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Discovering Reality by Studying the System of Freedom and Proving Its Equivalence with the Universe

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Abstract

The author has established a mathematical theory about the system of freedom in which components of freedom are ruled by the largest freedom principle, explaining how one invariant reality can be equated with the dynamical universe. Freedom as a whole is the reality, and components of freedom show variable phenomena and become a dynamic system. In freedom, component equality leads to sequence equality; therefore, various sequences coexist in the system. Because there are incompatible sequences for any sequence, the interior of freedom cannot be a static sequence. In order for the system to be a whole, there must be some connecting sequences between any two sequences. Then, at every part of freedom, it is always possible to find a group of three independent sequences that, for most components, is located inside. For the sequence group, there is a sequence through which most components flow in and out. The most abundant three - sequence group and most abundant connecting sequence correspond to the space - time structure. Other incompatible sequences correspond to particles, and interactions between these sequences correspond to interactions between particles. The interactions have some symmetries similar to those in physics, such as SU (3) AND SU (2)×U (1), thus proving the feasibility of the hypothesis: the universe is equivalent with the system of freedom.

Keywords: system of freedom, sequence freedom, symmetry, purely logical world

1. Introduction

According to the principle of Occam's razor, all other things being equal, the simplest theory is the most likely to be true. The simplest possible scheme about the world is monism. If there is only one reality, the laws regulating the reality must be part of reality, thus the being must be self - regulating.

Freedom is a candidate for this self - regulating reality. The system including only freedom is called the system of freedom. For the sequence from non - freedom to freedom, each point can be viewed as a component, and these components evolve under the guidance of the largest freedom principle. The feasibility of the scheme then depends on whether the scheme 'components of freedom pursue the largest freedom' can explain the fundamental physical laws about all phenomena. If so, it supports a hypothesis about the universe:

The universe is equivalent with the system of freedom.

If it explains the universe as well as other hypotheses, simplicity—including both number of being and number of hypotheses about being—makes it the most likely to be true. In conclusion, there is another form for the hypothesis: the universe is equivalent with the system of logic.

2. Relation between freedom and real number sequence

Principle 1:

Some components form a sequence of real numbers.

A place in a coordinate sequence for a component to occupy is called a site. If a site is occupied by a part of freedom, the part forms a component. In this definition, components do not overlap with each other. Differences between components depend on which sequence they belong to and where they are located.

If there is no component between two sites, there is no site between them; thus, the sequence is always continuous. If there is no component at a site, the site cannot exist (however, as will be explained later, it is not as simple as it seems), and the next site fills in. For example, if the components in the interval (0, 1) are removed, other sites translate and keep the continuity.

If the sequence is a real number sequence, freedom is continuous and infinitely divisible. Infinite divisibility means that the potential of freedom, the largest possible freedom, is infinite. (From a sequence of real numbers, by removing components into other sequences, there can be infinite sequences of real numbers.) However, there is a misunderstanding about infinite divisibility: in contemporary theory, there always exists another being or sequence that can divide a sequence infinitely, but this is forbidden in a system of unique reality. For a sequence, if there is not another sequence to fulfil the operation, the former cannot be divided. In the system of freedom, there must be multiple sequences dividing and regrouping. Dividing sequences, and then regrouping the released components, is the process of evolution. (In the universe, the energy sequence divides the spatial sequence: it segments spatial sequences into more components by activating particles.) Hence, self - segmentation is an infinite process; and infinite components can be realised only in infinite future. Self - segmentation makes total freedom increase with evolution. (In the universe, this corresponds to the fact that there are more and more particles and that the universe expands forever.)

Principle 2:
All components are equal; correspondingly, all sequences are equal.
Some sequences are incompatible. For example, when two components in a sequence exchange positions, the resulting sequence is incompatible with the original sequence. Hence, for any sequence, there are infinite incompatible sequences. (When coordinates exchange positions, the sequence changes; however, it is still called a coordinate sequence, although a new one replaces the old one.) To achieve the largest possible freedom, there must be component equality or sequence equality; then, alternation of sequences, or motion of the components, is necessary to make every sequence realisable. (If there were an absolutely static sequence, it would violate the largest freedom principle, because there would be no freedom for its components. Without the principle—without freedom—there is no component of freedom).
Therefore, a coordinate in any sequence is movable, and there is a momentum sequence for any sequence. For any coordinate sequence ***x***, there is a momentum sequence ***k***. Although the motion of a coordinate leads to incompatible sequences, a coordinate sequence and its momentum sequence are compatible. However, they are different sequences. (Energy marks the difference in the universe, because particles with momentum can be activated from space by energy.)
A sequence of freedom from non - freedom to freedom is not a rigorous measurement or definition, because ‘non - freedom’ and ‘freedom’ are not clearly defined parts located in the system of freedom. Freedom cannot be measured or defined unless it is first clarified: *freedom of what* and *freedom from where to where*. There are two kinds of measurement. First, for components moving in a sequence, freedom is measured by its momentum sequence. Second, for components moving between sequences, usually between a coordinate sequence and the corresponding momentum sequence, there are various connecting sequences measuring freedom, similar to the energy and time sequences in the universe.
The second situation refers to the definition of a sequence. In a pure being, a sequence should be defined between at least two sequences (though it is still not uniquely defined). Then, the defined sequence and the two sequences used in the definition can be equal. Thus, a component is located in three sequences instead of one, and the three sequences are mutually defined in the sequence group.

Principle 3:
A component deals with three sequences: initial sequence, connecting sequence, and end sequence.
Between two sequences, the number of connecting sequences is infinite, and there are at least two that are independent, because the momentum sequence of a sequence is independent. When two sequences are independent, the position of one does not influence that of the other. For example, there is a momentum sequence for ***E*** (***A***), which is time sequence ***T*** (***A***). Both ***E*** (***A***) and ***T*** (***A***) are connecting sequences between ***A*** and ***P*** (***A***). (If ***A*** represents any sequence, then ***P*** (***A***) is its momentum sequence, and ***E*** (***A***) and ***T*** (***A***) are its energy sequence and time sequence, respectively.)

Principle 4:
The system of freedom is a whole; correspondingly, there are connecting sequences between any two independent sequences.
If freedom in one sequence cannot enter another sequence, the largest freedom principle is violated. If two sequences are not connected, they are two isolated beings. Because unification generates more freedom, it is required by the largest freedom principle.
The largest number of independent sequences in a part of reality, notated as N_S, is an important parameter. In the scope of human experience, three - dimensional R - space, three - dimensional P - space, energy, and time provide eight sequences.
The connecting sequence between ***A*** and ***B*** is notated as **C** (***A***, ***B***), and the three sequences form a three - sequence group. According to principle 3, every sequence participates some three - sequence group. Because of component equality, both ***A*** and ***B*** can be connecting sequences. Hence, the following hypothesis:
From ***A***, ***B***, and any **C** (***A, B***), it is always possible to construct a three - sequence group (***X, Y, Z***) satisfying:

$$\boldsymbol{X} = \mathbf{C}\,(\boldsymbol{Y}, \boldsymbol{Z}) \qquad (2)$$

$$\boldsymbol{Y} = \mathbf{C}\,(\boldsymbol{X}, \boldsymbol{Z}) \qquad (3)$$

$$\boldsymbol{Z} = \mathbf{C}\,(\boldsymbol{X}, \boldsymbol{Y}) \qquad (4)$$

Since ***A***, ***P*** (***A***), ***E*** (***A***), and ***T*** (***A***) already provide four independent sequences, there is more than one way to construct a three - sequence group. Then, one of the groups contains the most components inside, called the most abundant three - sequence group, notated as ***R*** - space, corresponding to three - dimensional space. ***R*** provides a reference system for observing inside the system of freedom. Because there is a momentum sequence for any sequence, there is momentum space ***P*** (***R***). Since coordinate space includes the most components, momentum space includes the least components. Since ***R*** cannot be isolated from the rest of freedom, there are **C**[***R, P*** (***R***)] and ***P***[**C** (***R, P*** (***R***))], corresponding to energy and time, respectively.

Principle 5:
The three - sequence group that includes the most components becomes ***R***, and the one with least components becomes ***P*** (***R***). Among all connecting sequences between the two groups, there is a sequence with the most components, **T[*R, P* (*R*)]**, and one with the least components, ***E*[*R, P* (*R*)]**.
Since energy is scarce (lowest energy principle) and time is abundant in coordinate space, it is reasonable to suppose that the two sequences correspond to time and energy sequences, respectively. The most components flow between ***R*** and ***P (R)*** through **T[*R, P* (*R*)]**, and the least components through ***E*[*R, P* (*R*)]**. I have assumed that coordinate space and momentum space are symmetrical [1]:

$$\boldsymbol{P}[\boldsymbol{E}\,(\boldsymbol{R})] = \boldsymbol{E}[\boldsymbol{P}\,(\boldsymbol{R})] \qquad (5)$$

Hence, time and energy in coordinate space become energy and time in momentum space. If N_S = 8, this can be proved. Since both ***R*** - ***T*** and ***P*** (***R***) - ***P*** (***T***) include four independent sequences and do not overlap, if one includes the most, the other includes the least. Meanwhile, if N_S = 8, ***R*** - ***T*** - ***P*** (***R***) - ***P*** (***T***) provides a complete reference system in which any component can be decomposed into eight distributions within the eight sequences. Various ***R*** - ***T*** sequences exist in different parts of freedom and offer the most convenient reference system to describe local states of freedom. Quasars, for instance, are examples of a significantly different ***R*** - ***T*** structure.

Because there is a momentum sequence for any sequence, there is one accompanying sequence for every sequence. (Three sequences in ***R*** are compatible sequences, but they are not accompanying sequences.) Therefore, there is always an accompanying state for any state, as shown in $\begin{Bmatrix} 1 \\ 1 \end{Bmatrix}$. However, each of the two accompanying states can be both occupied and unoccupied, thus there are three possibilities for the total number of components of the two states, similar to the possibilities of integral charge of elementary particles.

Different sequences mean different measurements. ***A*** and ***P*** (***A***), together with their various combinations, form a one - dimensional continuum. The continuum can be measured by different sequences. If measured by a coordinate sequence, the length of the continuum is zero for the part occupied by the most momenta; if measured by a momentum sequence, the length is zero for the part occupied by most coordinates. In a continuum, equality of sequences represents the relativity of the terms ‘long’ and ‘short’. There are no transcendental definitions for long and short. A component cannot be larger or smaller in both ***A*** and ***P*** (***A***), thus giving rise to an invariant parameter: phase - shift ***kx***.

A component’s information is provided by the distribution in coordinate space and momentum space. The same wave functions located in different sequences are different states, (and can be differentiated by energy). From experience, this is obvious because different particles can have identical wave functions. In this theory, particles are different because they have different distributions in sequences, not because they are essentially different (because they belong to freedom). For accompanying sequences, superposition is permitted; therefore, these two states and their various combinations have identical wave functions in ***R*** - ***T*** or ***P*** (***R***) - ***P*** (***T***). Therefore, it is necessary to clarify the sequence in the description of wave function. A wave function purely in ***R*** - ***T*** is notated as $\begin{Bmatrix} 0 \\ \Psi \end{Bmatrix}$, or simply $\begin{Bmatrix} 0 \\ 1 \end{Bmatrix}$; and purely in ***P*** (***R***) - ***P*** (***T***) is $\begin{Bmatrix} 1 \\ 0 \end{Bmatrix}$.

A sequence changes when its two components exchange positions. (They go on exchanging unless other components interrupt the exchange, which represents an interaction.) That a component exchanges positions with an empty state is a prerequisite for the realisation of many incompatible sequences, such as increasing components in a sequence while reducing them in another. Therefore, $\begin{Bmatrix} 1 \\ 1 \end{Bmatrix}$ and $\begin{Bmatrix} 0 \\ 0 \end{Bmatrix}$ are inevitable, and charge becomes a necessity. (The number of parts in a spatial state is related to charge. A spatial state includes three continuums, thus the number of parts ranges from zero to six, resulting in seven possibilities of charges for fundamental particles.)

For $\begin{Bmatrix} 0 \\ 0 \end{Bmatrix}$, there is no component in either the coordinate sequence or the momentum sequence; however, the state exists because there is a component in the connecting sequence. Then, principle 1 becomes clearer: a site in sequence ***A***, together with the corresponding distribution in sequence ***P*** (***A***) and various superpositions of the two distributions, exists when there is component in ***A***, ***P*** (***A***), ***T*** (***A***), or ***E*** (***A***). Hence, the existence of a component causes at least four independent sites to exist. In past works [1] and [2], coordinate and site were assumed to be different. Now, there is an explanation. Even if the component in ***A*** moves away, component in ***P*** (***A***) or ***C*[*A*, *P* (*A*)]** can still support the existence of the site.

In order to understand the three - sequence group better, let us begin with basic causal law. If a basic logical proposition is **XYZ**, with **X**, **Y**, and **Z** representing subject, copula, and predicate respectively, then, in a system with unique being, the three items must be homogeneous – thus, they are equal and can be mutually transformed. Since these items can be regrouped freely, the hypothesis means that there are proper transformations making a basic proposition the closest unity of three independent and equal items. Present understanding of logic does not treat them as different forms of the same being, because the experiential usage of logic often connects two phenomena. In freedom, every sequence is a flow between two sequences, and freedom can also be viewed as the logical link between them. (Change in a part of freedom must have a cause and a result, by outflow or inflow, meaning that any piece of freedom is included in the system of freedom—that is, freedom is an isolated system, meaning that freedom is also a unified system.) However, the basic proposition cannot be directly observed, and what we *can* observe is the relation between **XYZ** and **X'Y'Z'**, though **XYZ** can be decomposed conditionally**.**

3. Particles and symmetry

The principles in this section, dealing with components, cannot match the principles above, because the correct (*a priori*) principles guiding components to regroup have not yet been found, and they are necessary for understanding components.

Particles in ***R*** are components in other three - sequence groups. If N_S = 8, a particle (a state in other three - sequence groups) can be resolved as combinations of states in ***R*** - ***T*** and ***P*** (***R***) - ***P*** (***T***). If space and particles always accompany each other in practical space, mathematics itself has a responsibility to solve the contradiction. Assuming two independent beings (space - time and particles) simplifies present efforts to lay a logical foundation for the universe, but also causes logical complexity. (A system with one space is some sort of a unified system, but the unification is useless if coordinates cannot move because freedom does not increase. When coordinates can move, there is momentum space, and the connection of the two spaces increases freedom so that there cannot be merely two spaces.) Free spatial transformation theory [1] supposes there are two symmetrical space - time structures, ***R*** - ***T*** and ***P*** (***R***) - ***P*** (***T***), and that particles are moving coordinates. However, this paper proposes infinite local structures of space - time, instead of two, in order to solve some problems, such as why space is three - dimensional, how to connect the two space - time structures into one unified system, or why energy and time are logically necessary. In the following, free spatial transformation theory is incorporated into theory about the system of freedom to explain the basic physical laws that are the end of *a priori* deduction. (Even if the system of freedom is the most unpredictable system, there are still some logical results, which can be called inference of truth or reality. I think they should belong to reality, because *a priori* determinism is a standard for distinguishing reality and phenomena.)

To analyse the properties of a component, it is important to clarify the definitions of different components. There are two styles. When two parts are symmetrical in a sequence, there is no dividing line between them and the parts can be called indistinguishable in the sequence. When two parts are anti - symmetrical in a sequence, they are distinguishable in that sequence. Components are interexchangeable through both indistinguishable and distinguishable channels.

If two components are distinguishable in one sequence, that does not mean they are distinguishable in all sequences. For instance, two components can be anti - symmetrical in sequence ***X*** but symmetrical in sequence ***Y***, (however, the symmetrical parts are different from the anti - symmetrical parts). In the system of freedom, components keep on reorganising themselves, not only between components, but also between different parts within a component. Without parts, a component cannot be changed partially through interaction between components, which is insufficient for the pursuit of the largest freedom.

Between two individuals, the distinguishable or anti - symmetrical relation is similar to market behaviour, whereas the indistinguishable or symmetrical relation is similar to love or any regrouping of the mind for judgment. Love is the interaction between the judgment of persons, similar to the cooperation between two companies. Before the behaviour in question, each pursues his own benefit; after that, the two keep on influencing each other’s judgments or pursuits. In market exchange, a person’s judgment is stable and distinct, while lovers’ judgments are nearly indistinguishable, because one can pursue happiness for the other (but will not always). In relations between two persons, love and market relationship can coexist, and both are necessary in the pursuit of freedom.

Between two lovers, J and K, there are three independent forms of love, as shown in a Pauli matrix: $\sigma_x = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$, $\sigma_y = \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix}$, and $\sigma_z = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$. σ_x represents J pursuing K’s present benefit and vice versa; σ_y represents J pursuing K’s previous benefit and K pursuing J’s future benefit; σ_z represents one pursuing his own present benefit better while the other sacrifices some of his. All other forms of two - individual love are a superposition of the three. Similarly, there are eight independent forms of love for three - individual love.

When the wave functions of two identical particles are observed as symmetrical, they are indistinguishable only in the dominating space ***R***, and can be distinguishable or anti - symmetrical in other sequences. When two wave functions are anti - symmetrical, the dividing line between them is usually clearer, thus it is easier to judge that there are two parts. (It does not mean that parts 1 and 2 are distinguishable, because they can exchange positions through sequences unobservable in ***R***),

A component includes different parts in different sequences. Usually, it refers to three parts: distribution in ***R***, in ***P*** (***R***), and in ***E*** - ***T***. Between a wave function purely in coordinate space Ψ_R and its corresponding distribution purely in momentum space Ψ_P, there are infinite possible connections or distributions in ***E*** - ***T***; however, these states are usually indistinguishable in ***R*** or ***P*** (***R***), and only four groups of states are distinguishable (and each includes infinite distributions in ***E*** - ***T***). When Ψ_R and Ψ_P are symmetrical (+), notated as $\boldsymbol{Y_{R-P}}$, there are three groups that are distinguished by energy in ***R*** - ***T***; when they are anti - symmetrical (-), notated as $\boldsymbol{N_{R-P}}$, there is a singlet. ($\boldsymbol{Y_{R-P}}$ and $\boldsymbol{N_{R-P}}$ are called internal symmetries because they are symmetries between different parts within a component.)

There are also external symmetries between components. $\begin{Bmatrix}1\\0\end{Bmatrix}$ and $\begin{Bmatrix}0\\1\end{Bmatrix}$, pure states in ***R*** and ***P*** (***R***), provide reference states for defining the symmetry. Pure states in the two spaces are anti - symmetrical (if anti - symmetrical in a sequence is defined as independent in a sequence, these states are totally independent—anti - symmetrical in all sequences). When Ψ_R is symmetrical with $\begin{Bmatrix}0\\1\end{Bmatrix}$, its symmetry is $\boldsymbol{Y_R}$; when anti - symmetrical, it is $\boldsymbol{N_R}$. Similarly, there are $\boldsymbol{Y_P}$ and $\boldsymbol{N_P}$. Then, possibilities of symmetry are limited for $\begin{Bmatrix}\Psi_P\\\Psi_R\end{Bmatrix}$. The formulation $\begin{Bmatrix}1\\0\end{Bmatrix}$ - Ψ_P - Ψ_R - $\begin{Bmatrix}0\\1\end{Bmatrix}$ provides another route to calculate symmetry between $\begin{Bmatrix}1\\0\end{Bmatrix}$ and $\begin{Bmatrix}0\\1\end{Bmatrix}$, and it must be the same as $\begin{Bmatrix}1\\0\end{Bmatrix}-\begin{Bmatrix}0\\1\end{Bmatrix}$ (if their relationship is stable), thus:

$$S_P S_A S_{R-P} = -1 \qquad (6)$$

If various three - sequence groups are equal, those inconsistent with the dominating space become particles. To understand the relation between particles and symmetry, imagine two distributions in ***R*** and their counterparts in ***P*** (***R***): symmetrical exchange between the two distributions is inconsistent with ***R*** and ***P*** (***R***), (as if the two spaces are connected at the two states), and it is a particle (boson). Without transportation between ***R*** and ***P*** (***R***), symmetry between ***R*** and ***P*** (***R***) must be identical: change in one space must be accompanied by the same change in the other. When there is transportation or symmetrical exchange between ***R*** and ***P*** (***R***), such as between Ψ_{1R}

and Ψ_{1p}, changes in the two spaces are not synchronised and there is relative motion. Thus, ***P*** (***R***) is not a mathematical tool anymore and becomes an independent space. If symmetrical in one space and anti - symmetrical in the other, the internal symmetry must be symmetrical, and it is also a particle (fermion).

To understand the interaction between particles, one must view freedom as an unstoppable system, thus some changes keep happening. The smallest change is the interaction between two components. When one of the two is $\begin{Bmatrix}1\\0\end{Bmatrix}$ or $\begin{Bmatrix}0\\1\end{Bmatrix}$, it is a particle moving in space, the simplest interaction. When neither of them is $\begin{Bmatrix}1\\0\end{Bmatrix}$ or $\begin{Bmatrix}0\\1\end{Bmatrix}$, it is an interaction between two particles.

Principle 6:

Two components can interact when their symmetry is different in different routes—that is, one and only one of their external symmetries is the same. Without interaction, symmetry must be the same for different routes.

When both of the two external symmetries are the same, route Ψ_{1R} - Ψ_{1P} and route Ψ_{1R} - Ψ_{2R} - Ψ_{2P} - Ψ_{1P} (equal to that of Ψ_{2R} - Ψ_{2P}), have identical symmetries, and hence cannot interact.

The key principle of interaction is one common external symmetry and one opposite external symmetry; thus, the two components are partially distinguishable and partially indistinguishable. Hence, $N_R Y_P Y_{R-P}$ and $Y_R Y_P N_{R-P}$ can interact because Y_P becomes the channel for the two components to be exchanged. Similarly, $N_R N_P N_{R-P}$ and $N_R Y_P Y_{R-P}$ interact through the N_R part. For these two structures, Ψ_{1R}–Ψ_{1P} and Ψ_{1R}–Ψ_{2R}–Ψ_{2P}–Ψ_{1P} offer different symmetry. Different symmetry along different routes represents contradiction. To stop the contradiction, the two components merge or stop interacting (to get rid of the second route), corresponding to a fermion absorbing a boson or emitting a boson respectively.

For a component, based on principle (6), there are only two possibilities for the three symmetries: two symmetries and one anti - symmetry or three anti - symmetries. Hence, if S_{R-P} is +1, there must be external anti - symmetry. Thus, it proves that the particle with external anti - symmetry, called a fermion, must have three generations, notated as N (R, P)Y_{R-P}. Likewise, it proves that a particle with external symmetry, called a boson, must have one generation, notated as Y (R, P)N_{R-P}. N (R, P) and Y (R, P) refer to external anti - symmetry and symmetry respectively.

N (R, P) not only includes two basic states, $N_R Y_P$ and $N_P Y_R$, but also their various combinations. When $N_P Y_R$ and $N_R Y_P$ are anti - symmetrical, there is a group of fermions with ***U* (1)** symmetry. When they are symmetrical, there is a group of fermions with ***SU* (2)** symmetry.

There are two kinds of bosons, because Y (R, P) includes $Y_R Y_P$ and $N_R N_P$, which follow ***SU* (2)** symmetry and ***U* (1)** symmetry respectively. Thus, the part of N (R, P) with ***SU* (2)** symmetry interacts with $Y_R Y_P N_{R-P}$; the part of N (R, P) with ***U* (1)** symmetry interacts with $\boldsymbol{N_R N_P N_{R-P}}$. Overall, when components keep their integrity, there is $\boldsymbol{SU(2)\times U(1)}$ symmetry.

However, parts in a component are not fixed; thus, a component can decompose. There are six parts in $\boldsymbol{P-R}$, ($\boldsymbol{E-T}$ is excluded, perhaps because it is unobservable); therefore, there are seven possibilities for the number of parts in $\boldsymbol{P-R}$—from zero to six—corresponding to seven possibilities of charge, - 1, - 2/3, - 1/3, 0, +1/3, +2/3 and +1. If three parts are defined as neutral and six parts as having unit charge, a fermion with only one part in $\boldsymbol{R}$ has a charge of - 2/3; and three directions provide three colours, notated as $\boldsymbol{N(i)Y_{R-P}}$. Gluon $\boldsymbol{Y(i, j)N_{R-P}}$ represents the symmetrical relation between the part along $\boldsymbol{x_i - p_i}$ and $\boldsymbol{x_j - p_j}$. There are eight gluons because two interexchanging points as a whole is $\boldsymbol{Y_R Y_P N_{R-P}}$.

The above discussions include all possible variations in $\boldsymbol{R-P}$. However, there are some other possible variations in the system (dealing with $\boldsymbol{E-T}$), but they are not focus of this paper. For example, internal sequences can also provide interaction and particles. Then, $\boldsymbol{N_{R-P}}$ and $\boldsymbol{Y_{R-P}}$ have their microstructures, and there are many kinds of scalar particles (for example, $\boldsymbol{N_T N_E}$ or $\boldsymbol{Y_T Y_E}$ can interact with $\boldsymbol{Y_T N_E}$ or $\boldsymbol{N_T Y_E}$). The interaction of scalar particles is the interaction required to rewind time, which is necessary condition for particles to enter $\boldsymbol{P}$ ($\boldsymbol{R}$) from $\boldsymbol{R}$ [1]. $\boldsymbol{N_S}$ is another uncertain factor. If $\boldsymbol{N_S \geq 9}$, there are sequences (particles and interactions) that are unobservable in $\boldsymbol{R-T}$ and $\boldsymbol{P}$ ($\boldsymbol{R}$) - $\boldsymbol{P}$ ($\boldsymbol{T}$).

Conclusions

If the world is purely logical, reality ought to be purely logical existence, (meaning that logic is the reality). There is no *a priori* reason for any material; however, that does not mean that nihility is the reality, because immaterial items can be reality. If there is no *a priori* confinement, freedom should be the unique reality. (*A priori* existence of a material is also a confinement, relative to freedom.) As reality, freedom represents the world with the least degree of logical confinement, whereas it is impossible for freedom the reality to be completely unconfined.

If the world is purely logical, without any illogical being, the reality must be freedom. Thus, the largest possible freedom and pure logic are different names and different observations of the same reality. Therefore, the world of freedom is equivalent with the world of logic, and with an isolated system in which all reasons and results are included [3]. Then, the purely logical (*a priori*) principle regulating components of reality is the largest freedom principle. (Without the principle, it is difficult to discover the properties of components of reality. Logic, freedom, and reality form a triplicity and serve as the bases for recognizing the world.) Finally, these components evolve into a dynamic world. Material is the reflection of interaction between components. Freedom looks like a simple concept when observing it as a whole; however, it is a boundless, complex world when observing its interior (for the purely logical world, there is nothing outside freedom). Thus, that self - regulated freedom is an *a priori* dynamical world is proved purely logically. Moreover, it is the only *a priori* world and the notion that the universe is not an *a priori* world is unacceptable, thus the universe must be equivalent with system of logic or system of freedom, as stated in the title.

With the largest freedom principle, the system of freedom is the most unknown or unpredictable system after the basic principle is known. A sequence of freedom can be interpreted as a sequence of logical propositions. In freedom, all components cannot be arranged into one sequence, thus the system is unpredictable. With the expansion of the system, freedom keeps on creating new phenomena and leading to the lowest degree of knowability. (In another work, I have suggested the possibility of exploring the unknown world using military principles [4]).

Some logical links are still missing; however, hypotheses can be made to bridge the gap to make the scheme feasible. The main properties of freedom are more reliable than they are in the delicate discussions surrounding the feasibility of self - regulated freedom. Freedom may be understood in such a scheme: whole freedom is the largest freedom principle; space - time is the first - order local structure, effective in different parts; and particles are the second - order structure, connecting various space - time structures into a whole.

A researcher uses logic to discover truth. However, experiences and materials do not belong to logic. Hence, an idealised researcher should purely use logic, (and a partially logical researcher looks like a religious believer). Then the researcher can discover that logic or freedom is the reality. Nothing else can become the logical reality; hence, it is logical to infer that everything in the world belongs to logic or freedom. Because reality (and truth, the simplest knowledge about reality) is purely decided by logic, reality is eternal and universal.

The theory aims to unify science and truth with the largest freedom principle. Its key premises are: freedom (or logic) is the unique reality, whereas interactions of components serve as phenomena; the largest freedom principle is the ultimate good, which is the unique reason for basic natural laws; all systems of freedom pursuit are governed by the same laws, unrelated with the dimension of freedom, including knowledge, profit, happiness, action, and so on [4]; and basic natural laws can be translated into social laws to find good in society [5]. The theory defines and systematises truth and simplifies correct beliefs about the world into the unique belief of logic. Its inferences include (but are not limited to) the existence of unique reality (freedom) and good (the largest freedom principle); the existence, eternality, and universality of truth; and the existence and universality of a perfect social system (and perfect thinking system).

Experience is not a part of logic. Rationality can reveal truth much better than experiences (experiments), first, because truth is in much closer range with logic than experiences, and second, because logic is sufficient for deducing truth, whereas no experience can do so. Moreover, logic works better when experiences are excluded. The correct usage of logic should begin with logic, not with empirical evidence. (Some ancient philosophers believed truth could be revealed by logic but failed to infer correctly from logic, but Newton made their thoughts seem obsolete). Then, freedom will be the logical beginning of logic, which is also called reality. (Meanwhile, if freedom is reality, the largest freedom principle offers a direction of evolution in the entire system, called logic. Thus, freedom and logic are equivalent as reality.) Since every existing belief uses logic to deduce, if logic itself provides a self - consistent belief about the world, other beliefs are logically inconsistent. Hence, a rational person does not need an irrational belief.

Unlike ordinary beliefs about professionals, a researcher of truth will cover all subjects with everlasting value, if he can find any. Various systems in the world are different parts of the system of freedom; thus they share the same fundamental principles [5]. This is the theoretical foundation for establishing a perfect society. All miseries of mankind come from various evils violating the largest freedom principle—the unique good. Thus, the ultimate solution of science meets the ultimate solution of society and of knowledge exploration.

If the universe is purely logical, the fundamental laws can be established purely logically, and thus precisely. The present state of the theory is similar to the condition of geometry before Euclid, and correct axiomatization is the final step in discovering truth. There is only one axiom: the world is purely logical. However, axiomization is more difficult because it is purely logical and thus completely abstract. I have established the foundation – proving that the system of logic follows the largest freedom principle and is dynamic – though I cannot rigorously deduce its local properties, thus hypotheses are made. Logical judgment and critique about a theory ought to first focus on the foundation, then on the hypotheses, and other items are negligible (on the condition that the theory is about reality and truth).

My theory cannot be refuted by logic or freedom—that universal good; however, it has been repeatedly rejected by other illogical beliefs and rules—those conditional evils. No matter how successful they might have been, inductive beliefs and rules are evils (unless they can be purely logical, like freedom, then they are good). Phenomena and experience are incomparable to reality and logic. (For example, from experience, freedom, logic, and the universe are different, whereas in pure logic they must be identical.) I have absolute confidence in the purely logical part of the theory no matter the objections, because purely logical results are universally and eternally correct, thus can never be challenged by anything other than pure logic. Even the assumptions I have made are results of various elaborate considerations, the principles of which have not been accepted and thus most of the considerations are unexplainable, such as the science of pursuit, similarities among various systems, and so on. If the theory is accepted one day, its embarrassing experiences prove that truth can be discovered by a rational person, whereas it is difficult for an irrational or evil society to accept truth. When numerous evils are labelled as sciences, good and truth are overlooked, thus acceptance of truth is highly improbable. (Without universality, professional knowledge does not offer any advantage in assessing reality and truth, and thus, the referee system just lowers the possibility of acceptance from x to x^2.) Human beings have found nothing absolute, (universal, eternal, or 100% accurate) if there are several absolutes in this paper, nothing else matters.

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