concept in the field of Intelligence Science, providing a unified and flexible theoretical framework for various branches of artificial intelligence, allowing it to be applied as a complete system in technology, engineering, and theoretical research [10]. The high degree of characteristic consistency between observers and agents indicates that agents can be seen as an expansion and deepening of the observer concept.

From the perspective of the evolution from observer to agent, the theories concerning agents in Intelligence Science can be viewed as a further theoretical extension and expansion following classical mechanics, relativity, and quantum mechanics. The evolutionary process of these theories is illustrated in Figure 1. This realization prompts us to explore the integration of fundamental principles of Intelligence Science and physics and to undertake interdisciplinary research.

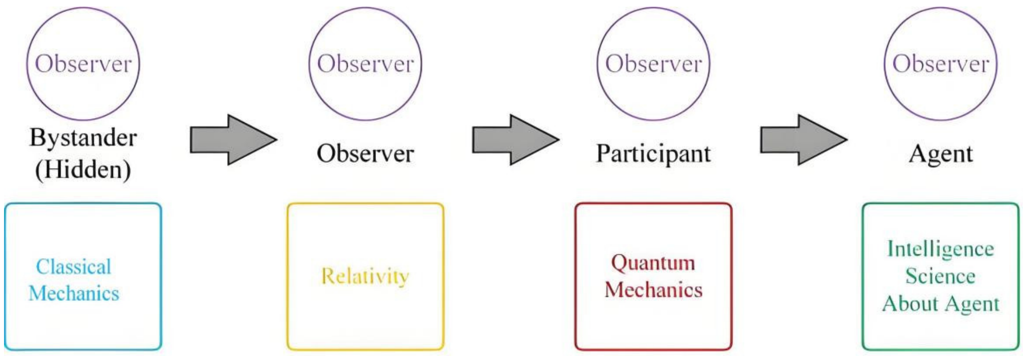

Figure 1. Schematic Diagram of Theoretical Evolution from Observer to Agent.

Unlike in physics where the observer is considered a part of the system under study, in this paper, we focus on the agent as the central object of our research, delving into its structure, functions, and evolutionary dynamics. Throughout this process, we have developed three foundational theoretical models in Intelligence Science.

First, Standard Agent Model provides an axiomatic system that unifies the characteristics of agents, laying the groundwork for all subsequent theoretical frameworks. Second, General Model of Agent Evolution establishes a dynamic framework for the evolution of agents, serving as a theoretical base for studying the fundamental principles of intelligence and consciousness. Lastly, Intelligent Universe Evolution Model constructs a dynamic model of cosmic evolution, used to analyze the origins, evolution, and future states of Universe.

In this paper, we name the theoretical system formed by integrating these three models Theory of Universal Intelligent Evolution, abbreviated as Omega Theory. The construction of the Omega Theory framework not only extends the foundational theories of Intelligence Science but also

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provides an exploratory basis for forming a comprehensive Theory of Everything, as shown in Figure 2.

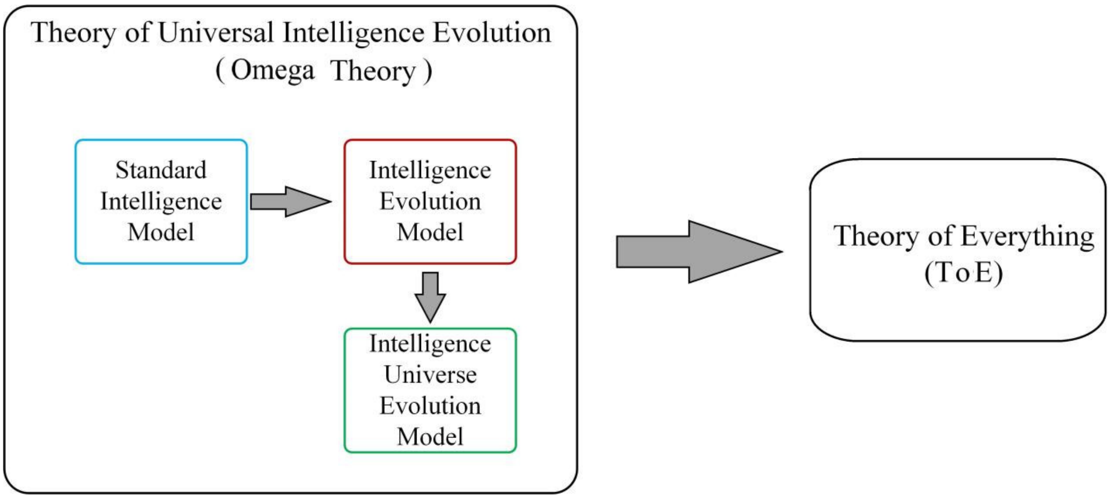

Figure 2. Omega Theory and ToE.

Physics is an extensive field that encompasses, but is not limited to, classical mechanics, relativity, quantum mechanics, thermodynamics, electromagnetism, and condensed matter physics. This paper primarily discusses the unification of classical mechanics, relativity, and quantum mechanics within Omega Theory. We will conduct a detailed analysis of the unification of other physical theories and Intelligence Science in subsequent research papers.

Under the framework of Omega Theory, this paper primarily achieves three substantial results:

1.It demonstrates that observers and research subjects in physics can be classified as types of agents.

2.It proposes that the four fundamental forces of physics have the potential to be unified under the two intelligence forces of Omega Theory.

3.It proves that the differences in the intelligence levels of observers are key to the discrepancies among the three major physical theories: classical mechanics, relativity, and quantum mechanics.

To comprehensively expound on the construction process of Omega Theory and its role in integrating the fundamental theories of physics and Intelligence Science, Chapter One introduces in detail the core concepts of the Standard Agent Model, the General Model of Agent Evolution, and the Intelligent Universe Evolution Model. Additionally, this chapter explains the rationale for naming these models collectively as the Theory of Universal Intelligent Evolution and Omega Theory.

Chapter Two discusses how observers and extensive research subjects in physics are regarded as types of agents under the Omega Theory framework, incorporating them into the Standard Agent Model. Moreover, it explores how the four fundamental forces in physics are integrated into the dynamic framework of Omega Theory, preliminarily demonstrating the consistency of underlying principles between physics and Intelligence Science.

Chapter Three delves into three fundamental issues in physics: the distinction between objective reality and subjective non-reality, the divergence between determinism and indeterminism, and the essence of space and time. These analyses aim to assess the current intelligence state of the Universe and provide a theoretical basis for understanding the differences among the three major physical theories.

Utilizing the framework of Omega Theory and the findings from Chapter Three, Chapter Four compares the characteristics of Universe intelligence as depicted by classical mechanics, relativity, and quantum mechanics with the current state of Universe intelligence, analyzing the fundamental reasons for their differences and limitations, and theoretically proving the unification of these three major physical theories under the Omega Theory framework.

Chapter Five sets up a thought experiment environment named ‘Experimental Universe 1,’ where an observer conducts experiments on classical mechanics’ acceleration, relativistic time dilation and equivalence principle effects, and Schrödinger's Cat in quantum mechanics. This chapter demonstrates that the fundamental reasons for the differences in the three major physical theories are related to the observer's level of intelligence and the intelligence state of the Universe and reveals two new physical phenomena under specific intelligence states.

Chapter Six evaluates and summarizes Omega Theory. It assesses how Omega Theory aligns with the 18 characteristics of a universal theory proposed by the scientific community. The results show that Omega Theory preliminarily meets 11 characteristics, has the potential to meet another four, but does not address the remaining three. Furthermore, this chapter highlights that the two types of intelligence forces or intelligence fields proposed in Omega Theory will be the main focus of future research.

2. Establishment of the Theory of Universal Intelligent Evolution

The Theory of Universal Intelligent Evolution (Omega Theory) is a foundational theoretical research in the field of intelligence science. It comprises three key models: Standard Agent Model, General Model of Agent Evolution, and Intelligent Universe Evolution Model. Together, these models form a comprehensive theoretical framework. The primary goal of this theory is to explore the intrinsic connections between physics and intelligence science, thereby providing a solid theoretical foundation for constructing a comprehensive Theory of Everything.

2.1. Establishment of Standard Agent Model

In the field of intelligence science, agents have become the core of research, influencing the development of key technological areas such as machine learning, natural language processing, robotics, and intelligent decision-making. The concept of agents is of great significance for a deeper understanding of the nature of intelligence and for advancing the applications of artificial intelligence [11].

Currently, there is no unified consensus on the definition of agents. Since 2014, to study the fundamental principles of intelligence and consciousness, we have conducted in-depth research on the functional structures of entities that generate intelligence and consciousness. The von Neumann architecture has received significant attention from us as it provides a unified functional framework for computers and intelligent systems [12]. However, it cannot encompass living systems such as humans.

To address this issue, we conducted an in-depth analysis of the characteristics of different intelligent systems. Based on the Von Neumann architecture, we established the Standard Agent Model as an axiom.

Definition 1: Standard Agent Model

An agent is defined as a system that possesses the capabilities of information (I) input (In), output (Out), storage (St), and creation (Cr), as well as the ability to control (Con) the utilization of these four capabilities.

The mathematical expression of Standard Agent Model is:

$$\boldsymbol{a} = (\boldsymbol{Con_a}; \{\boldsymbol{In_a}(\boldsymbol{I}), \boldsymbol{Out_a}(\boldsymbol{I}), \boldsymbol{St_a}(\boldsymbol{I}), \boldsymbol{Cr_a}(\boldsymbol{I})\})$$

The differences in performance in the field of intelligence among different systems are due to the varying strengths of these five capabilities. The structure of Standard Agent Model is shown in Figure 3 [13].

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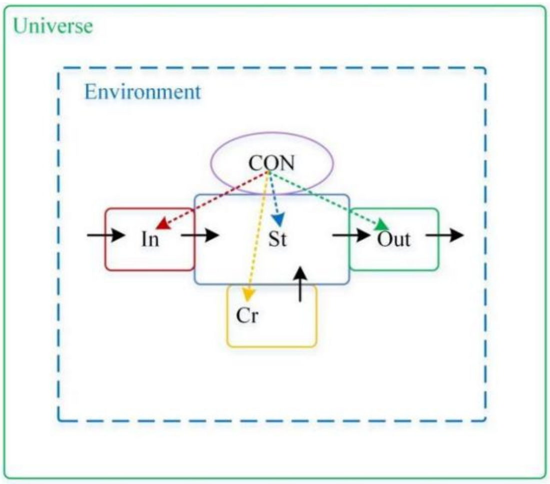

Figure 3. Structure of Standard Agent Model.

In this paper, information is the core concept, and the five fundamental capabilities of an intelligent agent-input, output, storage, creation, and control-work synergistically to process information, forming the basis of the theory of intelligence and consciousness. Information is a multidimensional and interdisciplinary concept. In physics and information theory, it is defined as a quantifiable measure of uncertainty reduction, abstracted as a sequence of bits (bit) [14], which serves as the fundamental unit of computation and communication.

In philosophy and cognitive science, there are two perspectives: the first posits that information is subjectively constructed by cognitive agents through experience and interaction [15,16], and the second attempts to unify the objective and subjective properties of information, as seen in the theories of Fred Dretske [17] and Karl Popper [18]. This paper adopts the view that information is subjectively constructed.

In the DIKW model, data, information, knowledge, and wisdom represent different levels and forms of information processing. Data refers to raw symbols or facts that have not yet been processed; information is meaningful data that has been processed and organized; knowledge is structured information formed through the analysis, understanding, and integration of information; wisdom reflects the decision-making and judgment abilities exhibited by living systems in their application of information [19]. This hierarchical structure of information serves as the foundation for the subjective non-reality of agents.

In computer science, bits are the fundamental units for data storage and transmission, applied across various interdisciplinary fields such as bioinformatics with DNA sequence data [20] and quantum computing with the concept of qubits [21]. Therefore, this paper chooses bits as the fundamental unit for measuring the amount of information.

In summary, we posit that in objective reality, matter is the fundamental constituent element with a dimension of mass and a unit of kilograms (kg). Correspondingly, information is the fundamental constituent element of the agent's subjective non-physical reality, with a dimension of information quantity (I) and a unit of bits (bit).

The explanations of the relevant concepts in the mathematical formula of Standard Agent Model are as follows:

I represents the amount of information that an agent can process or contain. Let a denote an agent, and the amount of information that agent aa can process or contain is represented by I_a. U denotes Universe, and the amount of information that Universe can process or contain is represented by I_u. E_a denotes the environment of agent a, and the amount of information contained in E_a is represented by I_{Ea}.

The input capacity , $In_a(I)$ represents the maximum amount of information that agent a can identify and acquire from Universe or environment E_a per unit time. The range of values for $In_a(I)$

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is $\mathrm{In_a}\ in\ [0,\infty]$. Let x represent the material or system of the objective world, and let f be the recognition function used to convert the characteristics and states of X into information I. The mathematical expression for the input capacity is given by:

$$\mathrm{In_a}\,(\mathrm{I}) = Max_T \sum_{i=1}^{N} f\,(X_i)$$

The output capacity, $\mathrm{Out_a(I)}$ represents the maximum amount of information that agent aa can output and transmit per unit time. The output information reflects the impact and changes on the characteristics and states of various component systems in the environment. The range of values for $\mathrm{Out_a(I)}$is $\mathrm{Out_a}\ in\ [0,\infty]$. Let g be the output function that converts the output actions of the agent into changes in the characteristics and states of the material or system X in the objective world. This change can be represented by the amount of information I . Thus, the mathematical expression for the output capacity is:

$$\mathrm{Out_a(I)} = \mathrm{Max_T} \sum_{\mathrm{i}=1}^{\mathrm{N}} \mathrm{g\,(X_i)}$$

The creation capacity,$\mathrm{Cr_a(I)}$ represents the maximum amount of new information that agent \(a \) can generate based on stored information per unit time. The range of values for $\mathrm{Cr_a(I)}$ is $\mathrm{Cr_a(I)}$ in $[0,\infty]$. Let $\mathrm{I_{stored}}$ denote the amount of information already stored by the agent. Within a unit time (T) , the agent can generate new information based on these stored data. The emergence process of this new information can be represented by the creation function h. Thus, the mathematical expression for the creation capacity is:

$$\mathrm{Cr_a(I)} = \mathrm{Max_T}(h(\mathrm{I_{stored}}))$$

The storage capacity$\mathrm{St_a(I)}$ represents the maximum amount of information that agent a can store in a unit of time based on input information, newly created information, and already stored information. The range of values for $\mathrm{St_a(I)}$ is $\mathrm{St_a}$ in $[0,\infty]$. Let $\mathrm{I_{input}(T)}$ denote the amount of information input into agent a in a unit of time, and $\mathrm{I_{stored}(T)}$ denote the amount of information stored by agent a in a unit of time. $\mathrm{I_{stored}(T)}$ represents the amount of information already stored by agent a in a unit of time, and $\mathrm{I_{creation}(T)}$ represents the new information created and emerged by agent a in a unit of time. The storage process can be represented by the storage function j. Thus, the mathematical expression for the storage capacity is:

$$\mathrm{St_a(I)} = \mathrm{Max_T(j(I_{input}(T) + I_{stored}(T) + I_{creation}(T)))}$$

The control capacity $\mathrm{Con_a}$ represents the ability of an agent to maximize the coordinated use of input capacity output capacity, storage capacity, and creation capacity within a unit of time to achieve any given goal. Coordinated use includes selecting capacities, adjusting strengths, combining, and dividing tasks to achieve the goal in the most optimal way. The range of values for $\mathrm{Con_a}$ is $\mathrm{Con_a}$ in $[0,\infty]$.

The control function K is defined as:

$$\mathrm{K(In\,(T), Out\,(T), St\,(T), Cr(T))} = \alpha\mathrm{In\,(T)} + \beta\mathrm{Out(T)} + \gamma\mathrm{St(T)} + \delta\mathrm{Cr(T)}$$

where $\alpha,\beta,\gamma,\delta$ are weighting parameters used to adjust the contribution of each capacity in the control function. Thus, the mathematical description of the control capacity is:

$$\begin{aligned}\mathrm{Con_a} &= \mathrm{Max_T(K(In_a(I), Out_a(I), St_a(I), Cr_a(I)))} \\ &= \mathrm{Max_T}(\alpha\mathrm{In\,(T)} + \beta\mathrm{Out(T)} + \gamma\mathrm{St(T)} + \delta\mathrm{Cr(T)})\end{aligned}$$

Compared to the traditional von Neumann architecture, Standard Agent Model introduces two significant improvements: firstly, it integrates computing and storage functions into dynamic storage units, achieving a unified design for storage and computation; secondly, it adds a Information creation module, designed to demonstrate the innovation and invention capabilities exhibited by humans and other organisms in adapting to and transforming their environment.

As the axiomatic foundation of the Theory of Universal Intelligent Evolution (Omega Theory), the five essential capabilities of Standard Agent Model logically form a minimal and self-consistent closed loop for Information processing. Agents achieve the internal and external conversion and flow of Information through their input and output capabilities; dynamic accumulation of Information through their storage capability; generation and emergence of internal Information through their

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creation capability; and adjustment of the magnitude of these four Information processing capabilities based on environmental changes and their own needs through their control capability.

Within the framework of Standard Agent Model, various specific intelligent functions can be regarded as part of or combinations of the five essential capabilities. For instance, image and text recognition reflect the Information input capability; robotic arm movements and speech output are applications of the Information output capability; memory and forgetting belong to the Information storage capability; Pattern discovery and reasoning fall under the Information creation capability; and learning ability is a combination of the Information input and storage capabilities.

Based on the differences in the five essential capabilities, agents can be classified into three major types (see Table 1). This classification not only supports the establishment of the Agent Evolution Dynamics Model and the Intelligent Universe Dynamics Model but also plays a crucial role in exploring the intrinsic consistency between the principles of physics and intelligence science.

Table 1. Three Types of Agents Based on Essential Capabilities.

Type Name	Mathematical Description
Absolute Zero Agent	$In_a = Out_a = St_a = Cr_a = Con_a = 0$
Finite Agent	$0 < In_a < 1$ or $0 < Out_a < 1$ or $0 < St_a < 1$ or $0 < Cr_a < 1$ or $0 < Con_a < 1$ （1 Represents ∞）
Omniscient and Omnipotent Agent	$I_a = O_a = S_a = C_a = Con_a = 1$， （1 Represents ∞）

In nature, entities such as rocks, iron blocks, biological remains, and discarded robots have all five essential capabilities at zero. They cannot interact with the environment, store Information, or create Information, thus exhibiting a non-active state of intelligence. Systems or agents in this state are defined as Absolute Zero Agents, abbreviated as α Point using the first letter of the Greek alphabet.

Although there is no solid empirical evidence supporting the existence of omniscient and omnipotent intelligent systems, religious texts often describe "God" as an omnipotent and omniscient being [22]. The concept of Laplace's demon introduced in classical mechanics also embodies these characteristics [23]. Both are characterized by having all five essential capabilities at infinity. Such idealized systems are defined as Omniscient and Omnipotent Agents, abbreviated as Ω Point using the last letter of the Greek alphabet, a naming convention that aligns with the similar concept proposed by the French thinker Teilhard de Chardin [24].

Living humans, animals, plants, and functional intelligent machines or programs all exhibit active intelligence characteristics. These systems are neither in a state of death or obsolescence nor omniscient and omnipotent, meaning their five essential capabilities are neither all zero nor all infinite. Therefore, we define this type of system or agent as Finite Agents, abbreviated as FA.

2.2. Establishment of General Model of Agent Evolution

Based on the different values of the five essential capabilities in Standard Agent Model, two extreme states of agents can be deduced: Absolute Zero Agent, i.e., α Point, and Omniscient and Omnipotent Agent, i.e., Ω Point. These two states define the boundary limits of agent evolution. Theoretically, the evolution of agents towards these two extreme states relies on specific dynamic mechanisms. Accordingly, we introduce two types of intelligence forces to elucidate the dynamics of agent evolution.

The first is α Gravity (f_α), a force that promotes the evolution of agents towards α Point, causing their five essential capabilities to gradually diminish to zero. The second is Ω Gravity ($\boldsymbol{f_\Omega}$), a force that drives agents towards Ω Point, continuously enhancing their five essential capabilities to infinity. These two forces exhibit opposing characteristics.

Based on the above research, we have constructed the General Model of Agent Evolution.

Definition 2: General Model of Agent Evolution

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Any agent undergoes dynamic evolution between α Point and Ω Point, driven by the combined influence of α Gravity and Ω Gravity.

The numerical description of General Model of Agent Evolution is as follows:

$$\begin{cases} a \to \alpha\ point & if\ f_\alpha > f_\Omega \\ a \to \Omega\ point & if\ f_\alpha < f_\Omega \\ a \to a & if\ f_\alpha = f_\Omega \end{cases}$$

a represents an agent，The above mathematical expressions can be simplified as:

$$\alpha\ \text{point} \xleftarrow{f_\alpha} a \xrightarrow{f_\Omega} \Omega\ \text{point}$$

This model provides a dynamic framework for the evolution of agents, as shown in Figure 4. Due to the similarity of General Model of Agent Evolution to the flight trajectory of an aircraft in the illustration, and inspired by the principles of flight, we have constructed the basic theoretical framework of intelligence and consciousness. Therefore, this model is also referred to as the “Flight Model of Intelligence and consciousness.”

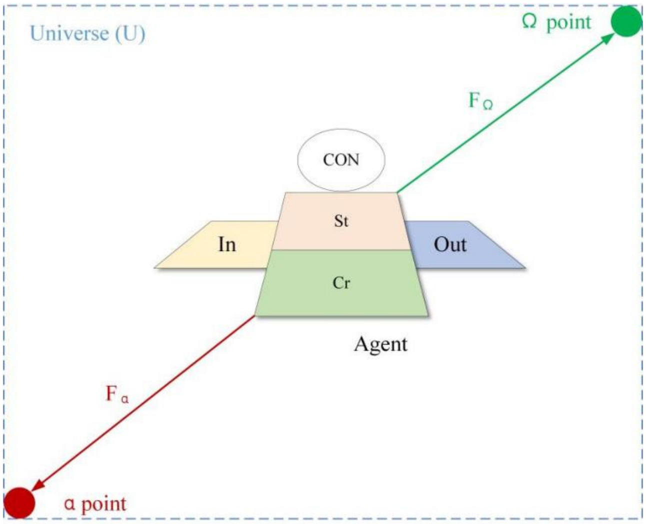

Figure 4. Schematic Diagram of General Model of Agent Evolution.

Nature showcases numerous instances of agents evolving towards either Ω Point or α Point. For example, human beings have significantly enhanced their Information processing capabilities over the course of their long evolutionary history, especially in the past few centuries, which has markedly accelerated their evolution towards Ω Point [25]. Conversely, dinosaurs, unable to adapt to environmental changes, became extinct approximately 66 million years ago, reaching the evolutionary endpoint of α Point [26]. Pandas, being on the brink of extinction, are gradually approaching α Point [27]. Sharks, on the other hand, have shown minimal changes in their intelligence processing capabilities over hundreds of millions of years, maintaining a relatively stable evolutionary state between α Point and Ω Point. [28]

The academic community has extensively studied the fundamental principles of intelligence and consciousness, proposing various definitions and constructing frameworks for understanding these two concepts from different perspectives [29,30]. Existing theories elucidate the mechanisms and neural bases of intelligence and consciousness from different angles, yet they still exhibit significant limitations. These limitations have led to discrepancies among definitions, hindering the formation of a systematic theoretical framework for intelligence and consciousness.

Inspired by the principles of flight, and based on General Model of Agent Evolution, we propose that intelligence is the agent’s ability to evolve towards Ω Point or α Point under the influence of Ω Gravity and α Gravity, utilizing five essential capabilities. According to the different characteristics of these five capabilities, the first four are defined as basic Intelligence, while the control capability is defined as Higher-Order Intelligence.

By analyzing the connotations of consciousness in medicine and daily life, we propose that consciousness is equivalent to the control function, which is the agent's ability to control its use of basic Intelligence. Depending on the different subjects of control, consciousness can be further divided into self-consciousness, other-consciousness, mix consciousness, and unconsciousness. Here, the "self" is an internal Information set formed by the agent's cognition of itself, while the "other" is an internal Information set formed by the agent's cognition of another agent. By combining self and other with the control capability in different forms, we define the four types of consciousness [31], as shown in Figure 5.

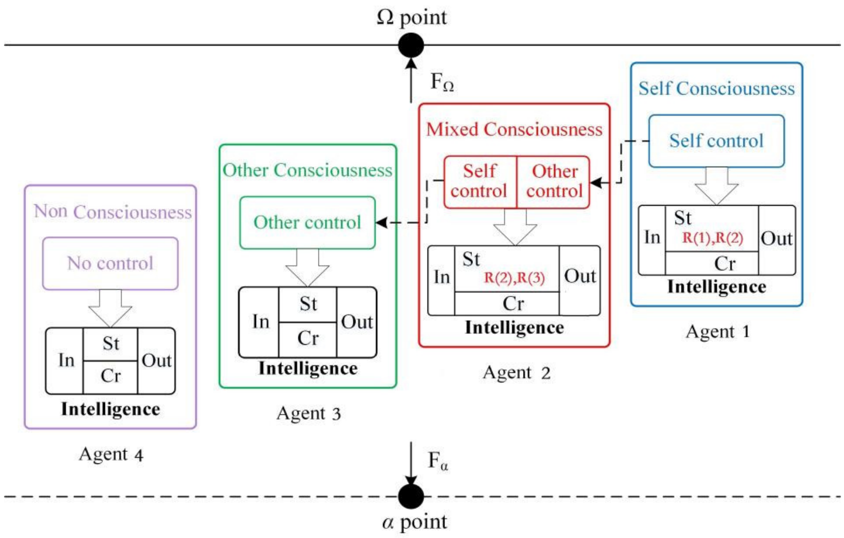

Figure 5. Agents with Four Types of Consciousness.

2.3. Establishing Intelligent Universe Evolution Model

From the perspective of physics and astronomy, Universe is the sum of all matter and energy, including galaxies, stars, planets, black holes, and all other celestial bodies, as well as light and other forms of radiation, elementary particles, and fields of weak interactions. These components and forces together form the framework through which we understand the structure and evolution of Universe [32]. Notably, the Big Bang theory posits that Universe expanded from an initial state of extremely high temperature and density about 13.8 billion years ago to Universe we observe today [33].

Based on General Model of Agent Evolution, we can propose three inferences about Universe from the perspective of intelligent evolution:

1.If a system or agent evolves to the Ω Point, its range of existence will theoretically expand to encompass the entire Universe, transforming Universe into a unified omniscient and omnipotent agent in essence.

2.If all systems or agents in Universe evolve to the α Point, Universe will converge into an absolute zero intelligence state, existing in absolute nothingness, at which point Universe itself would cease to exist.

3.When at least one finite agent exists in Universe, Universe is considered a combination of finite agents and absolute zero intelligence, essentially a finite agent.

Based on the aforementioned hypotheses, Universe can be seen as an agent that dynamically evolves under the influence of Ω Gravity and α Gravity. This conclusion also indicates that Ω Gravity and α Gravity act extensively throughout Universe, which can be regarded as universally existing fields in Universe, named the Ω Field and α Field, respectively. Within this theoretical framework, Ω Gravity and α Gravity can be seen as the force effects of the Ω Field and α Field on different types of agents.

Therefore, we have constructed Intelligent Universe Evolution Model, as shown in Figure 6.
Definition 3: Intelligent Universe Evolution Model

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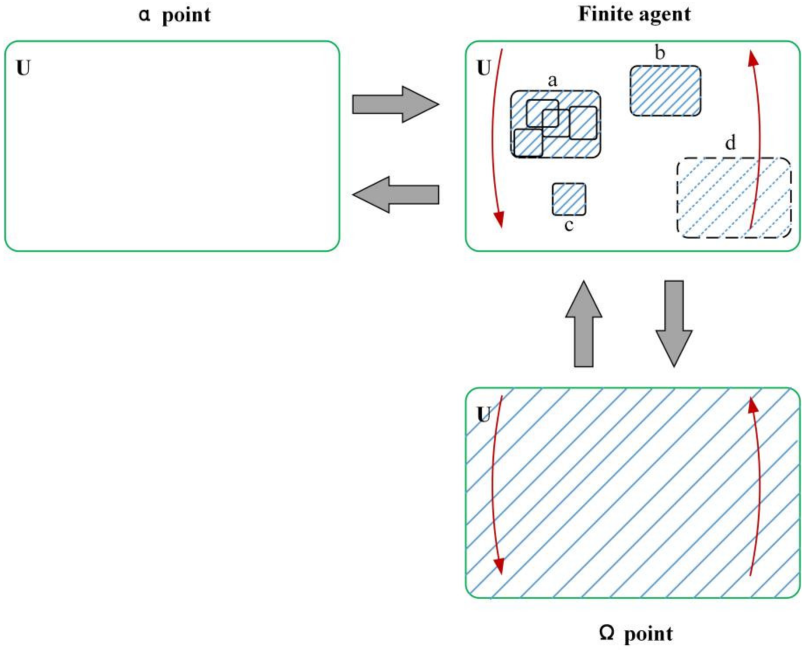

Figure 6. Three Typical States of Intelligent Universe Evolution.

Universe is an agent that continuously evolves among three states—Absolute Zero Agent, Finite Agent, and Omniscient Omnipotent Agent—under the combined influence of Ω Field and α Field.

To quantify the direction of intelligent evolution of Universe under the influence of these two fields, we introduce a core quantitative tool: the Global Potential Difference($\boldsymbol{V_{global}}$). This tool is defined by the following formula:

$$V_{global} = \int_U (V_{Field\ \Omega}(q) - V_{Field\ \alpha}(q))\, q$$

Where $V_{Field\ \Omega}(q)$ and $V_{Field\ \alpha}(q)$ represent the potential energies at each position q in Universe, generated by "Field Ω" and "Field α," respectively. The direction of Universe's evolution follows these rules:

$$\begin{cases} U \to \Omega\ Point\ if\ V_{global} > 0, Universe\ evolves\ towards\ \Omega\ Point\ dominated\ by\ Field\ \Omega \\ U \to \alpha\ Point\ if\ V_{global} < 0, Universe\ evolves\ towards\ \alpha\ Point\ dominated\ by\ Field\ \alpha \\ U \to U\ if\ V_{global} = 0, Universe\ reaches\ a\ dynamic\ equilibrium\ with\ no\ clear\ tendency \end{cases}$$

Note:Under the condition where $V_{global} > 0$, this indicates that across the entire Universe, the potential contribution of Field Ω surpasses that of Field α, causing Universe to tend towards Ω Point state dominated by Field Ω. Conversely, when $V_{global} < 0$, Universe tends towards α Point state dominated by Field α, as this indicates that the potential contribution of Field α is predominant throughout Universe. When $V_{global} = 0$, it signifies that the potential contributions of Field α and Field Ω are balanced overall, leading to a state of dynamic equilibrium. In this state, although there may be minor fluctuations in local regions, on a macroscopic scale, Universe maintains balance without favoring any dominant state.

The mathematical expression of the aforementioned Intelligent Universe Evolution Model can also be simplified as:

$$\boldsymbol{\alpha\ point} \xleftarrow{\textbf{Field}\ \boldsymbol{\alpha}} \boldsymbol{U} \xrightarrow{\textbf{Field}\ \boldsymbol{\Omega}} \boldsymbol{\Omega\ point}$$

Intelligent Universe Evolution Model provides a new framework for exploring the origin, evolutionary process, and dynamic characteristics of Universe. According to this model, agents are the fundamental units that constitute Universe. When Universe is at α Point, it represents an absolute "void," containing no elements and not even Universe itself. When Universe is at Ω Point, it becomes a singular omniscient and omnipotent agent.

When Universe is in a finite agent state, it consists of finite agents and absolute zero agents. Different types of agents can form systems of various scales through mechanisms such as combination, nesting, and linking, ranging from the microscopic level close to α Point to the macroscopic level close to Ω Point. This leads to the diversity and complexity of Universe. Inanimate objects or matter can be considered a special state of agents (absolute zero agents).

2.4. Proposal of Theory of Universal Intelligent Evolution

In the aforementioned research, we have constructed three interrelated theoretical models in the field of intelligent science. "Standard Agent Model" defines a set of axioms and fundamental assumptions for agents, "General Model of Agent Evolution" provides a framework for the dynamics of agent evolution, and "Intelligent Universe Evolution Model" offers a dynamic description of Universe evolving as an agent. Their mathematical expression is as follows:

$$\begin{cases} \text{Standard Agent Model: } Agent\ a = (Con_a; \{In_a(I), Out_a(I), St_a(I), Cr_a(I)\}) \\ \text{General Model of Agent Evolution: } \alpha_{point} \xleftarrow[Field\ \alpha]{f\alpha} a \xrightarrow[Field\ \Omega]{f\Omega} \Omega_{point} \\ \text{Intelligent Universe Evolution Model: } \alpha_{point} \longleftarrow U \longrightarrow \Omega_{point} \end{cases}$$

We refer to these three interrelated models collectively as the "Theory of Universal Intelligent Evolution." When any agent successfully evolves to Ω Point, Universe transforms into a unified, omniscient, and omnipotent agent capable of controlling and guiding all changes within it. Thus, we also refer to the "Theory of Universal Intelligent Evolution" as Omega Theory.

The core proposition of Omega Theory asserts that the fundamental units of Universe are agents, with matter being a special form of agents. Every agent evolves under the influence of both α Gravity and Ω Gravity, transitioning between an absolute zero intelligence state (α Point) and an omniscient, omnipotent intelligence state (Ω Point). Universe itself can be regarded as a dynamically evolving agent, continuously progressing between these two extremes.

3. Analysis of the Consistency of Intrinsic Mechanisms between Physics and Intelligent Science

This chapter aims to explore the intrinsic consistency between physics and intelligent science by conducting a comparative analysis of the research subjects and dynamic principles in both fields. Through this examination, we seek to uncover the fundamental mechanisms that link these two disciplines and provide a unified understanding of their underlying dynamics.

3.1. Exploration of the Consistency between the Intrinsic Mechanisms of Observers and Agents

As physics has developed, the role of the observer has gradually become central to research, reflecting the deepening exploration in physics. Traditionally, classical physics implicitly assumed the observer to be an omniscient bystander, as exemplified by the concept of Laplace's demon. This concept posited that if the observer knew all the initial conditions and physical laws of Universe, any state of Universe could be predicted at any time. However, it did not explicitly address the observer's intervention in the system, thereby maintaining the absoluteness and universality of physical laws [34].

In the 20th century, relativity theory first highlighted the importance of the observer in theoretical construction, revealing that the relativity of time, space, and the properties of matter depends on the observer's frame of reference [35]. Through the principles of the constancy of the speed of light and equivalence, relativity set limits on the capabilities of observers, while still preserving the determinism of physical laws [36].

Quantum mechanics further emphasized the centrality of the observer. Through the introduction of the "observer effect" via wave function collapse, as well as the uncertainty principle and complementarity principle, which limit the observer's capabilities, quantum mechanics demonstrated the impact of measurement on the system's state and the limitations on predicting future states [37,38].

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Current research in physics tends to deepen the understanding of the functions and structures of observers, going beyond their traditional roles in information reception and measurement [39]. However, the issue of the relationship between the observer and physics remains unresolved [40]. Based on the intelligent characteristics of observers in the different physical theories mentioned above, If analyzed within Standard Agent Model, these observers can be regarded as a type of agent, as shown in Table 2

Table 2. Analysis of Observer's Agent Types.

Physics Observer	Agent Type
Classical Mechanics Observer	An omniscient agent：In classical mechanics, the observer is implicitly considered an omniscient agent, capable of fully comprehending all the information within the observed system. However, classical mechanics assumes that the observer's role is passive, meaning the observer does not influence the system's operation in any way.
Relativity Observer	A hybrid of an omniscient agent and a finite agent. According to the deterministic viewpoint of relativity, if the observer knows all the initial conditions and physical laws of a system, they can theoretically predict its future state. Additionally, within the framework of relativity, the observer does not affect the system's evolution. The constancy of the speed of light limits the observer's information input to within the speed of light. Moreover, the equivalence principle states that, in a local reference frame (such as inside an elevator), the observer cannot distinguish between the effects of gravity and acceleration through any experiment.
Quantum Mechanics Observer	A finite agent. Based on the uncertainty principle, the complementarity principle, and the fact that the act of observation influences the observed system, the observer in quantum mechanics can be characterized as a finite agent.

3.2. the Consistency between the Research Objects of Physics and the Intrinsic Mechanisms of Agents

The scope of physics research is extremely broad, covering everything from microscopic particles (such as quarks, neutrinos, and atoms) to macroscopic objects (such as pendulums, bridges, and spacecraft), as well as astronomical systems (such as the Sun, the Milky Way, and black holes) and Universe itself [41]. Most research objects consist of non-living matter, lacking the ability to process information and knowledge [42]. According to Standard Agent Model, these systems or objects can be defined as "absolute zero agents."

In the 20th century, computing systems, including computers, communication systems, and quantum computers, became part of physics research, demonstrating data and information processing capabilities [43,44]. From the perspective of Standard Agent Model, such systems can be regarded as finite agents lacking self-consciousness.

Although physics mainly does not focus on living systems, experimental scenarios often involve humans, animals, plants, or microorganisms, such as "people on a train," "twin brothers," and "Schrödinger's cat" [45]. According to Standard Agent Model, these living systems can be classified as finite agents with self-consciousness.

In theoretical physics discussions, concepts such as "God," "Laplace's demon," and extraterrestrial life are frequently mentioned [46]. "God" is usually considered omniscient and omnipotent in religious interpretations, "Laplace's demon" reflects omniscience and omnipotence in

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thought experiments in physics, and extraterrestrial life is theoretically considered to have the ability to process information and autonomously adapt to environments but does not exist on Earth [47]. According to Standard Agent Model, "God" and "Laplace's demon" can be regarded as omniscient and omnipotent agents, while extraterrestrial life is considered finite agents with consciousness that do not reside on Earth.

In cosmology, dark matter is regarded as a phenomenon requiring further exploration. Dark matter is a form of matter not directly observed but inferred to exist through its gravitational effects on visible matter, radiation, and the structure of Universe [48]. Analyzed through Standard Agent Model, dark matter can be seen as agents that humans cannot directly observe but whose existence is indirectly inferred through gravitational effects. It could be absolute zero agents or finite agents.

The final concept to be explored is Universe itself. Based on Intelligent Universe Evolution Model, Universe has been deduced to be a dynamically evolving agent. The above analysis indicates that the research objects in physics, from the perspective of Information processing capabilities, can be regarded as a type of agent (it does not cover research objects related to forces and fields, which will be discussed later), as shown in Table 3.

Table 3. Relationship Between Physics Research Objects and Agents.

No.	Research Object	Type of Agent
1	Universe	Dynamically evolving agent
2	"God", Laplace's demon	Omniscient and omnipotent agent
3	Humans, animals, plants, microorganisms, extraterrestrial life	Finite agents with self-consciousness
4	Computers, measuring instruments, AI systems, quantum computers, communication devices, robots	Finite agents with other-consciousness
5	Quarks, neutrinos, atoms, molecules, pendulums, bridges, spacecraft, stars, the Milky Way, black holes	Absolute zero agents
6	Dark matter	Absolute zero agents or finite agents that cannot be directly observed by humans but can only be inferred through gravitational effects

From the perspective of Omega Theory, the research objects in physics and related fields can all be incorporated into the framework of Standard Agent Model and regarded as a type of agent. This achieves a unification of the research objects across intelligent science, physics, cosmology, sociology, zoology, botany, microbiology, and religious philosophy, as shown in Figure 7.

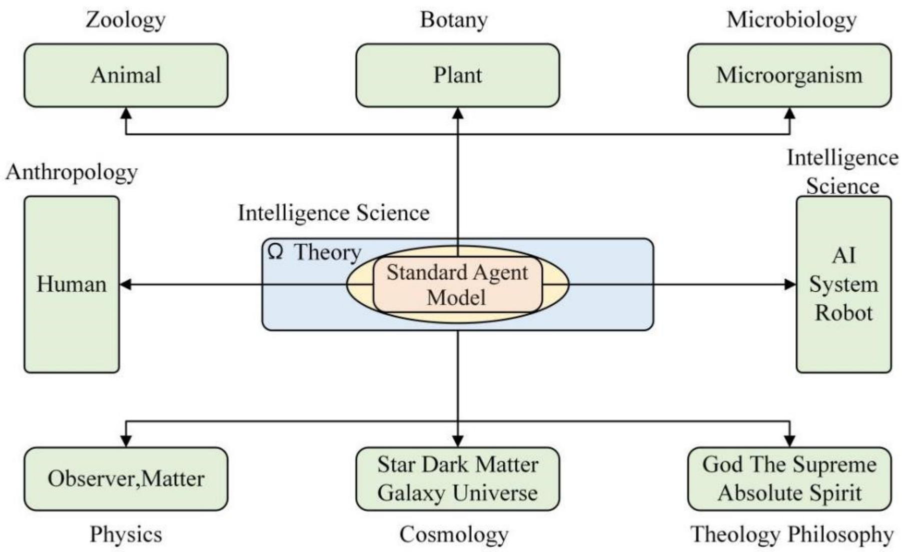

Figure 7. Unification of Research Subjects in Intelligence Science and Other Disciplines.

3.3. Unification of Forces in Physics and Intelligent Evolution Dynamics

In physics, four fundamental forces determine the interactions of matter in Universe: the strong interaction, the weak interaction, electromagnetism, and gravity [49]. These forces are associated with specific fields: the strong interaction with the gluon field, the weak interaction with the W and Z boson fields, electromagnetism with the electromagnetic field, and gravity with the gravitational field [50].

Except for gravity, the other three forces have been unified within the framework of quantum field theory in physics [51]. However, incorporating gravity into quantum field theory to achieve a complete unification of all four fundamental forces remains a significant challenge in physics [52].

Omega Theory deduces two new intelligent forces: α Gravity and Ω Gravity, which are associated with the α Field and Ω Field, respectively, driving agents towards the α Point or Ω Point. Based on the previous analysis, the research objects in physics can all be regarded as agents. Therefore, it can be reasonably deduced that they should first exhibit the effects of α Gravity and Ω Gravity. This logic suggests that the four fundamental forces in physics may be special manifestations of α Gravity and Ω Gravity in the physical domain.

Furthermore, different disciplines such as zoology, botany, microbiology, sociology, and religious philosophy reveal their own dynamic mechanisms, such as Darwin's natural selection in evolutionary theory [53], the "invisible hand" in socio-economic theory [54], human needs driving artificial intelligence [55], and the prime mover in philosophy and religion [56]. Although these dynamic mechanisms vary across fields, they can all be seen as acting on agents. Therefore, we can regard these diverse dynamics as specific manifestations of α Gravity and Ω Gravity in their respective domains. Figure 8 illustrates the possible intrinsic relationships among them.

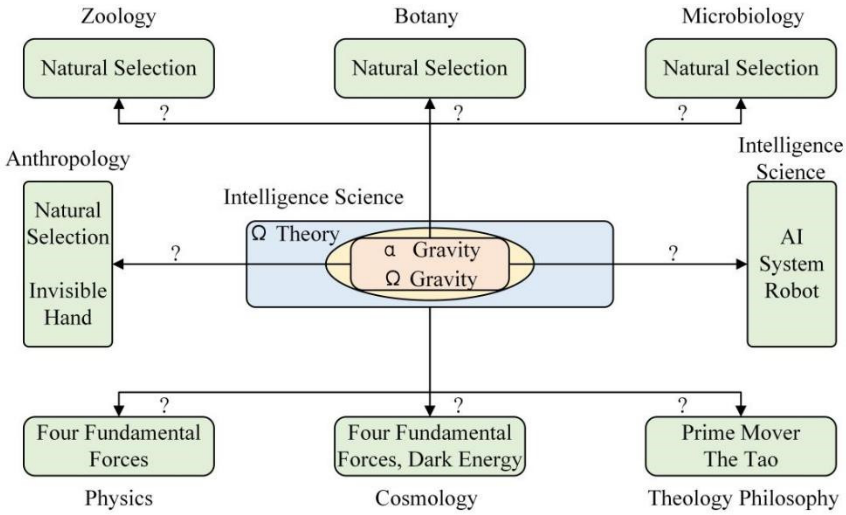

Figure 8. Unification of Dynamic Mechanisms in Intelligence Science and Other Disciplines.

In Omega Theory, Ω Gravity and *α* Gravity are core inferences. By analyzing the evolutionary processes of organisms such as humans, dinosaurs, pandas, and sharks over hundreds of millions of years, preliminary evidence of the existence of Ω Gravity and *α* Gravity in nature has been revealed. However, the origins and characteristics of these two forces are still in the early stages of research. The relationship between various forces in physics and related fields and these two intelligent forces requires further theoretical research and experimental validation. Therefore, in Figure 9, we have marked this relationship with a question mark to emphasize its exploratory nature.

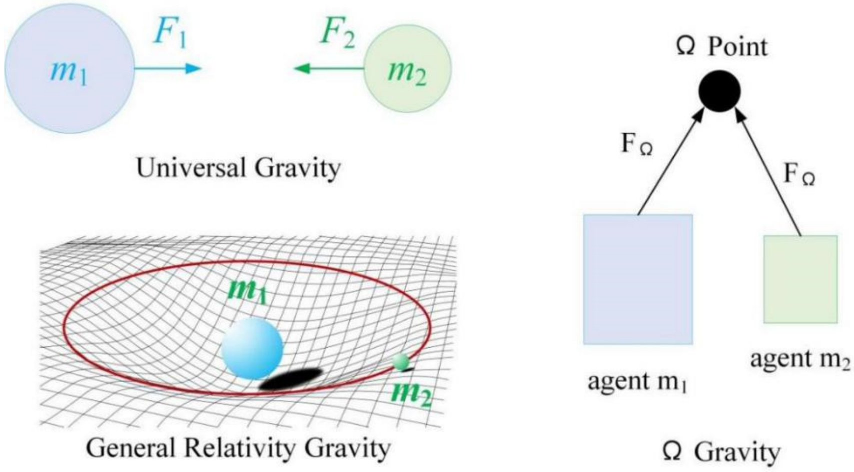

Figure 9. Illustrations of Universal Gravitation, General Relativity Gravity, and Ω Gravity.

Gravity, as a fundamental force in physics, is particularly worth studying in relation to Ω Gravity. Gravity describes the mutual attraction between objects with mass, and its theoretical foundation differs in classical mechanics and relativity. In classical mechanics, Newton's law of universal gravitation describes gravity as an instantaneous force acting between masses [57]. In relativity, gravity is viewed as the curvature effect of spacetime geometry, where massive objects cause spacetime to bend, and the change in spacetime geometry determines the trajectories of objects [58].

In Omega Theory, Ω Gravity is seen as the force driving the connection and integration between agents in Universe, pushing agents towards higher states of intelligence. Based on this, we hypothesize that there may be a close intrinsic link between gravity in physics and Ω Gravity. Exploring this connection in depth could provide a new perspective on understanding fundamental

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forces in Universe. The verification of this hypothesis will depend on further advancements in theoretical and experimental research. Figure 9 illustrates universal gravitation, general relativity gravity, and Ω Gravity.

4. Analysis of Fundamental Scientific Concepts Based on Omega Theory

In physics, The distinction between objective reality and subjective non-reality, the divergence between certainty and uncertainty, and the origins of time and space have long been core challenges in the field. Various interpretations of these issues have contributed to the diversity of physical theories. In this chapter, we will analyze these fundamental problems through the lens of Omega Theory and provide exploratory answers, laying the groundwork for the unified analysis of three major physical theories: classical mechanics, relativity, and quantum mechanics.

In Omega Theory, Intelligent Universe Evolution Model demonstrates three states of universal intelligence: α Point, finite agents, and Ω Point. This model provides an analytical framework for addressing the aforementioned fundamental physical problems. At the α Point, Universe is perceived as absolute "nothingness," where these fundamental problems and their solutions do not exist. It is only when Universe evolves to the stage of finite agents that the substantial background of these fundamental issues becomes apparent, providing a basis for theoretical analysis. As Universe further evolves to Ω Point, its characteristics of wholeness,unity,omniscience and omnipotence offer new perspectives for solving these fundamental problems.

4.1. Analysis of the Origins of "Objective Reality" and "Subjective Non-Reality"

"Objective reality" is typically defined as entities or phenomena that exist independently of the observer's cognition and perception [59]. In contrast, "subjective non-reality" refers to concepts and phenomena that depend on subjective experience, cultural constructs, or personal interpretation [60]. In modern physics, the involvement of the observer not only influences the outcomes of physical experiments but also blurs the traditional boundary between "objective reality" and "subjective non-reality" to some extent [61]. This blurring of boundaries caused by observer influence has sparked significant debate and in-depth research on the nature of reality in the field of physics [62].

In the formula of Standard Agent Model, there are two components with distinct properties. the functional structure of agent a, abbreviated as $\mathrm{STR_a}$, and the Information processed by agent a through its functional structure, denoted as I_a.

Regarding "objective reality" and "subjective non-reality," this section delves into three main aspects.

First, the existence of both is related to the intelligent state of the agent (including the universe). When the agent is at α Point, neither exists; when at Ω Point, "objective reality" merges into "subjective non-reality." It is only when the agent evolves into a finite agent that both "objective reality" and "subjective non-reality" can simultaneously exist.

Second, both concepts are relative to the existence of the agent. "Objective reality" is equivalent to the environment composed of all the functional structures of agents(STR_a) that the agent can perceive and influence, while "subjective non-reality" is equivalent to the Information set（I_a） formed by the agent through its four essential capabilities.

Third, the analysis of the two can be approached from both "Cosmic Global Perspective" and "Internal Perspective of Agent".

4.1.1. Analysis of Objective Reality and Subjective Non-Reality in the α Point State

When agent a is in the α Point state, which represents an absolute zero intelligence agent, Universe appears as absolute "emptiness" to it. In this state, the concepts of "objective reality" and "subjective non-reality" do not hold for agent a. If Universe itself converges to the α Point, meaning Universe is in a state of absolute "emptiness," then Universe itself also ceases to exist. In this scenario, "objective reality" and "subjective non-reality" cannot exist, as illustrated in Figure 10.

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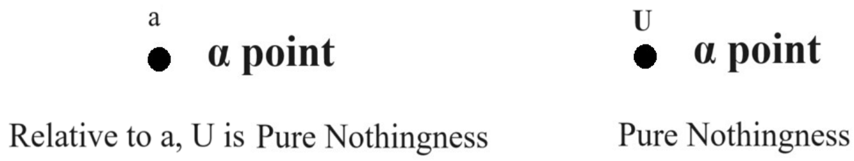

Figure 10. Schematic diagram of "objective reality" and "subjective non-reality" at α Point.

4.1.2. Analysis of "Objective Reality" and "Subjective Non-Reality" in the State of Finite Agents

As Universe evolves from the α Point to the state of finite agents, "objective reality" and "subjective non-reality" also emerge alongside the appearance of finite agents. The fact that humans and other organisms, as finite agents, are capable of generating and distinguishing these two concepts demonstrates that, in the state of finite agents, agents (including the Universe) can simultaneously encompass both "objective reality" and "subjective non-reality." Before exploring the relationship between "objective reality" and "subjective non-reality" in the state of finite agents, we must first establish two fundamental premises:

The first fundamental premise is that for an absolute zero intelligence agent, although Universe appears as absolute "emptiness" to it, other finite agents can still perceive the structural functions of the absolute zero intelligence agent. As illustrated in Figure 11, this can be evidenced by the fact that humans (as finite agents) can perceive inorganic objects such as minerals and metal blocks, which are absolute zero intelligence agents.

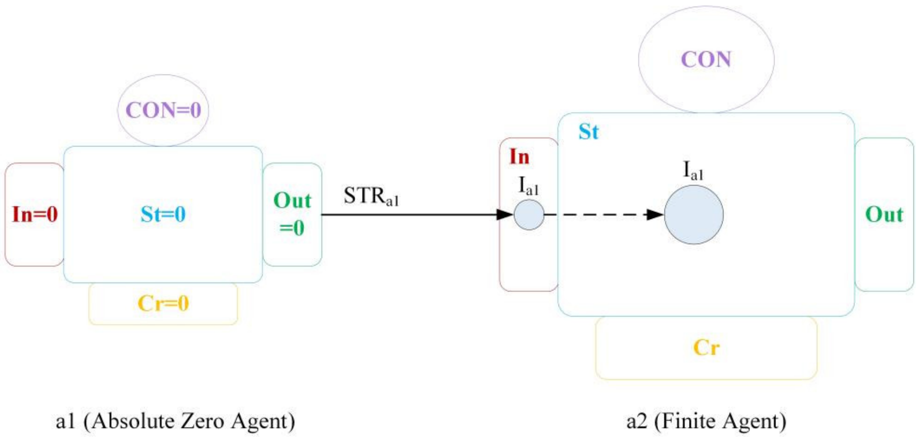

Figure 11. Diagram of finite agents perceiving an absolute zero intelligence agent.

The second fundamental premise is that in a scenario where multiple finite agents coexist, they must be separated by absolute zero intelligence agents. Without this separation, these finite agents would essentially be the same finite agent. Therefore, finite agents can only perceive each other's functional structures and cannot directly perceive each other's Information sets ($\boldsymbol{I_a}$), as shown in Figure 12. Finite agents can only indirectly perceive the existence of each other's Information sets by observing their impacts on the surrounding intelligent structures.

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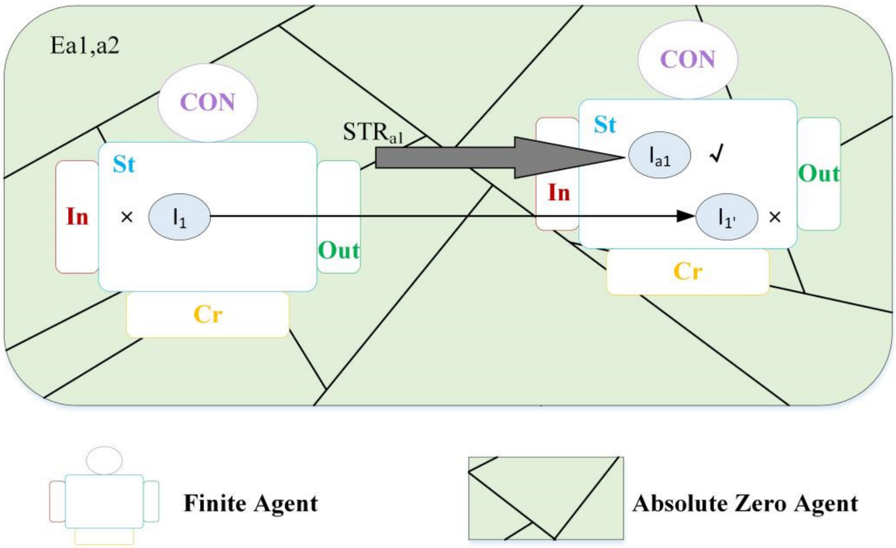

Figure 12. Diagram of finite agents indirectly perceiving Information sets.

First, we analyze the generation process of "objective reality." For any finite agent a, since it has not evolved into an omniscient and omnipotent agent, there must be boundaries in its capabilities and functional structures. Its input function In_a and output function Out_a operate at these boundaries. In_a is responsible for converting the structures of perceivable agents a(STR_a) into I_a; while Out_a is responsible for converting I_a into the impact on the structure of agent an (STR_a), thereby forming STR'_a. Thus, all the agent structures that agent a can perceive and influence constitute the "objective reality" of agent a, as shown in Figure 13.

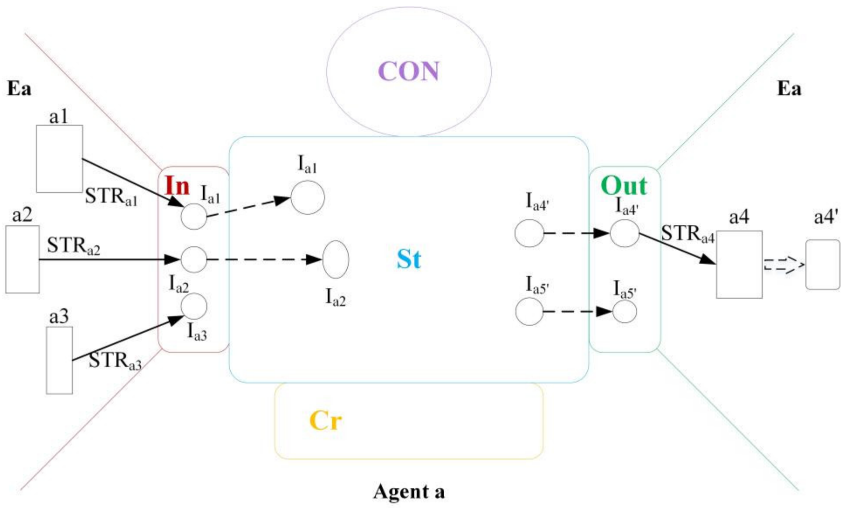

Figure 13. The Generation Process of Agent a's "Objective Reality".

All agent structures that a finite agent a can perceive and influence are generally referred to as a's external objective environment, denoted as E_a. According to the existing connotation of "objective reality," the external objective environment E_a of agent a is equivalent to the "objective reality" of agent a. Based on Omega Theory, the definition of "objective reality" is formed as follows:

"Objective reality" refers to the sum of all functional structures of agents that any finite agent a can perceive and influence through its input and output functions, denoted as $Objective\ Reality_a$. This is also generally referred to as the external environment E_a of the agent. "Objective reality" has a relativity based on the agent; if multiple agents have common elements in their respective "objective realities," then those agents share a common "objective reality."

Assuming that the entire intelligent structure perceived by the finite agent a through its input function is denoted as $STR_{a(In)}$, and the intelligent structure influenced by its output function is

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denoted as $STR_{a(out)}$, which together constitute the external objective environment$E_a$of the limited agent a, the following equation can be derived:

$$Objective\ Reality_a = STR_{a(In)} \cup STR_{a(out)} = E_a$$

If n finite agents a1,a2,…,an share common elements in their objective realities, then:

$$Objective\ Reality_{a1,a2..an} = Objective\ Reality_{a1} \cap Objective\ Reality_{a2} .. \cap Objective\ Reality_{an} \neq \emptyset$$ ◎

$Objective\ Reality_{a1,a2..an}$ constitutes the shared objective reality of the finite agents a1,a2,…,an.

Then, we use the information processing interaction between agent a and the external objective environment agents a1 and a2 as an example to analyze the process of generating "subjective non-reality," as illustrated in Figure 14. This process is divided into four steps：

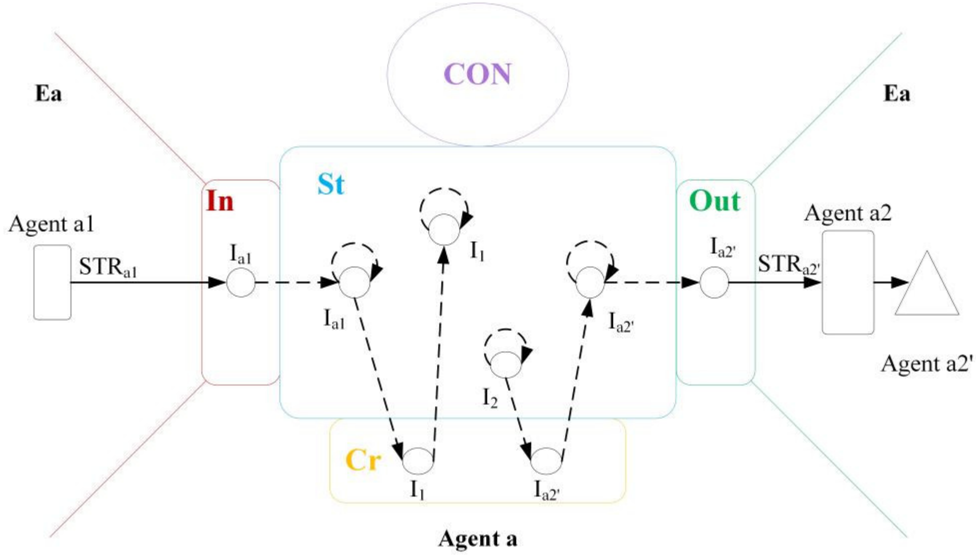

Figure 14. The Generation Process of Agent a's "Subjective Non-Reality".

The first step is that finite agent a, through its input function, converts agent a1 functional structure STR_{a1} from the external objective environment into the Input Information set $I_{a1(In)}$. This Information $I_{a1(In)}$ is then stored in the stored Information set $I_{a1(st)}$ via the storage function St_a.

The second step is that finite agent a, according to its needs, generates an innovative Information set $I_{1(cr)}$ based on $I_{a1(st)}$ through the creation function Cr_a. This $I_{1(cr)}$is also stored in the stored Information set as $I_{1(st)}$.

The third step involves the finite agent a generating the output information set $I_{2'(out)}$ based on the stored information set $I_{2(St)}$.This Information $I_{2'(out)}$ is then converted agent a2 functional structure STR_{a2} into agent a2' via the output function Out_a, thereby affecting or transforming the external objective environment.

The fourth step is that finite agent a, through its storage function, repeatedly and dynamically stores the Information $I_{a(St)}$ that has already been stored in the stored Information set. The dynamic storage process leads to forgetting due to the loss of Information elements.

The Information sets formed through the above four steps collectively constitute the Information set I_a of agent a. According to the connotation of subjective non-reality, I_a is also the "subjective non-reality" of agent a, as shown in Figure 14. Based on Omega Theory, the following definition is formed:

"Subjective non-reality" is the Information set I_a formed by any finite agent a through its input, output, storage, and creation functions, denoted as $Subjective\ Unreality_a$. "Subjective non-reality" has relativity based on the agent.

$$Subjective\ NonReality_a = I_a = I_{a(In)} \cup I_{a(St)} \cup I_{a(Cr)} \cup I_{a(Out)}$$

According to the second fundamental premise of Omega Theory regarding "objective reality" and "subjective non-reality," if the Information sets I_{a1}、$I_{a2}..I_{an}$ of finite agents a1,a2,…,an contain common Information elements, they cannot directly form a shared "subjective non-reality." It can

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only be formed indirectly through other agent functional structures STR in the "objective reality," denoted as:

$Subjective\ NonReality_{a1,a2..am}{=}I_{a1}{\cap}I_{a2}..\cap I_{an}\ \neq \emptyset\ (indirect)$

In discussing the composition of objective reality, the scientific and philosophical communities typically use the term "matter" [63,64]. However, there is no unified terminology for the composition of subjective non-reality. Relevant descriptions involve concepts such as consciousness, phenomena, thoughts, and cognition. These terms either easily lead to conceptual confusion (e.g., "consciousness") [65] or have not gained widespread consensus (e.g., "phenomena," "thoughts," "cognition") [66,67], creating difficulties in finding a unified term for data, information, and knowledge in this context. Therefore, we have chosen "Information" as a temporary unified term.

To address this, we propose the term "virtuality" as the fundamental construct corresponding to "matter" in objective reality. In the realm of subjective non-reality, data, information, and knowledge are considered different manifestations of "virtuality" under varying conditions. As shown in Figure 15, how data, information, and knowledge transform as "virtuality" under different conditions will be discussed in detail in future research.

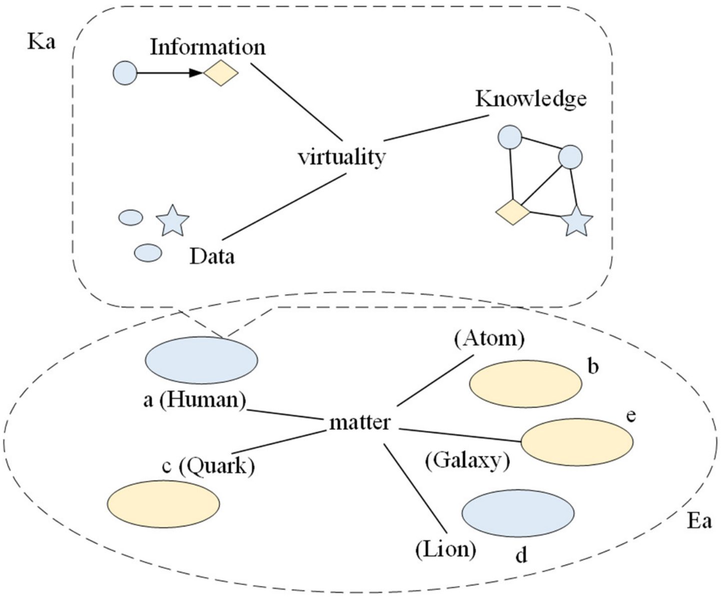

Figure 15. Different Manifestations of Matter and Virtuality.

4.1.3. Analysis of "Objective Reality" and "Subjective Non-Reality" at Ω Point

When any agent a reaches Ω Point, it merges with the entire universe, which evolves into a unified, omniscient and omnipotent agent without any distinction between internal and external.as shown in Figure 16. In this state, the boundary between "objective reality" and "subjective non-reality" disappears, and the two become unified. Furthermore, because Universe in the Ω Point state has no "external," the concept of "objective reality" loses its foundation. Universe is essentially incorporated into the subjective non-reality domain of Omniscient and Omnipotent Agent.

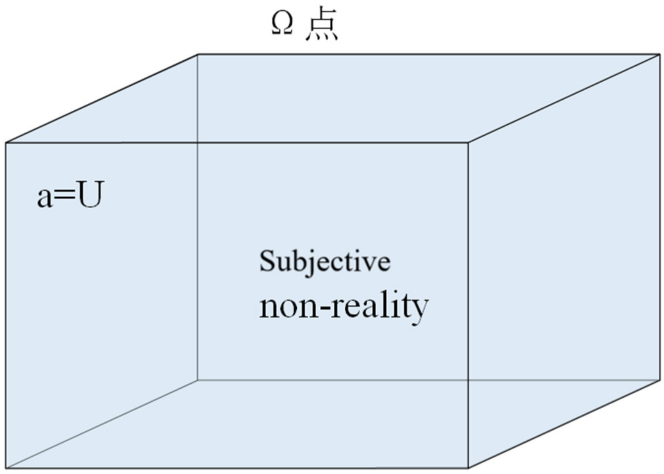

Figure 16. The Fusion of "Objective Reality" and "Subjective Non-Reality" at Ω Point.

4.1.4. Two Perspectives on Analyzing "Objective Reality" and "Subjective Non-Reality"

Based on the previous discussion, it can be concluded that the distinction between "objective reality" and "subjective non-reality" only becomes apparent when the agent is in a state of finite intelligence. In practical applications, humans, as finite agents, use two different perspectives to analyze these concepts.

The first perspective is the cosmic macro perspective, where human observers assume they are outside Universe, observing the evolution, movement, and Information interaction processes of agents within Universe. From this perspective, one can observe how "subjective non-reality" emerges in the functional structures of agents as absolute zero intelligence agents evolve into finite agents. Conversely, when finite agents regress to absolute zero intelligence agents, "subjective non-reality" disappears from their functional structures. When an agent evolves into omniscient and omnipotent agent (Ω Point), human observers can see how objective reality and subjective non-reality merge. Thus, from the cosmic macro perspective, "objective reality" precedes "subjective non-reality," indicating that "objective reality" is the foundation for the generation of "subjective non-reality." Figure 17 illustrates this cosmic macro perspective.

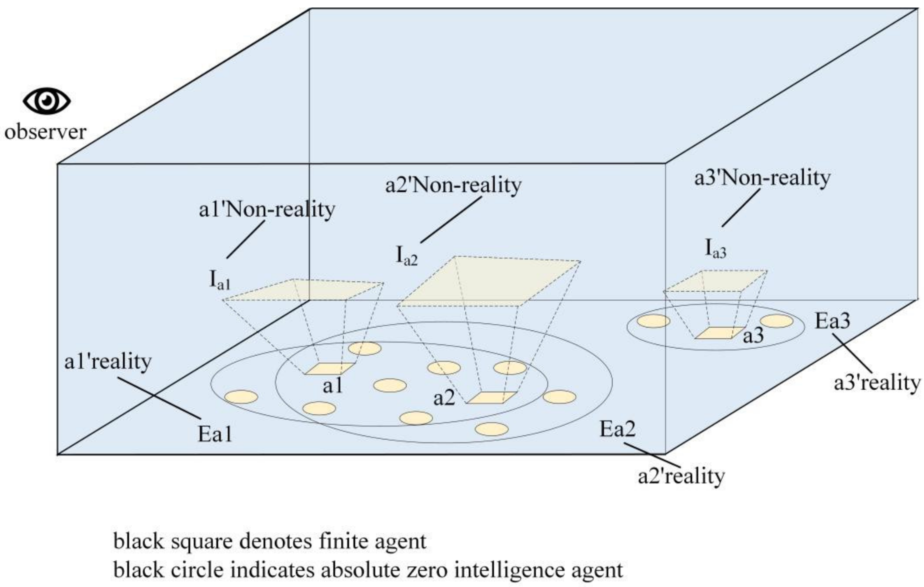

Figure 17. "Objective Reality" and "Subjective Non-Reality" from the Cosmic Macro Perspective.

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From this perspective, for a finite agent a, objective reality is composed of the entire set of functional structures of agent that it can perceive and influence.

$Objective\ Reality_a = STR_{a(In)} \cup STR_{a(out)} = E_a$

In contrast, subjective non-reality consists of the information set generated by the finite agent a through its input, output, storage, and creation functions:

$$Subjective\ NonReality_a = I_a = I_{a(In)} \cup I_{a(St)} \cup I_{a(Cr)} \cup I_{a(Out)}$$

The second perspective is the internal perspective of the agent, where human observers take the standpoint from within the agent itself, relying on the agent's Information input-output mechanisms, such as vision, hearing, and touch, to perceive the external world. All material elements of the external world need to be transformed into internal Information (virtuality) elements to be perceived and recognized by the observer. When human observers actively close their input-output channels, the external world temporarily disappears for that agent. From this perspective, humans often conclude that "subjective non-reality" comes first, constructing and defining "objective reality." Figure 18 illustrates this internal perspective of the agent.

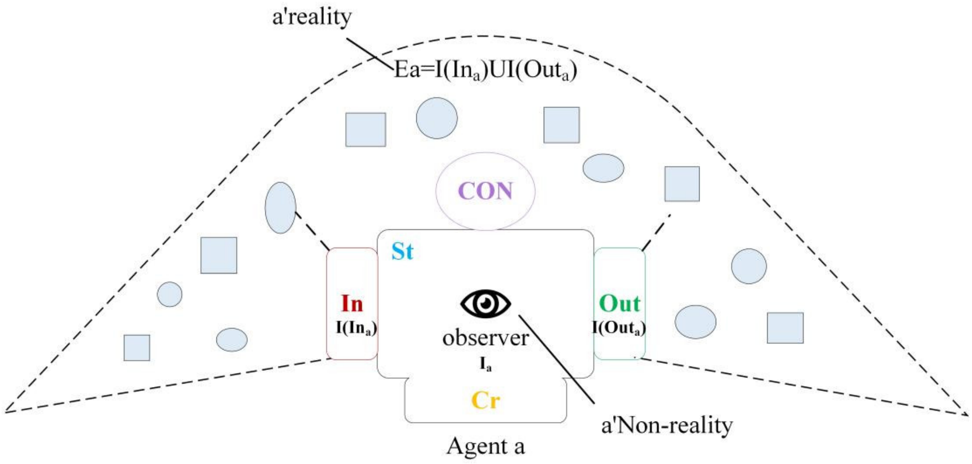

Figure 18. Conceptual Framework of "Objective Reality" and "Subjective Non-Reality" from the Internal Perspective of the Agent.

From this perspective, for a finite agent a, objective reality is composed of the information set generated through its input and output functions.

$\text{Objective Reality}_a = I_{a(In)} \cup I_{a(Out)} = E_a$

In contrast, subjective non-reality consists of the information set generated by the finite agent a through its input, output, storage, and creation functions:

$$Subjective\ NonReality_a = I_{a(In)} \cup I_{a(St)} \cup I_{a(Cr)} \cup I_{a(Out)} = I_a$$

Therefore, from the internal perspective of the agent, objective reality is a subset of subjective non-reality.

The difference between the internal perspective of an agent and the cosmic macro perspective forms the core of the divergence between "objective reality" and "subjective non-reality." Humans and any finite agents are incapable of truly observing Universe from a cosmic macro perspective outside of Universe, nor can they perceive the external world detached from their own Information input-output mechanisms. Therefore, the internal perspective of an agent is the direct and fundamental viewpoint for humans and other finite agents, while the cosmic macro perspective is an expanded and indirect method of understanding. This indicates that the cosmic macro perspective actually originates from the internal perspective of the agent, meaning "objective reality" is deduced and created from "subjective non-reality."(see Figure 19).

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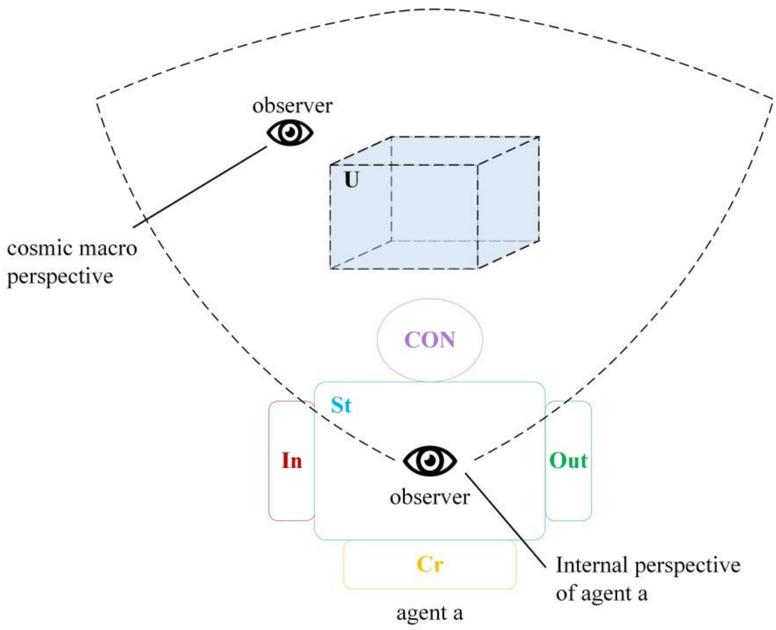

Figure 19. Relationship between "the Cosmic Macro Perspective "and "the Internal Perspective of the Agent".

However, this conclusion does not imply that "objective reality" is a subjective fabrication by finite agents. According to the analysis of the four essential capabilities in Standard Agent Model, the Information produced by finite agents through input-output mechanisms significantly differs from Information formed through creative and storage mechanisms in terms of controllability, boundary definition, and source characteristics. This difference will persist until the agent evolves to the Ω Point. Therefore, for finite agents, "objective reality" is an objective existence deduced through "subjective non-reality," not merely fabricated by "subjective non-reality."

As agents evolve to a state of omniscience and omnipotence, "objective reality" will merge with "subjective non-reality." This conclusion is logically consistent with the relationship under finite intelligence states, where "objective reality" is derived and created from "subjective non-reality."

4.2. Analysis of the Origins of Certainty and Uncertainty

In physics research, certainty and uncertainty are two fundamental and opposing concepts [68]. Certainty involves the ability to precisely predict or explain the outcomes of events based on known initial conditions and laws [69]. In contrast, uncertainty indicates that even with known initial conditions, the outcomes of events still have multiple possibilities [70]. The exploration of whether Universe strictly adheres to the principle of certainty or if fundamental uncertainty exists has been a central topic in both physics and philosophy [71]. This exploration profoundly influences the interpretation of different physical theories and the construction of methodologies, carrying significant implications for scientific methodology and its philosophical foundations [72].

From the perspective of Omega Theory, certainty and uncertainty are viewed as concepts relative to agents (including Universe). Certainty describes an agent's ability to comprehensively understand and control its environment or Universe using its intelligence. Conversely, uncertainty arises from the limitations of an agent's capabilities, preventing it from fully understanding or mastering the changes in its environment or the entirety of Universe. As the state of intelligence of an agent changes, the characteristics of certainty and uncertainty also exhibit different features, as detailed in Table 4.

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Table 4. Analysis of Certainty and Uncertainty under Different States of Intelligence.

State of Intelligence	Certainty	Uncertainty
α Point	None	None
Finite Agent	Relative Certainty	Absolute Uncertainty
Ω Point	Absolute Certainty	None

4.2.1. Analysis of Certainty and Uncertainty in α Point State

When agent a is in the α Point state, Universe is absolutely "empty" relative to it. Therefore, for agent a, neither certainty nor uncertainty exists. When Universe is in the α Point state, it is also in an absolute "empty" state, meaning Universe itself does not exist. Thus, for Universe in the α Point state, neither certainty nor uncertainty exists either, as illustrated in Figure 20.

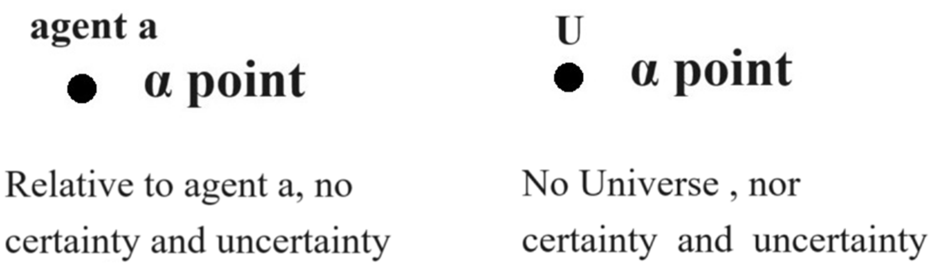

Figure 20. Certainty and Uncertainty at α Point.

4.2.2. Analysis of Certainty and Uncertainty in the Ω Point State

When the universe evolves to the Ω Point state, it becomes an omniscient and omnipotent intelligent entity. In this state, we infer that the universe has complete cognition and control over all its internal elements. This means not only that it can precisely predict or explain the development trajectory of anything, but also that it can create and modify the progress of things according to its own will. Therefore, when the universe is in the Ω Point state, as a unique agent, it exhibits strict and absolute certainty, with no uncertainty present (unless self-imposed by the universe). We term this absolute certainty as "Absolute Certainty," as shown in Figure 21.

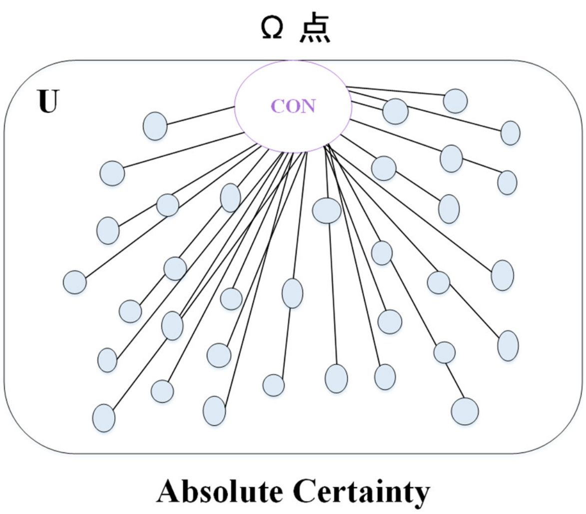

Figure 21. Certainty and Uncertainty in Ω Point State of Universe.

4.2.3. Analysis of "Certainty" and "Uncertainty" in the State of Finite Agents

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As Universe evolves from the α Point state to the state of finite agents, certainty and uncertainty emerge alongside the appearance of finite agents. This is because any finite agent, due to the limitations of its five essential capabilities, cannot fully comprehend the existence or detailed composition of other agents in Universe, nor can it entirely influence or alter other agents according to its will. Until they evolve to Ω Point, these finite agents will remain in a state of uncertainty.

In Universe composed of finite agents and entities with absolute zero intelligence, no part can achieve absolute certainty, making uncertainty a significant characteristic of such a state. This pervasive uncertainty within Universe is referred to as "Absolute Uncertainty."

When multiple finite agents exist in Universe in the state of finite agents, they possess different levels of intelligence due to variations in their five essential capabilities. In the same environment, agents with higher levels of intelligence have greater cognitive and control abilities relative to their surroundings. Although Universe as a whole is in a state of absolute uncertainty, these finite agents can create a certain degree of certainty within their local environments. However, this certainty is not fixed; changes in the environment may alter the agents' cognitive and control abilities. This unstable certainty observed in the local environments of finite agents is termed "Relative Certainty," as illustrated in Figure 22.

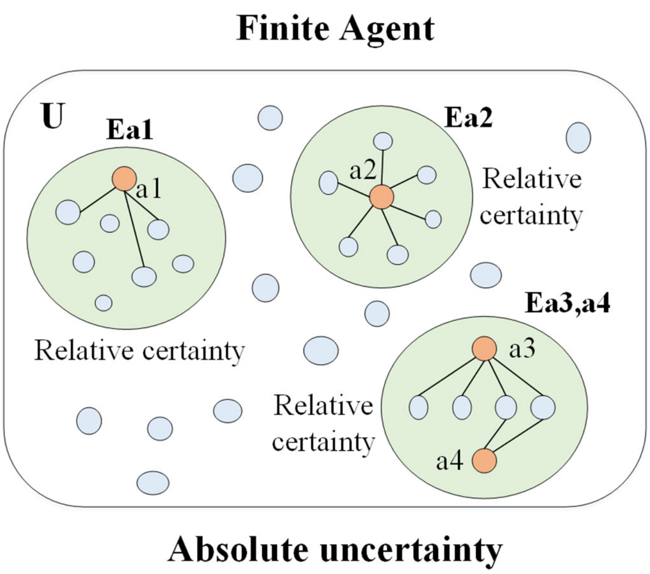

Figure 22. Certainty and Uncertainty of Finite Agents.

Assume there are five agents a, b,c, d, and e existing in the same environment $\boldsymbol{E}_{\mathbf{a,b,c,c,e}}$, where a, b, c, and d are finite agents, and e is an absolute zero agent. Agent a reaches the highest intelligence level in this environment, thus its Relative Certainty is 1. Agents b, c, and d achieve 25%, 60%, and 70% of agent a's intelligence level, respectively, making their Relative Certainties 0.25, 0.6, and 0.7, respectively. Agent e, being an absolute zero intelligence agent and at the α Point, has zero intelligence and thus its Relative Certainty is 0. The distribution of Relative Certainty for the five agents is illustrated in Figure 23.

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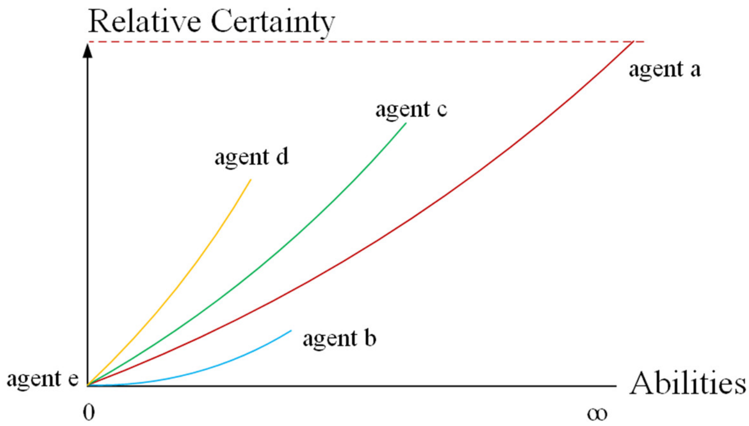

Figure 23. Relationship between Agent Intelligence Levels and Relative Certainty.

4.3. Analysis of the Origins of Space and Time

In the field of physics, space and time are key attributes for understanding the mechanisms of Universe [73]. Space is typically defined as the three-dimensional framework of the relative positions and motions of objects [74], while time is understood as the measure of the sequence of events [75]. In classical physics, space and time are viewed as independent and absolute entities [76]. However, Einstein's theory of relativity unifies them into a single concept of spacetime, suggesting that spacetime, as an objective existence, can be curved by matter and energy [77,78].

Within the framework of Omega Theory, time and space are understood as concepts relative to agents (with Universe also considered as an agent), belonging to the subjective, non-real products of the agents. Therefore, time and space exhibit relativity and subjectivity.

The existence of space and time is related to the intelligent state of the agent. When an agent is at the α Point, neither time nor space exists for it. When the agent reaches the Ω Point, time and space lose their objective significance and can be altered at will. Therefore, it is only when the agent is in the state of a finite intelligence that space and time have value and meaning.

For a finite agent a, the environmental Information set ($\boldsymbol{I_{Ea}}$) formed through its input capabilities determines its understanding of space and time. Space is the relative positions and motion relationships among various agents discovered through the agent's creative capabilities within this Information set. Time is the evolution or motion laws of the agents discovered through the agent's creative capabilities within this Information set, serving as a standard for measuring environmental changes.

4.3.1. Analysis of Space and Time at the α Point

When an agent a is at α Point, according to the definition of α Point, space and time do not exist for it. When Universe is at α Point, as this state represents an absolute "void" containing no elements or entities, theoretically, it also does not include Universe itself. Thus, in Universe at α Point, space and time do not exist, as shown in Figure 24.

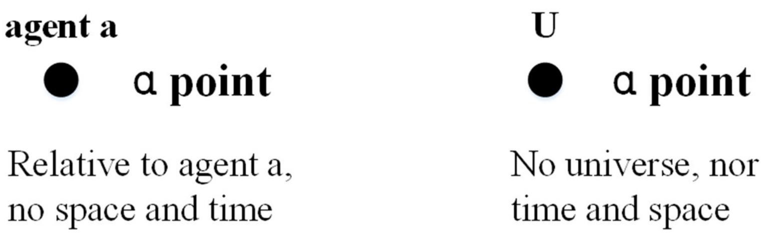

Figure 24. The Existence of Space and Time at α Point.

4.3.2. Definition of Space and Time in the Finite Intelligent State

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As Universe evolves from the α Point to a finite intelligent state, time and space emerge with the appearance of finite agents. Taking any finite agent a as an example, the process of generating its time and space is illustrated.

Agent a uses its input and storage capabilities to transform the external objective environment （$\boldsymbol{E_a}$） into an internal environmental Information set（$\boldsymbol{I_{Ea}}$）. Then, through its Information creation function, agent a analyzes the environmental Information set（$\boldsymbol{I_{Ea}}$）, discovering and forming the relative positions and motion relationships among various agents. This forms its spatial Information set（$\boldsymbol{I_{space\_a}}$）, which constitutes the space of agent a, as shown in Figure 25. The dimensions of space are determined by the agent's capabilities and needs. If agent a cannot establish a spatial Information set ($\boldsymbol{I_{space\_a}}$)through its creative capabilities, the concept of space does not exist for it.

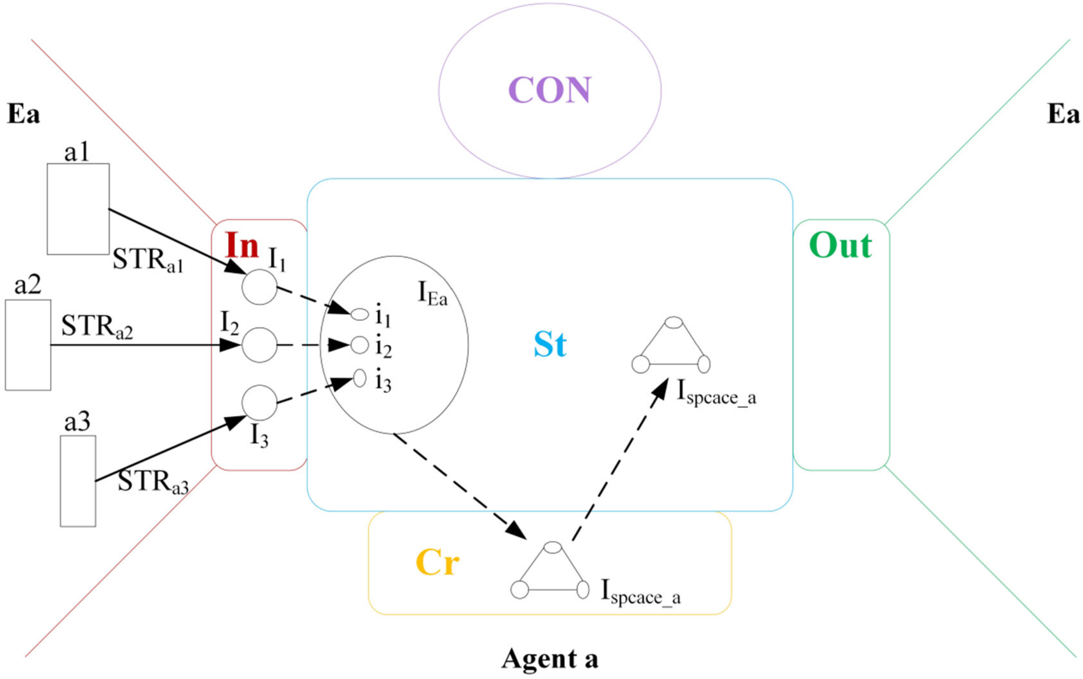

Figure 25. The Process of Space Generation for a Finite Agent.

When agent a uses its Information creation capabilities to identify one or several agents' evolution or motion laws from the environmental Information set ($\boldsymbol{I_{Ea}}$) and uses these laws as the standard for measuring changes in its environment, it constructs a time Information set（$\boldsymbol{I_{Time\_a}}$）. This Information set constitutes the time for finite agent a, as shown in Figure 26. If agent a cannot discover or establish a time Information set（$\boldsymbol{I_{Time\_a}}$） through its creative capabilities, the concept of time does not exist for it.

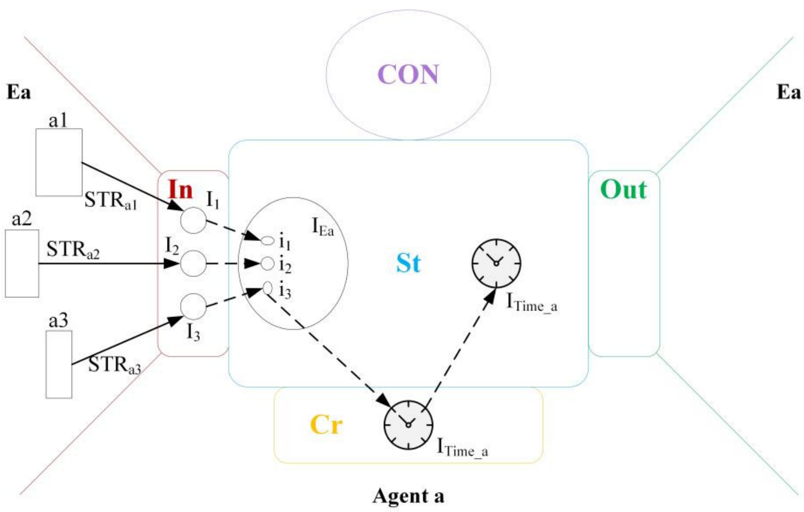

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Figure 26. The Process of Time Generation for a Finite Agent.

When Universe in a finite intelligent state contains multiple finite agents a1， a2..an, each forms its own spatial Information set $\boldsymbol{I_{space\_a1}}$、$\boldsymbol{I_{space\_a2}}$..$\boldsymbol{I_{space\_an}}$， . If these spatial Information sets intersect （$\boldsymbol{I_{space\_a1}} \cap \boldsymbol{I_{space\_a2}}..\cap \boldsymbol{I_{space\_an}} \neq \emptyset$） , then a1、 a2..an share common space.

When finite agents a1、 a2..an each select one or several agents' evolution or motion laws as the standard for measuring environmental changes, they form their respective temporal Information sets. If these temporal Information sets intersect（$\boldsymbol{I_{Time\_a1}}$、 $\boldsymbol{I_{Time\_a2}}$、 ..$\boldsymbol{I_{Time\_an}}$.） , then a1、 a2..an share common time. This indicates that they simultaneously choose one or several agents' evolution or motion laws as the standard for measuring changes in their environment.

4.3.3. Analysis of Space and Time at Ω Point

When any agent evolves to Ω Point, it expands to encompass Universe and forms a unified omniscient and omnipotent agent. According to the analysis in section 3.1.4, at Ω Point, the objective reality of Universe merges into subjective non-reality. Therefore, Universe can freely create, modify, or eliminate the concepts of space and time according to its will. At this stage, although the concepts of space and time can still be constructed, they lose the stability and objectivity in the finite intelligent state of Universe, as shown in Figure 27.

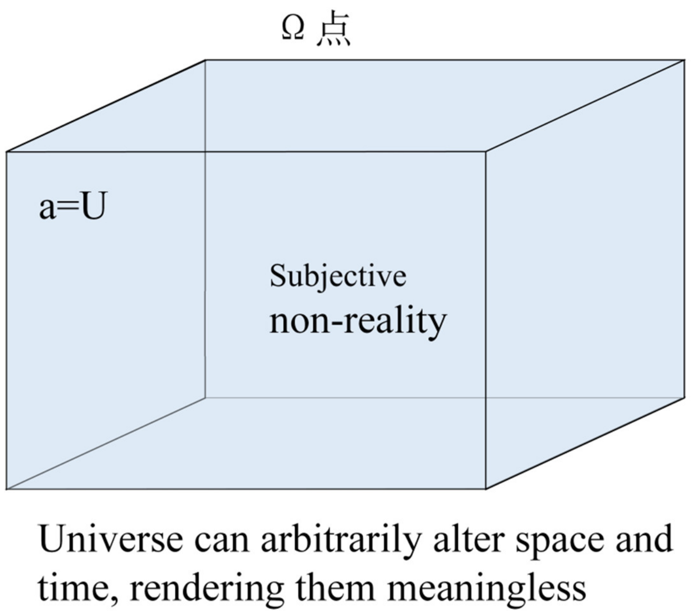

Figure 27. Characteristics of Space and Time in Universe at Ω Point.

5. Unified Interpretation of the Three Major Physical Theories within Ω Framework

Physics, as a broad discipline exploring phenomena from microscopic particles to macroscopic cosmic events, aims to reveal the diversity and regularity of nature [79–81]. Based on the preliminary discussion of the principle consistency between physics and intelligent science, this chapter will delve into the fundamental reasons for the differences among the three major physical theories—classical mechanics, relativity, and quantum mechanics—within the Omega Theory framework. It will explore how to achieve the unification of their principles under the Omega Theory and design experiments to verify this unification.

The starting point of the analysis is to first determine the current intelligence characteristics of humans and Universe, using these as a benchmark to compare the observer's intelligent state in the three physical theories. The analysis shows that the current state of human and cosmic intelligence is a state of limited agents. Classical mechanics assumes the observer to be in a state of omniscient agent;

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the observer in relativity is considered a mix of omniscient agent and limited agent; while the observer in quantum mechanics is set as a limited agent. The degree to which the intelligent state of the observer and Universe constructed in different physical theory frameworks matches the current state of human and cosmic intelligence determines the applicability and precision of the theory.

In our thought experiment, by adjusting the intelligence levels of observers, we demonstrated how to achieve the coexistence of classical mechanics, relativity, and quantum mechanics within a unified physical scenario that includes the object acceleration experiment, the equivalence principle experiment, and the Schrödinger's cat experiment. This process demonstrates the potential of the Omega Theory framework to encompass the fundamental principles of classical mechanics, relativity, and quantum mechanics.

5.1. Intelligence Characteristics of Current Humanity and Current Universe

Before discussing the three core theories of physics, it is essential to evaluate the intelligence characteristics of Current Universe and humanity using the Omega Theory framework. The aim is to compare these characteristics with the intelligence of the observers defined in the three major physical theories and the theoretical universe constructed thereby, identifying the root causes of differences and the inherent limitations of these theories.

First, considering the existence of humanity and its limited capabilities, we can infer that Universe is not in Absolute Zero Agent state. Second, there is currently insufficient evidence to suggest that Universe has evolved to Ω Point, thus containing Omniscient and Omnipotent Agent. Based on these considerations, we determine that both humanity and Current Universe are in a state of Finite agents. Building on the discussions in previous chapters about fundamental issues in physics, we analyzed the intelligence characteristics of Universe in the state of limited agents from eight dimensions. The specific analysis results are detailed in Table 5.

Table 5. Eight Intelligence Characteristics of Current Universe with Humanity.

Analytical Dimension	Characteristic	Description
Observer's Intelligence State	Finite Agent	Observers, including humans, animals, plants, and extraterrestrials, can only be Finite Agents.
Universe's Intelligence State	Finite Agent State	Universe lacks an omniscient and om nipotent agent, but because it include s humans and other finite agents, it i s not in an absolute zero intelligence state.
Intelligence State of El ements Composing Uni verse	Finite Agents and Absolute Zero Age nts	All agents composing Universe are n ot omniscient and omnipotent agents, but at least include one Finite Agent.
Deterministic Propertie s of Universe	Absolute Uncertain ty and Relative Ce rtainty	Universe exhibits absolute uncertainty along with relative certainty.
Objective and Subjectiv e Properties of Univers e	Coexistence of Obj ective Reality and Subjective Non-Rea lity	Since Universe is in a state of limite d agents, both objective reality and s ubjective non-reality exist simultaneou sly.

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Analytical Dimension	Characteristic	Description
Objective and Subjective Properties of Space-Time	Subjective Non-Reality	Time and space are subjective non-realities formed by finite agents' perceptions of objective reality.
Relativity of Space-Time	Relativity	Different agents generate their own perceptions of time and space, but shared Information can lead to a common understanding of time and space.
Universe's Intelligence Evolution Attribute	Existence of Intelligent Evolution	Universe and any system or agent within it evolve between the α Point, limited agent state, and Ω Point.

5.2. Comparative Analysis and Interpretation of Intelligent Characteristics in the Classical Mechanics Universe

Classical mechanics, as a foundational branch of physics centered on Newton's laws of motion and universal gravitation, primarily describes the motion of macroscopic objects and finds extensive applications in engineering, aerospace, and other fields [82,83]. By using mathematical formulas to precisely predict object movements, it demonstrates a high degree of scientific accuracy, with experimental results validating its theoretical effectiveness [84]. However, classical mechanics shows limitations at microscopic scales and under extreme conditions (e.g., near-light speeds and strong gravitational fields), which has prompted the development of quantum mechanics and relativity [85,86].

This section compares the intelligent characteristics of Universe constructed by classical mechanics with Current Universe across eight dimensions. The comparison results are detailed in Table 6.

Table 6. Comparative Analysis of Intelligent Characteristics between the Classical Mechanics Universe and Current Universe.

No.	Dimension of Analysis	Characteristics of the Classical Mechanics Universe	Characteristics of Current Universe
1	Intelligence State of the Observer	Omniscient Agent (Implicit)	Finite Agent
2	Intelligence State of Universe	Omniscient State	Finite Agent State
3	Intelligence State of Universe's Elements	Absolute Zero Intelligence Agent	Finite Agent and Absolute Zero Intelligence Agent
4	Deterministic Attribute of Universe	Absolute Determinism	Absolute Uncertainty, Relative Determinism
5	Subjective and Objective Attributes of Universe	Only Objective Reality Exists	Both Subjective Non-Reality and Objective Exist

6	Subjective and Objective Attributes of Space-Time	Objective Reality	Subjective Non-Reality
7	Relativity Attribute of Space-Time	Absoluteness	Relativity
8	Universe's Intelligence Evolution Attribute	No Agent Evolution	Agent Evolution Exists

In the eight-dimensional comparison presented in Table 13, classical mechanics and Current Universe show formal inconsistency in dimensions 5 and 6 but logical consistency in connotation. They exhibit partial consistency in dimensions 3 and 4. The remaining four dimensions demonstrate significant inconsistency. We will analyze these in detail and explore how they affect the precision of classical mechanics and its theoretical limitations.

For dimensions 1 and 2, within the theoretical framework of classical mechanics, although the concept of an observer is not explicitly defined, the theory implicitly assumes an idealized observer [87]. This observer, visualized through thought experiments as "Laplace's Demon," is assumed to precisely know the position and velocity of all particles in Universe, thereby predicting the future and calculating the past [88]. In classical mechanics, there is no upper limit to the speed of matter movement, which can reach infinity, and observations of object movement by the observer are instantaneous [89]. This implies another implicit capability of the classical mechanics observer: the ability to control infinite speed and observe without affecting the motion of the detected objects. Therefore, within the Omega Theory framework, the observer in classical mechanics is an omniscient agent, and the classical mechanics universe is at Ω Point. However, since classical mechanics does not involve other Information output capabilities, the intelligence state of the classical mechanics universe is that of a omniscient agent. Given that Current Universe is in a finite agent state, where any agent acting as an observer can at most reach the intelligence level of a finite agent, there is a significant difference between classical mechanics and Current Universe in these two dimensions.

For dimension 3, regarding the intelligence state of Universe's elements, classical mechanics studies non-intelligent, non-living matter. In the classical mechanics universe, only Absolute Zero Agents exist, differing from Current Universe, which includes both absolute zero intelligence agents and finite agents. This difference means that classical mechanics cannot cover the finite agents in Universe. The validity of classical mechanics formulas in experiments requires the absence of conscious behavior interference by finite agents.

For dimensions 4, 5, 6, and 7, considering that Current Universe is in a finite agent state and all agents, including humans, cannot achieve omniscient and omnipotent intelligence levels, Current Universe possesses absolute uncertainty, with both objective reality and subjective non-reality existing simultaneously, and space-time having subjectivity and relativity. In contrast, Universe constructed by classical mechanics is described by a omniscient agent. According to Omega Theory, the classical mechanics universe has absolute determinism, Universe is subjectively non-real, and space-time is absolute and subjective. At Ω Point, the objective reality and subjective non-reality of Universe converge, making objective reality equivalent to subjective non-reality, and the objectivity of space-time equivalent to its subjectivity. Thus, although classical mechanics describes Universe and time as objective in its actual description, its connotation remains logically consistent with the subjectivity of Universe and time under Omega Theory. Human finite agents, utilizing their five capabilities, can achieve relative determinism in their environment, making classical mechanics highly accurate in describing and predicting physical phenomena in routine life settings with high relative determinism.

For dimension 8, the Universe's Intelligence Evolution Attribute, classical mechanics does not consider the intelligent evolution of systems or agent, including Universe, resulting in theoretical incompleteness. From the perspective of Omega Theory, if Universe evolves to α Point, classical mechanics and Universe it describes will no longer exist. If Universe reaches Ω Point state, the intelligent characteristics of Universe described by classical mechanics will closely align with this state, leading to the highest theoretical precision of classical mechanics at Ω Point.

Overall, classical mechanics exhibits strong internal logical coherence, despite the inconsistency between the constructed Universe and the intelligent characteristics of Current Universe. In high relative determinism environments, the laws and phenomena described by classical mechanics align well with human intuition.

5.3. Comparative Analysis and Interpretation of Intelligent Characteristics in the Relativistic Universe

Relativity, comprising both Special and General Relativity, is one of the cornerstones of modern physics [90]. Special Relativity, based on the principles of relativity and the constancy of the speed of light, challenges the notion of absolute space and time, asserting that the speed of light remains constant in all inertial reference frames [91]. General Relativity, by introducing the principle of equivalence and the concept of spacetime curvature, interprets gravity as a property of spacetime geometry, emphasizing how an observer's position and motion in curved spacetime affect their observational results [92]. The scientific robustness of relativity stems from its precise predictive power regarding experimental observations, such as light bending and time dilation phenomena [93,94]. Nonetheless, relativity encounters challenges at the quantum scale, showing incompatibilities with quantum mechanics in fundamental assumptions and certain predictions [95].

This section compares the intelligent characteristics of the relativistic universe and Current Universe across eight dimensions, with the comparative results presented in Table 7.

Table 7. Comparison of Intelligent Characteristics between the Relativistic Universe and Current Universe.

No.	Analysis Dimension	Characteristics of the Relativistic Universe	Characteristics of Current Universe
1	Observer's Intelligent State	Coexistence of Omniscient Agents and Finite Agents	Finite Agents
2	Intelligent State of Universe	Coexistence of Omniscient Agents and Finite Agents	Finite Agents
3	Intelligent State of Constituent Elements	Finite Agents and Absolute Zero Agents	Finite Agents and Absolute Zero Agents
4	Deterministic Properties of Universe	Coexistence of Absolute Determinism and Indeterminism	Absolute Indeterminism, Relative Determinism
5	Subjective and Objective Properties of Universe	Only Objective Reality Exists	Coexistence of Subjective Non-Reality and Objective Reality
6	Subjective and Objective Properties of Spacetime	Objective Reality	Subjective Non-Reality
7	Relativity of Spacetime	Relativity Exists	Relativity Exists
8	Presence of Intelligent Evolution in Systems	Absence of Intelligent Evolution	Presence of Agent Evolution

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In the eight-dimensional comparison presented in Table 14, relativity and Current Universe exhibit logical consistency in dimensions 3 and 7, while showing partial consistency in dimensions 1, 2, 4, and 5. Dimensions 6 and 8, however, display significant inconsistencies. The comparison results indicate that the relativistic universe aligns more closely with Current Universe than classical mechanics does. Therefore, relativity significantly surpasses classical mechanics in accurately describing the motion of cosmic matter, achieving high theoretical precision in the macroscopic domain and becoming one of the cornerstones of modern physics.

Relativity first established the observer's central role in scientific theory, emphasizing the observer's crucial role in theoretical construction. The observer's role in relativity exhibits dual characteristics: on one hand, following Einstein's deterministic thought, relativity endows the observer with the ability to make precise predictions of physical events based on initial conditions, reflecting the observer's omniscient attribute. However, the observer lacks the ability to intervene in Universe, thus not qualifying as omniscient and omnipotent agent. On the other hand, relativity explicitly limits the observer's capabilities through its core principles. For example, the principle of the constancy of the speed of light defines the upper limit of the observable Universe's speed for the observer, requiring the observer to use detection methods that do not exceed the speed of light and assuming that the detection medium does not interfere with the observed system. Through the equivalence principle, the observer cannot distinguish between being in a uniform gravitational field and an accelerated non-inertial reference frame, further limiting the observer to a finite intelligent state. Therefore, the observer in relativity simultaneously exhibits characteristics of both an omniscient agent and a finite agent.

The observer in relativity embodies both omniscient and finite intelligent attributes, giving the relativistic universe a dual nature in terms of intelligent states, reflecting both Ω Point and Finite Agent states. This duality results in the relativistic universe displaying both absolute determinism and indeterminism in the dimension of determinism. However, the absolute determinism characteristic contrasts sharply with the absolute indeterminism of Current Universe, which is a fundamental reason for the difficulty in reconciling relativity with quantum mechanics.

Relativity established the concept of spacetime relativity, with General Relativity particularly emphasizing how the geometry of spacetime is determined by the distribution of matter and energy. Within this framework, an observer's measurements of time and space for the same physical event differ based on their position in different gravitational fields or their motion relative to the gravitational source. These differences arise not only from the observer's relative velocity but also from the varying geometrical environment of spacetime they occupy. Spacetime relativity, as a core aspect of relativity, aligns well with the characteristics of spacetime relativity in Current Universe, contributing significantly to the high theoretical accuracy of relativity.

The primary focus of relativity is on non-intelligent or non-living matter, referred to as absolute zero agent. However, the groundbreaking aspect of relativity lies in its incorporation of the observer into the theoretical framework of physics, assigning the observer a central role in physical phenomena. As a result, in the dimension of analyzing the intelligent state of the constituent elements of Universe, relativity aligns with the characteristics of the current universe inhabited by humanity.

Based on Omega Theory, in Current Universe, due to the limitations of human capabilities, only media with a maximum speed equal to the speed of light can be used to probe target systems. When measuring high-speed matter, there will be observed time dilation and length contraction in the observer's subjective non-reality (internal Information set). Correspondingly, relativity views spacetime as an objective entity. Although this view does not align with Current Universe's subjective and objective states (based on Omega Theory), relativity's treatment of spacetime as an objective reality achieves time dilation and scale contraction at high speeds. Thus, through both objective reality and subjective non-reality interpretative paths, relativity and Omega Theory can achieve equivalent computational results. This means that the differences in interpretative paths do not impact the accuracy of relativity's analysis of material motion but may increase the difficulty for humans to understand relativistic spacetime.

Relativity does not account for the evolution of the observer's and Universe's intelligent states. While this omission does not affect relativity's theoretical precision under Current Universe state, it does impose limitations on its theoretical completeness. According to Omega Theory, when Universe evolves to α Point, the maximum speed in Universe will drop to zero or cease to exist. When Universe evolves to Ω Point, the maximum allowable speed will increase to infinity. Even in Current Universe, with the advancement of human capabilities, it is theoretically permissible to discover media with speeds greater than the speed of light, which can be used as observational or measurement tools. In such cases, the maximum observable speed in Universe would theoretically be allowed to exceed the speed of light. When human capability reaches infinity, or humanity evolves to Ω Point, Universe will enter a state described by classical mechanics, where the maximum speed in Universe, according to both Omega Theory and classical mechanics, would be allowed to be infinite.

Description: In Figure 28, Observer 1, Observer 2, and Observer 3 are three relatively stationary observers with different observational capabilities. Observer 1 is a classical mechanics observer who can use detection media with an infinite speed to observe objects. Observer 2 is a relativistic observer who can use photons as detection media with the maximum speed of light to observe objects. Observer 3 can use sound waves as detection media with a maximum speed equal to the speed of sound in Earth's atmosphere to observe objects. They are all positioned 10,000 kilometers away from objects 1 and 2, where Object 1 is moving at half the speed of light and Object 2 is stationary. In this scenario, Observer 1 takes 0 time to observe both objects using the detection medium. Observer 2 takes approximately 0.822 seconds to observe Object 1 and 0.667 seconds to observe Object 2 using the detection medium. Observer 3 takes an infinite amount of time or is unable to observe Object 1, and takes 583,090 seconds to observe Object 2 using the detection medium. This experiment illustrates that time dilation and the maximum observable speed are related to the speed of the detection medium.

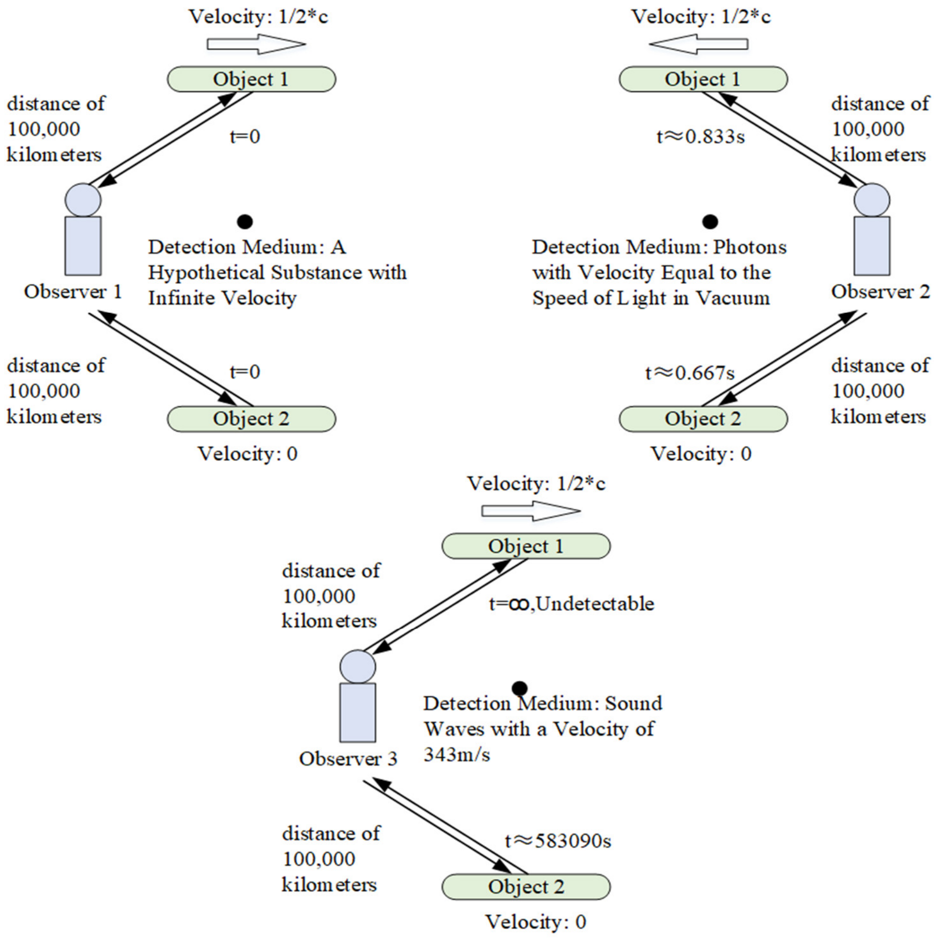

Figure 28. Observational Results of Different Detection Media.

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In 2020, Professor Ruan Xiaogang proposed the Theory of Observational Relativity [96], extending the analysis of the principle of the constancy of the speed of light and the objectification of spacetime curvature in relativity. Based on the idea that "human understanding of the objective world is limited by observational methods and the observational process," Professor Ruan deeply explored the importance of the speed of the detection medium. For instance, in classical mechanics, the speed of the detection medium can theoretically be considered infinite; in the framework of relativity, light, as the detection medium, is limited to the speed of light in a vacuum; for bats, the detection medium they rely on is sound waves, with an upper speed limit equal to the speed of sound in the air under normal conditions. Based on this viewpoint, Ruan further proposed the "Principle of Observational Locality," which states that when the speed of the detection medium η is less than infinity, the observer will inevitably require time to observe objects using that medium. The time required for these three types of observers to observe objects moving at different speeds using different detection media is shown in Figure 28.

Based on the Principle of Observational Locality, Professor Ruan Xiaogang proposed that observational locality is the fundamental reason for the effects of the constancy of the speed of light in Special Relativity and the curvature of spacetime in General Relativity. These relativistic phenomena are considered observational effects, stemming from the limitations of the speed of the detection medium ($\eta < \infty$), rather than absolute realities of the objective world. Ruan further explained that increasing the speed of the detection medium η could influence the maximum speed limit set in Special Relativity and reduce the curvature effects described in General Relativity. In the limit where η equals infinity, the curvature effects of spacetime would disappear entirely [97].

The enhancement of detection medium speed in Observational Relativity aligns with the principle of enhancing observer capabilities in Omega Theory, indicating that observers can influence the fundamental assumptions of relativity by discovering and utilizing faster detection media. Observational Relativity and Omega Theory present equivalent theoretical perspectives in explaining the limitations of relativity. However, neither Observational Relativity nor Omega Theory denies the accuracy and theoretical precision of relativity under the current levels of human intelligence and the intelligent state of Universe. Both suggest that relativity has theoretical limitations and incompleteness, with room for expansion.

5.4. Comparative Analysis and Interpretation of Intelligent Characteristics in the Quantum Mechanics Universe

Quantum mechanics is the fundamental physical theory that describes the behavior of microscopic particles. Its core concepts include wave-particle duality, quantum superposition, the uncertainty principle, quantum entanglement, and the wave function [98]. The advent of quantum mechanics has further emphasized the importance of the observer. According to the Copenhagen interpretation, the state of a quantum system exists in superposition until measurement occurs, causing the wave function to collapse and the system to select a specific eigenstate from the superposition [99]. This process not only reveals the indeterminate nature of the microscopic world but also highlights the critical role of the observer in quantum measurement. However, the Copenhagen interpretation is not the only interpretation of quantum mechanics; there are various theories regarding the observer's role [100]. The diversity of interpretations reflects the depth and complexity of this theory.

This section continues to compare the intelligent characteristics of the quantum mechanics universe and Current Universe across eight dimensions, with the comparative results presented in Table 8.

Table 8. Comparison of Intelligent Characteristics between the Quantum Mechanics Universe and Current Universe.

No.	Analysis Dimension	Quantum Mechanics Universe Characteristics	Current Universe Characteristics

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1	Observer's Intelligent State	Finite Agent	Finite Agent
2	Intelligent State of Universe	Finite Agent	Finite Agent
3	Intelligent State of Constituent Elements	Finite Agents and Absolute Zero Agents	Finite Agents and Absolute Zero Agents
4	Deterministic Properties of Universe	Absolute Indeterminism, Relative Determinism	Absolute Indeterminism, Relative Determinism
5	Subjective and Objective Properties of Universe	Coexistence of Subjective and Objective (Implicit)	Coexistence of Subjective and Objective
6	Subjective and Objective Properties of Spacetime	Objective Reality (Implicit)	Subjective Non-Reality
7	Relativity of Spacetime	Relativity (Implicit)	Relativity
8	Presence of Intelligent Evolution in Systems	Absence of Agent Evolution	Presence of Agent Evolution

In the eight-dimensional comparison presented in Table 14, quantum mechanics and Current Universe exhibit logical consistency in dimensions 1, 2, 3, 4, 5, and 7, while showing significant inconsistency in dimensions 6 and 8. The comparison results indicate that quantum mechanics is the theory that most closely aligns with the intelligent state of Current Universe among the three physical theories, making it one of the most influential pillars of modern physics.

Within the framework of quantum mechanics, the central role of the observer is further reinforced, transforming the observer from a passive receiver to an explicit participant. The observer's measurement directly affects the state of the system, making the output capacity of the observer's Information explicit. At the same time, quantum mechanics imposes further limitations on the observer's capabilities through the uncertainty principle and the complementarity principle, defining the observer in quantum mechanics as one with finite capabilities.

The uncertainty principle and complementarity principle change the deterministic and certain characteristics attributed to Universe by classical mechanics and relativity. In the quantum mechanics universe, no omniscient and omnipotent agents exist, and indeterminism is a fundamental property of Universe. Thus, the intelligent state of the quantum mechanics universe is characterized by Finite Agents, consistent with the intelligent state of Current Universe.

Since the observer is no longer a bystander but an integral part of the quantum mechanical system, and with the development of quantum mechanics, the subjects of research in quantum computing and quantum communication have begun to possess information processing attributes, they can also be seen as a form of Finite Agents. Therefore, the constituent elements of the quantum mechanics universe include not only non-living objects or systems but also Finite Agents.

Quantum mechanics does not explicitly separate the subjective and objective aspects of Universe, but its core concept, the wave function, has theoretically achieved such separation from the perspective of Omega Theory. However, within the framework of quantum mechanics, there are multiple interpretative theories, and the subjective nature of the wave function has not been conclusively determined [101,102]. Major interpretations of the wave function include the Copenhagen interpretation, the Many-Worlds interpretation, Hidden Variable theories, and Quantum Bayesianism [103,104]. Quantum Bayesianism, for instance, posits that the wave function is subjective, representing the observer's Information or belief state about a specific quantum system [105,106]. Upon receiving new information (e.g., measurement results), the observer updates their beliefs about the system according to Bayesian rules [107]. Thus, from the perspective of Quantum

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Bayesianism, the collapse of the wave function does not represent a change in objective reality but rather an update of the observer's subjective Information based on measurement results [108,109].

From the perspective of Omega Theory, the wave function in quantum mechanics reflects the cognitive limitations faced by Finite Agents when measuring the high-speed motion states of microscopic particles. Due to the incomplete information in the observation process, observers cannot construct an accurate description of the microscopic particle states within their subjective cognitive framework, leading to the probabilistic expression of the wave function. This limitation is also present in the macroscopic world, where Finite Agents cannot completely and accurately obtain all the detailed information of an object, causing macroscopic objects to exhibit certain fluctuations and uncertainties in the observer's subjective cognition.

When an observer engages in the measurement process of microscopic particles, they utilize their Information output capacity to probe the state of the microscopic particles, then integrate the perceived particle information into their Information system through Information input capacity, thereby promoting the updating and deepening of Information. In this process, the collapse of the quantum system state can be understood in Omega Theory as a (relative) deterministic inference occurring in the observer's subjective world after supplementing relevant information. This collapse is not an event in the objective world. Thus, the interpretation of the wave function from the perspective of Omega Theory aligns theoretically with the interpretation of Quantum Bayesianism, indicating that the wave function in quantum mechanics essentially achieves the separation of subjective and objective.

Regarding the subjectivity and relativity of spacetime, quantum mechanics has not developed an independent view of spacetime in its standard form but inherits the absolute and background-independent spacetime concept from classical mechanics [110]. In modern quantum theories such as quantum field theory, which incorporate the principles of Special Relativity, a spacetime view consistent with relativity is adopted [111], hence exhibiting relativity. However, in both classical mechanics and relativity, spacetime is considered an objective reality [112]. As discussed in the previous section, adhering to the classical mechanics view of spacetime would result in significant theoretical prediction errors compared to actual measurements, whereas adhering to the relativistic view of spacetime yields highly precise theoretical predictions despite different interpretative paths.

Analyzing from the dimension of agent evolution, quantum mechanics does not address the evolution of agents, including Universe itself. This omission results in theoretical limitations in this dimension. When Universe evolves to α Point state, the absolute "void" will cause all phenomena described by quantum mechanics to disappear entirely, rendering quantum mechanics itself non-existent. When Universe evolves to Ω Point state, as observers transform into omniscient and omnipotent agents, the absolute indeterministic characteristics of Universe will transition to absolute determinism. In this scenario, the subjective and objective worlds will merge. Consequently, fundamental assumptions of quantum mechanics, such as the uncertainty principle and the probabilistic description of the measurement process, will no longer be valid, making quantum mechanics inapplicable and classical mechanics the most accurate theory.

6. Thought Experiment on the Unification of Physical Theories within the Omega Theory Framework

Within the Omega Theory framework, we compare the theoretical universes constructed by classical mechanics, relativity, and quantum mechanics with the intelligent characteristics of Current Universe. We analyze how observers with different levels of intelligence affect the accuracy and limitations of these theories, exploring the potential for their unification under Omega Theory. Experimental verification is an essential step to validate the rational interpretation of these three major physical theories by Omega Theory. Given the complexity and high cost of directly simulating universe-scale phenomena in a laboratory environment, we employ thought experiments for validation.

The experiment design involves selecting an agent with variable intelligence levels as the observer, performing a series of physical experiments within a unified experimental environment.

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These experiments include accelerated linear motion in classical mechanics, time dilation predicted by relativity [113], the application of the equivalence principle in an elevator [114], and the Schrödinger's cat thought experiment in quantum mechanics [115]. By changing the observer's intelligence level—including omniscience and omnipotence, omniscience, a mix of omniscience and finite intelligence, finite intelligence, and Absolute Zero Agent states—we examine which typical physical phenomena the observer would perceive.

6.1. Experimental Environment, Elements, and Procedures

First, we set up a simulated experimental environment called "Experimental Universe 1," containing the elements listed in Table 9.

Table 9. Experimental Elements in "Experimental Universe 1".

No.	Experimental Element	Function
1	Agent a	An agent whose intelligence can vary, simulating observers of different physical theories.
2	Earth model (Earth)	Generates gravity similar to that of Earth.
3	A fully enclosed elevator (100 cubic meters)	Conducts experiments to verify the equivalence principle.
4	Clock	Used to verify the relativistic effect of time dilation.
5	An apple	Placed in the elevator to measure gravity and acceleration.
6	Sealed wooden box (1 cubic meter)	Placed in the elevator for Schrödinger's cat experiment.
7	A live cat	Placed in the wooden box for Schrödinger's cat experiment.
8	Bottle with cyanide	Placed in the wooden box for Schrödinger's cat experiment.
9	Device containing radium	Placed in the wooden box for Schrödinger's cat experiment.
10	Mechanical hand	Placed in the wooden box, used by the observer in specific scenarios to move the bottle and prevent the cat's death.

In this experiment, Agent a is set as the observer, with its intelligence level adjustable to simulate observers with different levels of intelligence, as shown in Table 10.

Table 10. Different Intelligence Levels of Agent a as the Observer.

No.	Intelligence Level	Description
1	Omniscient and Omnipotent	The observer, as Omniscient and Omnipotent Agent, possesses infinite capabilities in Information input, output, storage, creation, and control.
2	Omniscient	As a classical mechanics observer, the agent is omniscient, with infinite Information input and storage capacity, enabling comprehensive observation of any event in "Experiment

No.	Intelligence Level	Description
		al Universe 1" in infinite detail. However, the observer's Information output capacity is limited to interference-free observation with an infinitely fast medium and cannot control the mechanical hand in the box. This represents a limited omniscient and omnipotent agent.
3	Mix of Omniscient and Finite Intelligence	As a relativity observer, the agent is a mix of omniscient and finite intelligence. Based on the deterministic principles of relativity, it has infinite Information input and storage capacity, allowing for an omniscient range of observation. However, the equivalence principle restricts the observer from distinguishing gravity from acceleration in local experiments, limiting its input capability to a finite intelligence state. Additionally, the constancy of the speed of light restricts the observer's interference-free observation capacity to the speed of light, limiting Information input. As the relativity observer cannot affect or interfere with the observation system, it lacks output capacity other than using photons for system probing.
4	Finite Intelligence	As a quantum mechanics observer, the agent represents finite intelligence. According to the principles of uncertainty, complementarity, and quantum measurement, the observer's Information input, output, storage, creation, and control capabilities range between zero and the maximum value.
5	Absolute Zero Intelligence	The observer, as Absolute Zero Agent, all five intelligence capabilities are zero.

In "Experimental Universe 1," we set up the experimental scenarios shown in Figure 29. Agent a will participate in the following series of experiments:

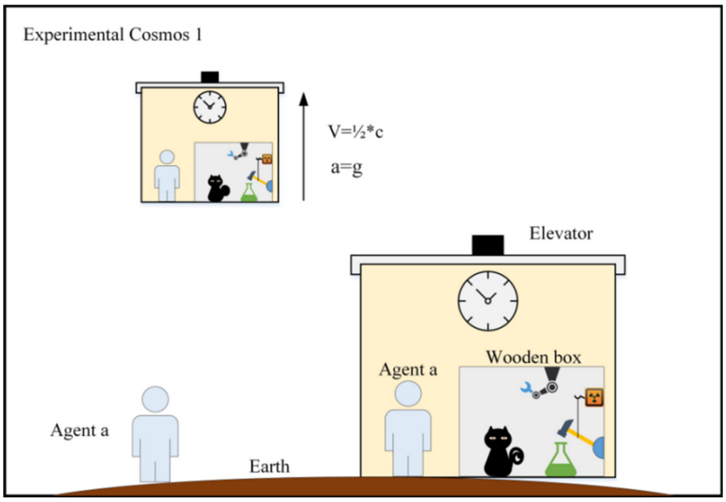

Figure 29. Schematic Diagram of "Experimental Universe 1".

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1) Classical Mechanics Accelerated Motion and Relativistic Effects Experiment

Agent a is placed on the Earth model, observing the clocks in two elevators. The first elevator is stationary on Earth, while the second elevator is flying in space with an initial velocity of half the speed of light and an acceleration of g in a straight line. Agent a's task is to observe the motion state of the moving elevator and to observe the relativistic time dilation effect through the clocks in both elevators.

2) Equivalence Principle Experiment

Agent a is inside an elevator, with the experiment conducted under two conditions: one with the elevator stationary on the Earth's surface, and the other with the elevator flying in space at a speed that produces an acceleration equivalent to Earth's gravity. The experiment tests whether Agent a can distinguish the effects of gravity and acceleration at different intelligence levels.

3) Schrödinger's Cat Experiment

Agent a is inside the elevator, facing a wooden box containing a cat, a radioactive element, and cyanide. Agent a needs to determine the cat's state of life or death and then open the box to verify its judgment. This experiment tests how Agent a handles probability and uncertainty in quantum mechanics at different intelligence levels. To test Agent a's ability to influence the target system, a mechanical hand is installed in the wooden box. Agent a, with specific capabilities, can manipulate the experimental equipment inside the box to protect the cat's survival.

6.2. Experiments with Observers at Omniscient Intelligence Level

In this round of experiments, Agent a, with omniscient intelligence, participates in various experiments. The results show that at this intelligence level, Agent a observes phenomena consistent with the laws of classical mechanics. The experimental process is illustrated in Figure 30.

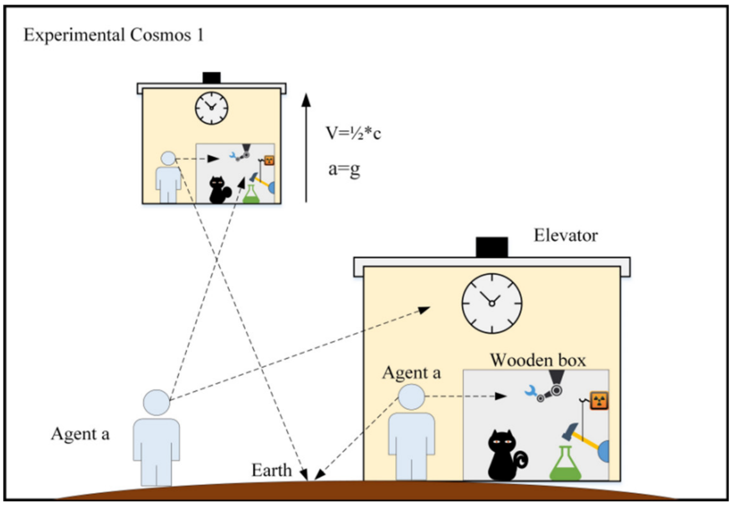

Figure 30. Experimental Setup for Omniscient Observer.

Agent a is first placed in a stationary reference frame on Earth and observes two clocks: one in an elevator at rest on Earth and the other in an elevator moving in space with an initial velocity of half the speed of light and an acceleration of g along a straight path. Due to Agent a's ability to fully observe "Experimental Universe 1" with infinitely fast detection material, the times on both clocks will remain synchronized, with no time dilation observed. From Agent a's perspective, the motion of the elevator simplifies to a point mass model following Newton's Second Law (Law of Acceleration), unaffected by relativistic effects.

Next, Agent a enters the elevator to conduct the equivalence principle experiment. Despite being in an enclosed space, Agent a's omniscient intelligence allows it to see through the elevator's confines and fully understand all events in "Experimental Universe 1." This ability enables Agent a to accurately distinguish whether the elevator's gravity is due to Earth's gravity or acceleration. Hence, the equivalence principle of relativity does not apply to Agent a.

Furthermore, during the Schrödinger's cat experiment inside the elevator, Agent a's omniscient intelligence allows it to monitor all dynamics inside the wooden box in real-time, including the decay of radium and the cat's life or death status. Therefore, under Agent a's observation, the cat's state is definite, rendering the quantum mechanics uncertainty principle inapplicable.

Because Agent a's Information output is limited to using infinitely fast material for system detection, it cannot directly manipulate the mechanical hand inside the box to protect the cat. Only when Agent a reaches full omniscient and omnipotent intelligence can it influence events within "Experimental Universe 1," such as moving the cyanide bottle to protect the cat. A fully omniscient and omnipotent observer can precisely know and control the cat's fate, which is beyond the scope of a classical mechanics observer. For Omniscient and Omnipotent Agent, traditional physical laws no longer apply, as it possesses the ability to create and alter physical laws.

6.3. Experiments with Observers at a Mix of Omniscient and Finite Intelligence Level

In this round of experiments, Agent a, as the observer, has its intelligence level reduced from omniscient to a mix of omniscient and finite intelligence. The results show that at this intelligence level, Agent a observes phenomena consistent with the laws of relativity. The experimental process is illustrated in Figure 31.

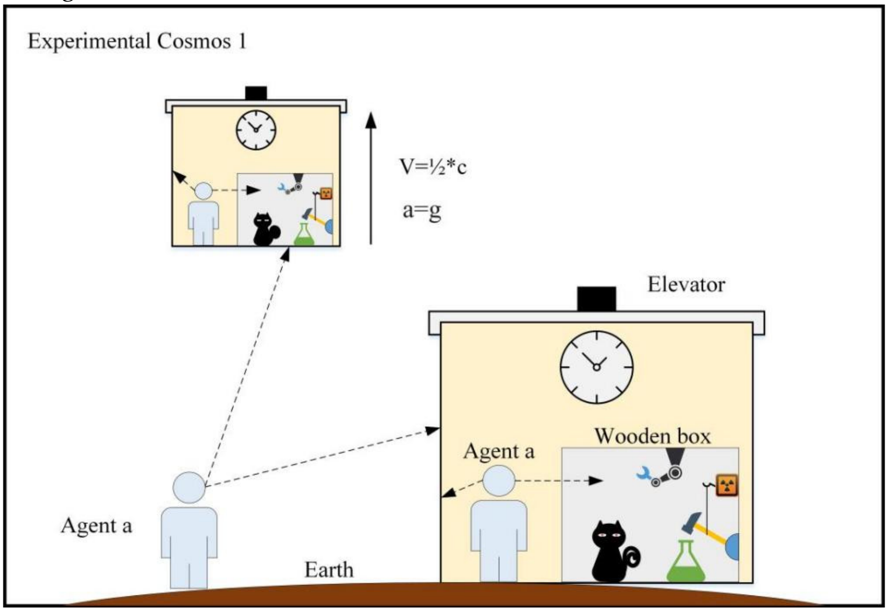

Figure 31. Experimental Setup for Mix of Omniscient and Finite Intelligence Observer.

Agent a is initially placed in a stationary reference frame on Earth to compare the clocks in stationary and moving elevators. Through this comparison, Agent a will observe that the clock in the moving elevator runs slower compared to the stationary clock. From the perspective of Omega Theory, this phenomenon can be explained by the limitation of Agent a's observational capabilities, which allow detection only at the speed of light. In this context, Agent a perceives that the time taken for the clock in the moving elevator to complete one cycle is longer than that in the stationary elevator, leading to the conclusion of time dilation for moving objects in its subjective world. From the perspective of relativity, changes in time and space are inherent properties of the objective world, and moving objects will exhibit time dilation relative to the observer. Therefore, the time shown by the clock in the moving elevator will be longer than that in the stationary elevator. Although the two theories adopt subjective and objective approaches respectively, the analysis in section 4.3 shows that these methods yield consistent experimental results.

Next, Agent a enters the elevator to conduct the equivalence principle experiment. The elevator is operated under two different conditions: stationary on the Earth's surface and moving in space with an acceleration equivalent to Earth's gravity. In these settings, as a finite intelligence observer, Agent a cannot perceive the external environment of the elevator or determine the source of the gravitational effect—whether it is Earth's gravity or acceleration. Thus, for Agent a, the equivalence principle is validated.

Finally, Agent a conducts the Schrödinger's cat experiment inside the elevator. Based on the deterministic nature of relativity, Agent a can obtain all events and information in its reference frame, including the decay of radium and the cat's life status. Therefore, for an omniscient intelligence observer, the cat's state is definitively known, and the quantum uncertainty principle does not apply.

6.4. Experiments with Observers at Finite Intelligence Level

Agent a's intelligence level is further reduced to a finite intelligence state, with all five capabilities between zero and infinity. The results show that at this intelligence level, Agent a observes phenomena consistent with the laws of quantum mechanics. The experimental process is illustrated in Figure 32.

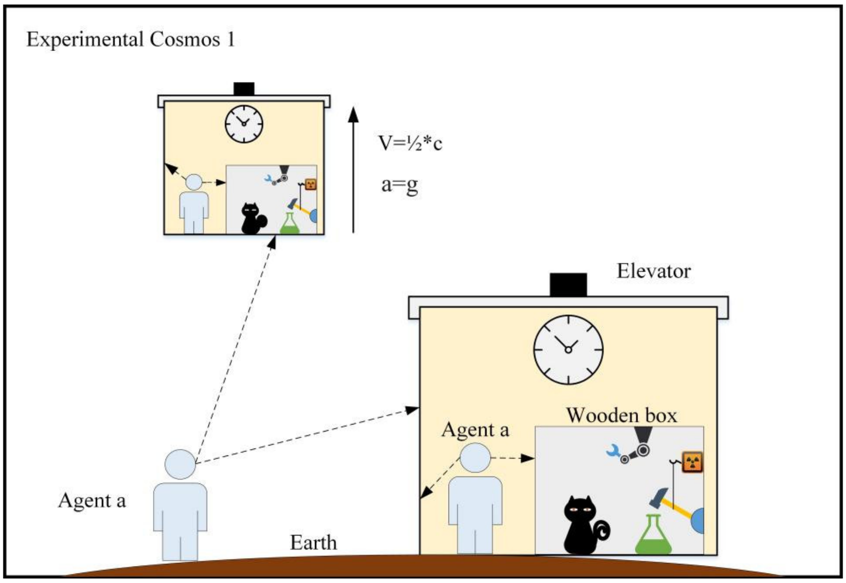

Figure 32. Experimental Setup for Finite Intelligence Observer.

Agent a is first placed in a stationary reference frame on Earth and observes the clocks in the stationary and moving elevators. As a finite intelligence observer, capable only of using the speed of light as the maximum detection speed, Agent a will also observe the relativistic effect, with the moving clock running slower.

When Agent a participates in the equivalence principle experiment, as a finite intelligence agent, it cannot identify the external environment of the elevator or determine the source of gravity—whether it is Earth's gravity or acceleration. Therefore, the equivalence principle is validated for Agent a.

During the Schrödinger's cat experiment, due to its finite intelligence level, Agent a cannot directly observe the inside of the wooden box. According to the Copenhagen interpretation, before observation, the cat's state is in quantum superposition, neither dead nor alive. The act of observation collapses the system state to a definite outcome. The quantum Bayesian interpretation sees the quantum state as Agent a's subjective belief based on available information rather than an objective physical state. This means the cat's superposition reflects Agent a's belief in the possible states. The act of opening the box updates Agent a's belief based on the observation. In this experiment, the quantum Bayesian interpretation aligns perfectly with Omega Theory. Regardless of the interpretation, when Agent a's intelligence level is reduced to finite intelligence, phenomena consistent with quantum mechanics will appear.

Further reducing Agent a to Absolute Zero Agent means it loses all Information processing capabilities, rendering the three major physical theories inapplicable to Agent a. When all

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components of "Experimental Universe 1" are Absolute Zero Agents, these theories will completely disappear.

Conversely, gradually increasing Agent a's intelligence level from Absolute Zero Agent will sequentially reveal phenomena predicted by quantum mechanics, relativity, and classical mechanics, as well as phenomena where the omniscient and omnipotent intelligence level can arbitrarily change physical laws.

6.5. Experimental Summary: Omega Theory as a Unified Framework for the Three Major Physical Theories

In this chapter, we altered the intelligence states and levels of the same observer within a unified experimental setting according to the theoretical framework of Omega Theory. This allowed us to observe not only the typical phenomena of the three major physical theories but also two additional physical phenomena, as shown in Table 11.

Table 11. Observations of Physical Phenomena by Observer Intelligence Levels.

Observer's Intelligence State	Intelligence Level Description	Observed Physical Phenomena
Omniscient and Omnipotent Agent	Infinite capabilities in Information input, output, storage, creation, and control	Arbitrary creation and alteration of physical laws
Omniscient Agent	Infinite Information input and storage capabilities, ability to detect without affecting the system using infinitely fast material, no other omnipotent output abilities	Classical physics typical phenomena
Mix of Omniscient and Finite Intelligence Agent	Infinite Information input and storage capabilities via determinism, limitations on input and output abilities through the constancy of the speed of light and the equivalence principle	Relativity typical phenomena
Finite Agent	Information input, output, storage and creation capabilities between 0 and infinity	Quantum mechanics typical phenomena
Absolute Zero Agent	Zero capabilities in Information input, output, storage, creation, and control	Complete disappearance of physical phenomena and physical laws

This thought experiment reveals that the fundamental differences among the three major physical theories—classical mechanics, relativity, and quantum mechanics—stem from different settings of the observer and the universe's intelligence level. This finding emphasizes the increasing importance of the observer in physics research and suggests that the diverse theories of physics can be integrated within a unified theoretical framework of intelligent science.

7. Evaluation and Summary: The Potential of Omega Theory in Achieving a Theory of Everything

Based on Omega Theory, this study accomplished the following four major tasks:

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1.Incorporating the research objects of physics, human society, biology, and religious philosophy into Standard Agent Model framework.

2.Proposing that the four fundamental forces may be unified under the frameworks of α Gravity (α Field) and Ω Gravity (Ω Field), and suggesting research directions accordingly.

3.Conducting an in-depth analysis of fundamental questions in physics, such as Objective Reality and Subjective Non-Reality, Certainty and Uncertainty, Time and Space, and providing interpretations from the perspective of Omega Theory.

4.Comparing the intelligent characteristics of classical mechanics, relativity, and quantum mechanics with those of Current Universe, and explaining how different intelligence levels of observers are the root cause of their differences and limitations. This was demonstrated through thought experiments in a unified experimental setting.

To date, the Theory of Everything remains an exploratory scientific term without a clear and stable definition. However, physicists, biologists, and AI experts have proposed many features that Theory of Everything should possess during their discussions [116–122]. From these, we selected 18 frequently mentioned features to evaluate Omega Theory's current degree of alignment with the goal of achieving a Theory of Everything based on the work presented in this paper. The matching degrees are classified into three levels: "Not Currently Addressed," "Potential to Solve," and "Preliminarily Satisfied." The evaluation results are shown in Table 12.

Table 12. Evaluation of Theory of Everything Features in Omega Theory.

No.	Features a Theory of Everything Should Have	Evaluation Status of Omega Theory
1	Unifying the research goals of physics, intelligent science, human sociology, biology, and religious philosophy in terms of structure and function	Preliminarily Satisfied
2	Unifying the dynamic mechanisms of physics, intelligent science, human sociology, and biology	Potential to Solve
3	Unifying relativity, cosmology, and quantum mechanics, especially combining the equations of General Relativity (GR) and Quantum Mechanics (QM) to solve extreme cases and other issues	Potential to Solve
4	Unifying gravity, electromagnetism, strong and weak forces	Potential to Solve
5	Defining quantum gravity	Not Currently Addressed
6	Explaining the origin, evolution, and ultimate fate of the universe	Preliminarily Satisfied
7	Explaining initial conditions, such as how energy was produced through inflation or cyclic/bounce processes	Not Currently Addressed
8	Allowing experimental verification	Preliminarily Satisfied
9	Having unity, simplicity, and elegance	Preliminarily Satisfied
10	Explaining constants in the Standard Model, including the masses of fundamental particles and t	Not Currently Addressed

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	he coupling strengths of the strong, weak, and electromagnetic forces	
11	Being able to generate arbitrary complexity to explain the existence of complex phenomena, or at least not producing results that conflict with the complexity observed in the universe	Preliminarily Satisfied
12	Following the assumption of reductionism	Preliminarily Satisfied
13	Including life and intelligence in the theory	Preliminarily Satisfied
14	Explaining whether the universe is deterministic or indeterministic	Preliminarily Satisfied
15	Explaining dark matter and dark energy	Potential to Solve
16	Solving the unification of classical mechanics, relativity, and quantum mechanics from a philosophical perspective	Preliminarily Satisfied
17	Meeting background independence	Preliminarily Satisfied
18	Presenting in a simple formula suitable for display on a T-shirt	Preliminarily Satisfied

The evaluation shows Omega Theory has preliminarily satisfied 11 features of the Theory of Everything and has the potential to solve another 4 features, with 3 features not yet addressed. This indicates that Omega Theory demonstrates significant competitiveness and development potential in becoming a comprehensive Theory of Everything. However, as a newly proposed theoretical framework, Omega Theory still has many gaps to fill, and its theoretical derivations and predictions require further experimental verification.

In future research on Omega Theory, we have identified two key directions. First, supported by theories such as quantum field theory, observer relativity, quantum Bayesian theory, free energy theory, we will explore the possibility of merging α Field and Ω Field into a unified Ω Intelligence Field. In this process, α Point is considered the ground state, the Finite Agent state as the excited state, and Ω Point as the fully excited state, as shown in Figure 33. This merger will foster a new mathematical description, providing a more solid theoretical foundation for Omega Theory. Second, we will delve into the mechanisms of α Gravity and Ω Gravity and conduct mathematical modeling and experimental verification. These studies will be crucial for unifying the fundamental forces in physics, advancing physics, intelligent science, and the philosophy of technology, and addressing their core issues.

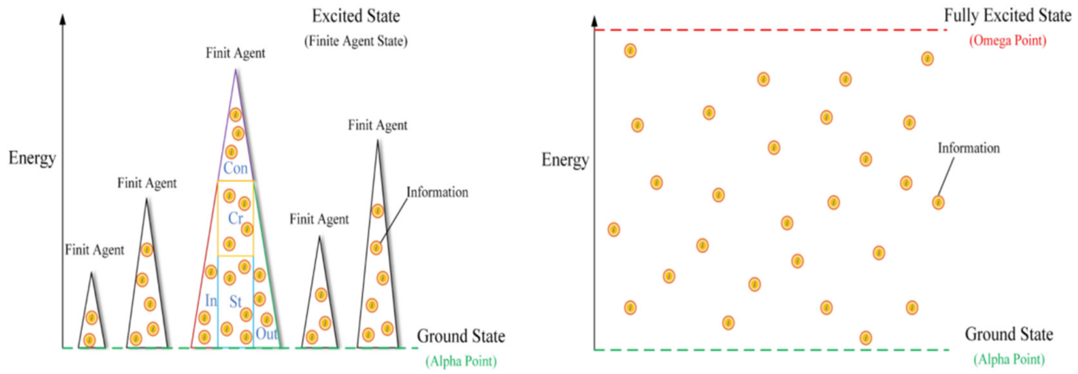

Figure 33. Ω Intelligence Field.

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