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Combinatorial Science –
How Science Leads Humans with the Nature in Harmony

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Abstract: Science has greatly improved the material civilization, also promoted the spiritual civilization of humans. Even so, *can we assert that science is consistent already with the sustainable developing of humans in 21st century?* The answer is certainly Not because science is itself only a conditional truth on the reality of things and it is verified by the disposal of wastes in industrial activities led by science over the past hundreds of years. Notice the sustainable developing of humans introduces that humans should live with the nature in harmony, namely all products in human activities must be properly disposed of and not disturb the nature but it is far from this objective until today. Actually, the universal connection between things implies the application of science should be a systemic or combinatorial one, not a solitary or fragmented one, namely it should be discovered the closed systems of substances produced in human activities with an inherited combinatorial structure G^L and then, applied it for benefiting humans without intruding to the nature. Such a pattern on science developing is essentially a pattern different from the traditional but a revolution on science, i.e., a biggest problem of science facing to promote human civilization in the 21st century.

Key Words: Combinatorial science, conditional truth, CC conjecture, Smarandache multispace, coexistence of humans with the nature in harmony, sustainable developing of humans, application rule of science, science revolution.

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§1. Introduction

As we all know, the nature is the condition for human survival and science is the recognition of humans ourselves on the laws of nature in order to continuously improve the ability of humans adapting to the nature. Certainly, all practices of humans showed that science has greatly improved the material civilization, also promoted the spiritual civilization of humans. Even so, *what is the relationship of humans with the nature and what is the significance of science in human developing?* Surely, the purpose of science is to serve our human society and it has been

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a great success already. For example, the power units such as the steam engines, hydraulic presses and internal combustion engines have promoted the development of textiles, mining, metallurgy and the transportation, given the birth to modern vehicles such as automobiles, trains, ships and airplanes, improved human's travelling and extended the range of human's activities, the replacing of manual labor with machines has greatly improved the productivity. And meanwhile, the development of science with technology such as the synthetic materials, aerospace technology, electronic computers, the internet and artificial intelligence as well as the wide application of a large number of robots in production and living have further reduced the labor intensity and danger of humans, improved the quality of human living which showed further the role of science in promoting the development of human society, and greatly satisfied human's material and spiritual needs. However, the more science develops, the greater the interference of humans activities led by it on the nature. *Is such a kind of development led by science really beneficial to humans ourselves?* A fundamental question for answering this is the recognition on the ultimate goal of science, i.e., *is science intended to promote humans becoming the master of universe?* In this regard, it is necessary to correctly understand the relationship of humans with the nature as well as the position and role of humans in the universe.

Clearly, the vastness of universe determines the insignificance of human's position and the limitation of recognition on things in the universe, namely we can only recognize the laws of nature within the recognizable range of humans under conditions, can not clearly recognize those of things too far away or too close to humans. For example, the observation law of a planet in 1500 light-years from the earth is its law in 1500 years ago, not the current but only a historical one. At the same time, the uncertainty principle of microscopic particles shows that the measuring on a microscopic particle by human is affected by the external fields including the body field of human itself. And so, we can only carry out the relative recognition under conditions within the range of knowability while we measures an objective thing.

So, *is there an interdependent relationship between humans and the nature?* The answer is certainly Not because human is the product of nature, namely the existing of human depends on the nature, following *the survival of the fittest* but the nature does not depend on humans because the nature objectively exists before humans, i.e., whether there is human or not, the nature is operating in its order. In such a situation, *is there an interaction between humans and the nature, and the nature can accommodate or not all the infestation or wastes of humans?* These questions seem simple but they are actually the crucial question in science, even humans developing ourselves because under the survival of the fittest, the change of nature may finally affects the human survival. For many years, lots of humans answered these questions only from the perspective of human interests and always believed that all activities that can bring benefits to humans can be carried out, ignoring the intrusion of human activities on the nature. For example, the *fire* originated in human civilization directly discharges carbon dioxide, carbon monoxide and other wastes produced by the combustion into the air. *How should we dispose of the wastes that accompany with the combustion?* If we stand only on the local interests or industrial benefits, we will not aware of the intrusion of humans to the nature but believe that the nature can indefinitely absorb all wastes produced by human activities led by science, accumulating to today. However, a large number of facts show that the cumulative effect of

carbon in atmosphere is the reason of the destruction of ozone layer, rising temperatures, melting of Antarctic ice sheet, frequent droughts and extreme weather as well as the virus transmission and mutation, which have led to the deterioration of the human living environment, also harmful to human developing. Usually, such a cumulative effect can not be observed by one in a short period of time and may not be perceived by present humans for their limitation. And so, when we analyze the relationship of humans with the nature, we can not statically observe only in a specific time period or a short-term but should be historically measuring in a long-term after generations of work.

Generally, let humans (M) and the nature (U) be two independent systems and so, humans and the nature form an interacting binary system $K_2^L[M,U]$, as shown in Figure 1.

Figure 1

Notice that the effect of nature on humans is immediate, instantaneous and visible to humans today, but the reaction of nature to humans caused by human's action on the nature is a delayed effect, which is an accumulated effect of human activities acting on the nature over a period of time t, i.e.,

$$A(M,U) \ \to \ \int_{t=0}^{t} L(v,u)[s]ds = \int_{t=0}^{t} (L_1(s), L_2(s), \cdots, L_n(s))\, ds = A(U,M), \tag{1.1}$$

causing the human intrusion into the nature $A(M,U)$ from the quantitative to the qualitative change and the reaction $A(U,M)$ or the disasters to humans.

So, *how should we evaluate science with its role for promoting human civilization in the binary system $K_2^L[M,U]$ formed by humans with the nature?* We know that science is humans' own recognition on the laws of things, which is locally established by the human eyes, ears, nose, tongue, body and the mind, i.e., *six roots* on the present laws of things under conditions. Certainly, it is limited by human's own recognitive abilities and conditions, is not the essence of things, nor is it necessarily the whole pattern of the behavior of things ([4],[5],[12]), including the mathematical reality ([8]). And so, the application of any scientific conclusion is bound to be in the dilemma of that is both beneficial and harmful to humans, and the behavior of discarding directly to the nature is essentially forming $A(M,U)$ to invade the nature, and this infestation $A(M,U)$ accumulated over years will form $A(U,M)$ reaction of the nature to humans, i.e., the natural disasters or perceived by human's *six roots*. In this context, it really needs to review the intrusion of human activities led by science on the nature since the industrial revolution and repair or restore the coexistence of humans with the nature in harmony before the industrial revolution. Certainly, the main factor of which is the human activities ourselves, which is necessary to reflect on the ultimate goal of human, distinguish the relationship of humans with the nature and how science should develop with repairing the intrusion of previous scientific applications on the nature in order to achieve the ultimate goal

of humans, lead human activities without intrusion to the nature under the allowable condition of nature and then, achieve the coexistence of humans with the nature in harmony, which is the biggest problems of science developing facing in 21st century. For this objective, this paper aims to use the combinatorial notion ([6], [12]), a systematization of science on the notion of coexistence of humans with the nature in harmony to hold on the intruding mechanism and the limitations of scientific recognition in promoting the material and spiritual civilization of humans, appeals for a revolution of science developing and the self-restraint of humans ourselves in steps of the coexistence of humans with the nature in harmony.

§2. **Scientific Life**

Certainly, the human living depends on the development and utilization of natural resources, which are divided into renewable and non-renewable resources. Here, the renewable resources can be further subdivided into two categories, i.e., short-term renewable such as years, months or days and long-term renewable. Generally, the resources that are beyond the limitation of life for generations, namely it requires thousands or even tens of thousands of years to regenerate are classified as non-renewable because once they are exhausted, they are no longer available to the present and serval subsequent generations. Among them, the living of humans in ancient times and the era of agricultural civilization depends on *grains* and the horses, cattle, pigs, sheep, etc., which are all renewable resources but the industrial and modern civilization led by science extended the living condition of human to non-renewable resources in a large number. So, *how are scientifically led changes in human living of natural resources intruding on the nature?* We analyze in the following.

2.1.Living Conditions. As a high-level animal on the earth, the birth of human is inseparable from the earth's environment with its providing of materials. Standing on the side of humans in $K_2^L[M, U$, we first look at the living conditions of other creatures on the earth. For example, ①Plant's living. Plant takes its continuation in cycle of the four seasons as the goal because there are environmental and material conditions on the earth adapting to the plant's living such as the sufficient rainwater, air, fertilizer, photosynthesis, etc., which can maintain their growth and reproduction; ②Animal's living. Animal is also maintaining its species going as the goal because there are environmental and material conditions on the earth that meet the survival and reproduction of the animal, namely a variety of foods that meet its survival and maintain the nutrients needed by its body, accompanying only by certain spiritual needs. Among them, the spiritual needs of animals are used as the condiments of material needs. For example, animals often fight when foraging or competing to be the leader of group, maintaining the social order of population, etc. Naturally, human's living is similar to that of the animal such as to meet the first need of survival and the species going, i.e., the necessary material conditions and the second, to pursue one's psychological satisfaction or happiness, i.e., to achieve human's spiritual needs. However, different from the ordinary animals, the human spiritual needs are mainly leaded by consciousness, which can be pursued separately from the material needs. This is the biggest difference of human to that of ordinary animal in behavior, also a main problem that we need to pay attention to in analyzing human activities led by science and achieve the

coexistence of humans with the nature in harmony because all animals and plants are based on satisfying living conditions, i.e., the material needs on the earth but humans need both to meet their material and spiritual needs, and even to a certain extent, the spiritual needs are higher than that of the material needs ([2]).

So, *are there the material conditions of human living on the earth?* The answer is Yes! According to the principle of survival of the fittest, it is precisely because of the natural environment of living on the earth that led to the birth of human on the earth and then followed an era of agricultural civilization in about 7,000 years of humans. Conversely, if the changes of earth's environment are no longer suitable for human survival on a certain day, the earthlings will inevitably cease to exist. Notice that the human is born on the earth because it has the material conditions for human survival. So, *what material conditions are needed for human survival on the earth?* The answer is usually *the clothes, food, residence and traveling*, which is necessary for human survival. Here, the *clothes* refers to *dressing*, mainly reflecting the function of protecting one from cold, rain and shame; the *food* means the satiety of *diets*, i.e., from the living of picking wild fruits and hunting to imitating the growth law of grains, horses, cattle, pigs, sheep, etc., organizing cultivation and livestock feeding to obtain various nutrients for human body; the *residence* means the dwelling, i.e., shelter, house from the wind, rain and protecting one from other animals invasion; the *traveling* refers to the travel pattern, i.e., from walking, riding and other livestock traveling to horse-drawn carriage, ox cart traveling, etc., reflecting the function of shortening the traveling time by livestock in space. Notice that the agricultural civilization had also provided the material needs for human's living whether it is *grain* or horses, cattle, pigs, sheep, etc., meeting the needs of nutrition, clothing, dwelling, traveling and other materials of human body. However, they are all renewable ones on the earth, which achieved the coexistence of humans with the nature in harmony in about 7,000 years.

2.2.Scientific Mechanisms of Substance. Certainly, all substances are steady composites in the nature, not a pure molecule or atom with solid, liquid and gaseous states, which are the product of billions of years of natural mechanisms. The main way of science leading human activities and benefiting humans ourselves lies in designing the industrial production through by physical process and chemical reactions such as those of forging, decomposing or synthesizing substances that are beneficial to humans, developing and promoting the material and spiritual civilization of humans. Generally, a main way of scientific application for producing new substances needed by humans is to create artificial conditions, promote physical changes or chemical reactions between substances and achieve the change of shape, the decomposition or synthesis of substances. Usually, an industrial process contains multiple physical forging or chemical reactions with a chemical pattern

$$A_1 + A_2 + \cdots + A_m \ \rightarrow \ B_1 + B_2 + \cdots + B_n \tag{2.1}$$

in standard, where the symbol A_i denotes a molecule involved in the reaction, B_j is a produced molecule for integers $1 \leq i \leq m, 1 \leq j \leq n$, $m \geq 1, n \geq 1$ and there are two main matters that need special attention, namely ①$A_1, A_2, \cdots, A_m$ are m pure molecules involved in the chemical reaction which can be achieved only under the laboratory conditions. Usually, a compound

not only contains molecules $A_1, A_2, \cdots, A_m$ but also accompany with other compounds or impurities in practice; ②All produced molecules $B_1, B_2, \cdots, B_n$ are not all beneficial to humans. Without lost of generality, assume that $B_1, B_2, \cdots, B_{s_0}$ are beneficial but $B_{s_0+1}, B_{s_0+2}, \cdots, B_n$ are harmful. Then, the outputs $B_{s_0+1}, B_{s_0+2}, \cdots, B_n$ are wastes, including the solid, liquid and gaseous in an industrial process. So, *what are the steps in the industrial process designed through the mechanism led by science and what are the substances that intrude to the nature?* Here, an analysis on the industrial processes is as follows.

(1)Resource extraction. The resource extraction is a physical process, namely it does not change the molecular structure and properties of resources but only leaves a certain number of tunnels or holes on the earth. Generally, the measure will be taken accordingly on the extraction and will not affect the stability of the earth's structure, but it is not clear to what extent the holes will affect the moving of earth. At the same time, humans are not clear about the role of liquid and gaseous resources such as oil, shale gas in operating of the earth, but from the depletion of water in a region will lead to soil drought in this region and affect the growth of crops on it, the human exploitation of earth's resources must involve in operating mechanism of the earth, but humans can not understand clearly in a short period of time. For example, we can all sense that the lack of water will cause the earth surface to dry up, crack and plant on it deplete and die, etc. So, *what is the role of coal, oil, shale gas and other products of natural evolution over hundreds of millions of years in operating of the earth? Will it affect moving of the earth, will it cause frequent geological disasters such as earthquakes, mountain collapse and mudslides after large-scale mining? Does it have an impact on the operating environment of other stars?* Indeed, humans are there while exploiting these natural resources, they only see the useful value for humans but do not or can not see its final impact on operating of the earth, even the nature because the natural regulation on such an intrusion of humans is a long-term gradual process, its effect maybe perceptible decades or centuries later, namely its reacting on humans can be perceived by humans, not on the current but the future generations. Among them, not only the depletion of resources but also the natural reaction will cause more events that are relative to human disasters, may not be seen by current. So, when looking at the relationship of humans with the nature, we can not only stand on the human side in $K_2^L[M, U]$ and look at science to benefit humans at present and then, allow it to invade the nature without restraint because science to benefit humans needs to ensure first the sustainability of human reproduction, which can benefit not only the present but also the future generations.

(2)Energy production. Energy is the power source of industrial production and living of humans, including fossil energy such as the coal, oil, natural gas, nuclear materials as well as the thermal power, hydropower, nuclear power, wind power, solar energy, biomass energy, etc. Among them, the fossil energy is generated by natural mechanisms over tens of thousands of years and is the non-renewable resource on earth. For example, a thermal power plant consists of three main systems such as the combustion system, soda system and electrical system, and its waste generated includes sulfur dioxide, sulfur dioxide, dust, fly ash, waste water, etc.; A nuclear power plant consists of nuclear island and conventional island, and its waste generated includes the radioactive solid, liquid and gaseous substances, including the waste water and washing water, radioactive gaseous substances, etc. In contrast, a hydroelectric power plants

produces fewer pollutants, and its impact on the nature mainly lies in the impact of dams on the ecological environment such as water resources and the barrier of fish migration channels.

(3)Waste disposal. All energy and industrial production, including the military and defense industries may cause certain disturbances to the nature. For example, a nuclear power plant has a special system for the disposal of radioactive waste because the direct discharge will cause severe pollution of soil, river and air. Generally, if the discharge from a nuclear reactor can not be reused, a storage measure needs to be taken. Usually, the raw materials used in industrial production also contain a certain proportion of impurities in addition to the main compounds. And meanwhile, the gaseous, liquid and solid wastes are directly discharged into the natural environment in most cases unless to centralized recovery and disposal in the sealed reaction device. So, *how do humans dispose of the waste, and under what conditions to do so?* Generally, humans dispose of waste according to their own standards and then, discharge it into the nature, namely after the disposal, it is discharged into air in a gaseous state, the liquid state into the river and the solid is placed in the field. Let's take the textile printing and dyeing as an example. Usually, each ton of textile printing and dyeing needs to consume 100-200 tons of water, resulting in 80%-90% of waste water, containing slurry and its decomposition products, fiber chips, enzyme pollutants, grease, nitrogenous compounds, bleach, sodium thiosulfate, sulfide alkali, aniline, copper sulfate, formaldehyde, terephthalic acid, ethylene glycol and other harmful substances. So, *can we discharge the printing and dyeing waste water directly into the river?* Of course Not! The discharging of printing and dyeing waste water directly into the river, even if it does not contain other impurities and meeting the condition ① in (2.1), it will still cause the river to be polluted and the aquatic organisms such as the fish and shrimp will gradually die. So, all industrial wastes $B_{s_0+1}, B_{s_0+2}, \cdots, B_n$ in (2.1) need to be disposed of according to the corresponding standards before they into the nature. After then, *does the disposed $B_{s_0+1}, B_{s_0+2}, \cdots, B_n$ according to standards do not pose an intrusion to the nature?* The answer is Not also because all wastes $B_{s_0+1}, B_{s_0+2}, \cdots, B_n$ are disposed of according to human standards set by ourselves and do not restore the natural composition to its original state. In fact, if all wastes are disposed of in its original state before the industrial production, it should be existed a reverse process

$$B_1 + B_2 + \cdots + B_n \ \rightarrow \ A_1 + A_2 + \cdots + A_m \tag{2.2}$$

of (2.1). Even if the inverse process (2.2) of (2.1) exists, its implementation mechanism with condition $\mathcal{C}^-$ needs to be researched further under the human ability.

2.3.Spiritual Need on Science. Generally, human needs are physiological needs in the first, including food, water, air, sexual desire, health, etc., and then follows by the spiritual needs, including personal safety, life stability, protection from physical pain, disease and other safety needs as well as the social needs such as the socialization, respect, self-realization, personal feelings of achievement or self-worth, recognition, respectful needs and the self-realization needs for the pursuit of ultimate goal of life. In fact, all human activities led by science are more around human's spiritual needs after the material need is satisfied. For example, Energy science has been built to meet the human needs for protection from the frost damage, cooking

meals, industrial power and organizing the production, transmission of energy; Architectural science has been established and the light textile, building material production, construction technology have been developed in order to meet the comfort and safety of human's living, which constructs a large number of artificial buildings, commercial housing and the household industries; Nutrition and medical science have been established and the food processing, light industry, pharmaceutical industry have been established in order to ensure human food safety and disease prevention; The establishment of traffic science, the research and development of driving devices, the creation of trains, cars, planes and ships are shortening the time and space distance of human traveling. In order to meet the needs of human's information exchange, the information science has been established with the terminal facilities such as the internet, telephone, mobile phone and mobile communication. Similarly, in order to reduce the labor intensity and reduce the danger, the artificial intelligence production or auxiliary systems have been constructed, robots that can replace manual labor in whole or in part have been developed to achieve the automatic production and the automatic monitoring, alarm systems and the facilities have been developed to meet the needs of industrial production and social management; And also, the devices, facilities and weapons of mass destruction produced to meet the needs of politics, military and the national defense have increased, the excessive exploitation and consumption of natural resources to satisfy the spiritual desires of a small group or number of humans become the norm. Meanwhile, whether it is energy or industrial production, the output of waste and the intrusion to the nature are greatly increased compared with the era of agricultural civilization such as those of the nitrogen and hydrogen compounds, sulfur dioxide, nitric oxide, nitrogen dioxide, suspended particulate matter and other waste emissions, and the threat to human survival by reaction of the nature is forming in the extreme disasters.

2.4.Application Rule of Science. Usually, science is a local recognition of humans on the laws of objective things, i.e., it is the recognition under conditions, namely science is the local or conditional truth on things. Thus, its improper application will bring certain harms to humans, which forms a situation that science is both of beneficial and harmful, i.e., dilemma to humans. So, *what is the application rule of science?* The application rule of science means that the application of scientific conclusion should be in accordance with the principle that no intruding to the nature, namely they should be applied and benefit humans ourselves in the field and under the conditions in which their conclusions are established with all products properly disposed of. But in fact, most of the human activities led by science fail to strictly comply with this principle, which is reflected in the fact that the energy exploitation, preparation and industrial activities for promoting the material and spiritual civilization of humans are not carried out in a strictly closed container and most of the wastes generated in process, including the gaseous, liquid and solid are directly discharged into the nature, which forms a factual invading to the nature including the air, water and land around or on the earth.

Certainly, the abusive application of science to meet the needs of a few humans in certain extent such as the domination, resource plunder, capital profit-seeking, excessive pursuit of spiritual enjoyment in history resulted in the human activities led by science violating the application rule of science ([1], [9]) such as those of ①Applying the nuclear fission and nuclear fusion of physics to the manufacture of nuclear weapons such as atomic bombs and hydrogen

bombs, destroying humans, buildings and structures of humans; ②Applying the bacteria, protoorganisms, viruses, etc. in biotechnology to the manufacture of biological weapons and carries out large-scale transmission in the population through poisonous gas or infected mosquitoes, lice, bed bugs and human breathing; ③Capturing asteroids or capturing precious metals enormously on other planets, affecting the natural operating; ④Causing a large number humans to lose their jobs by the internet and AI while reducing labor intensity; ⑤Research and developing various computer viruses spreading on the internet, destroying or interfering with various management systems of the commerce, finance, government and military on which humans depend; ⑥Violating the principle of survival of the fittest, artificially changing the gene structure formed naturally for capital profits and affecting the social order of creatures or humans. For example, the growing number of the internet, mobiles and commercial housing has blocked the communication in humans. AI, including the robot was originally developed to facilitate the production and life for those of intellectual disabilities or partial physical deficiency, which should not be widely applied to general humans. Otherwise, while it provides convenience for humans it will also weaken or replace the natural functions of human body adapting to the natural environment. Particularly, those AI robots with functions such as those of learning, dialogue and interaction further weaken the social structure and the function of human body, which will urge a few ones to control the robots or natural humans modified only by relying on keys in their hands, form a new domination or robot empires, endangering the survival of humans further, and so on.

Notice that there is a dilemma in the application of science. So, *how should science developing to promote the coexistence of humans with the nature in harmony?* The answer is that science should develop with a criteria that leads all human activities in harmony with the nature, i.e., promoting the coexistence of humans with the nature in harmony on the application rule of science by systematic or combined scientific conclusions rather than a partial or an isolated one, actively terminates those of science that only satisfies the needs of humans ourselves but intruding too much to the nature ([3]).

§3. Combinatorial Science in Closed System of Substances

The existence of universal connections between things in the universe and the local recognition of things by humans ourselves naturally lead to a conclusion that the reality of a thing is nothing else but a Smarandache multispace ([13]-[14]) in recognition, which provides the combinatorial notion on the recognition of things ([6]). Generally, disposing of the wastes $B_{s_0+1}, B_{s_0+2}, \cdots, B_n$ to their original states $A_1, A_2, \cdots, A_m$ in chemical reaction (2.1), an effective way is by the reverse process (2.2) of (2.1). However, by this way all products $B_1, B_2, \cdots, B_{s_0}$ that are beneficial to human needs should be readded to $B_{s_0+1}, B_{s_0+2}, \cdots, B_n$ and then, the wastes $B_{s_0+1}, B_{s_0+2}, \cdots, B_n$ can be synthesized from (2.2) into $A_1, A_2, \cdots, A_m$ under condition $\mathcal{C}^-$. Generally, the implement condition $\mathcal{C}^- \supset \mathcal{C}$, i.e. the realizing condition of inverse process (2.2) is usually stronger than that of (2.1). But then, humans will not be able to get $B_1, B_2, \cdots, B_{s_0}$ and benefit from (2.1) also. In other words, to obtain $B_1, B_2, \cdots, B_{s_0}$ from the industrial pattern (2.1) necessarily produces the wastes $B_{s_0+1}, B_{s_0+2}, \cdots, B_n$. Thus,

if we have no new evolutionary mechanism for applying or properly disposing of outputs $B_{s_0+1}, B_{s_0+2}, \cdots, B_n$ in (2.1), it is inevitable to form an intrusion $A(M,U)$ of (1.1) into the nature and it is impossible to achieve the coexistence of humans with the nature in harmony, namely the disposal of wastes produced by (2.1) can not be carried out in its reverse process. Notice that all science conclusions are local or conditional truth of humans and the existence of universal connection between things. There must be an inherent combinatorial structure G^L in scientific conclusions on the reality of things ([12]), which implies that any scientific conclusion should not be applied in isolation but should follow the application rule of science on a systematic recognition. We should find the inherited structure G^L in those of related conclusions such as the pattern (2.1) produces an evolutionary combination of substances so as not to invade the nature, and actively sequester wastes generated by (2.1) rather than discarding them to the nature if necessary. This is the biggest problem of science developing facing in 21st century.

3.1.Evoluing System of Substance. After hundreds of thousands of years, all substances in the nature have formed a relatively stable evolutionary closed system, following the law of conservation of substance. And so, the science combinatorization is to discover the closed system of evolving around substances in human activities according to the rule of substance evolving so as to change the single or partial application mode of science and then, lead human activities to achieve the coexistence of humans with the nature in harmony and complying with the application rule of science. For a typical example, the molecules $A_1, A_2, \cdots, A_m$ in the pattern (2.1) are reorganized and evolved into new substances $B_1, B_2, \cdots, B_n$ under conditions with atoms as the basis, namely $A_1, A_2, \cdots, A_m$ is a permissible group $\mathcal{G}(A_1, A_2, \cdots, A_m)$ of molecules in 1st level, and the output of $B_1, B_2, \cdots, B_n$ is an induced molecular group $\mathcal{G}(B_1, B_2, \cdots, B_n)$ in 2nd level. In this case, the pattern (2.1) is

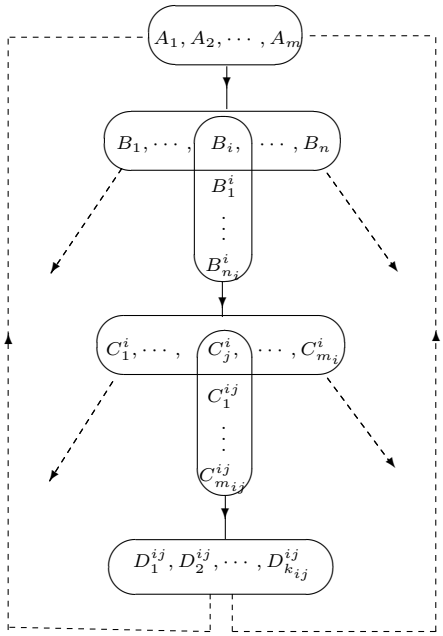

Figure 2

$$\mathcal{G}(A_1, A_2, \cdots, A_m) \to \mathcal{G}(B_1, B_2, \cdots, B_n) \tag{3.1}$$

Among them, whether they are the beneficial substances $B_1, B_2, \cdots, B_{s_0}$ or the disposing of wastes $B_{s_0+1}, B_{s_0+2}, \cdots, B_n$ to humans, both of the cases can produce new substances, or other substances can be found to form new permissible groups with one or more molecules of $B_1, B_2, \cdots, B_n$. Without loss of generality, for any integer $1 \leq i \leq l$ assume that the molecules $B_1^i, B_2^i, \cdots, B_{n_i}^i$ with the molecule B_i constitute a permissible group $\mathcal{G}\left(B_i, B_1^i, B_2^i, \cdots, B_{n_i}^i\right)$ of

molecules in 2nd level and there is

$$\mathcal{G}\left(B_i, B_1^i, B_2^i, \cdots, B_{n_i}^i\right) \to \mathcal{G}\left(C_1^i, C_2^i, \cdots, C_{m_i}^i\right), \quad 1 \le i \le n \tag{3.2}$$

Similarly, for any integer $1 \le j \le m_i$, assume that the molecules $C_1^{ij}, C_2^{ij}, \cdots, C_{m_{ij}}^{ij}$ with the molecule C_j^i form a permissible group $\mathcal{G}\left(C_j^i, C_1^{ij}, C_2^{ij}, \cdots, C_{m_{ij}}^{ij}\right)$ of molecules in 3rd level and there is

$$\mathcal{G}\left(C_j^i, C_1^{ij}, C_2^{ij}, \cdots, C_{m_{ij}}^{ij}\right) \to \mathcal{G}\left(D_1^{ij}, D_2^{ij}, \cdots, D_{k_{ij}}^{ij}\right), \quad 1 \le i \le n,\ 1 \le j \le m_i, \tag{3.3}$$

which results in an induced molecular group $\mathcal{G}\left(D_1^{ij}, D_2^{ij}, \cdots, D_{k_{ij}}^{ij}\right)$ in 4th level, $\cdots$.

Notice that this evolving process can go on forever, as shown in Figure 2. So, *under what conditions does such an evolving constitutes a closed system?* The answer is the new substance induced by the permissible groups of molecules have already appeared in permissible groups of molecule with lower level, namely the collection

$$\left\langle A_{i_0}; B_i, B_j^i; C_j^i, C^{ij}; D_k^{ij}, D_l^{ijk}, \cdots, 1 \le i_0 \le m, 1 \le i \le n, 1 \le j \le n_i, 1 \le k \le m_{ij}, \cdots \right\rangle \tag{3.4}$$

forms a closed set under the evolving rule of molecules. In this case, the molecular system (3.4) naturally forms a substance flow ([7],[15]) under the rules of material evolving and follows the conservation law of substance in the nature. Furthermore, let the vertex set $V(G)$ of graph G consists of each molecule in (3.4) and if the permissible groups of molecules $\mathcal{G}(\cdots, u, \cdots) \to \mathcal{G}(\cdots, v, \cdots)$, connect an edge (u, v) between u and v, and if a molecule v in an induced groups of molecule has appeared already in a permissible group of molecules, connect an edge (v, v) from v to v in the molecular group with lower level. Now, let the output of molecule v in permissible group of molecules $\mathcal{G}(\cdots, u, \cdots) \to \mathcal{G}(\cdots, v, \cdots)$ be $C(v)$ and label the edge (u, v) or (v, v) by $C(v)$. In this way, a mathematical model on the evolution of substance flow is obtained, called the *continuity flow* G^L with all edge-end operators 1 ([10]-[12]). At this time, the conservative law of substance in nature is shown by the conservative law of each vertex in G^L, which is a closed system of substances evolving in human activities.

Generally, by the coexistence of humans with the nature in harmony, we should discover the closed system similar to (3.4) on substance evolving and then, establish the continuity flow G^L on each of human activities for the sustainable developing of humans.

3.2.Allowable Contents of Living. Certainly, the construction of substance evolving system G^L of human activities is an ideal situation in which all human activities follow the natural laws and do not intrude with the nature. However, there are many important issues that need to be clarified. It should be pointed out that the discharge of wastes $B_{s_0+1}, B_{s_0+2}, \cdots, B_n$ into the nature for obtaining benefits $B_1, B_2, \cdots, B_{s_0}$ of (2.1) in case of difficult discovering the closed evolving system G^L of substances, is essentially an intruding on the nature and violating the application rule of science. Among them, the problem that the content of each substance suitable for human survival in the nature or its limitation has not yet been solved, which results in that all wastes in industrial production are disposed of according to the standards set by humans ourselves. It seems to be consistent with the laws of substance evolving but the

impact may be on the descendants of humans because the nature's self-regulation or reaction to human intrusion is a cumulative effect, not necessarily on the present. In the case that the closed substance evolving system G^L of human activities can be difficult discovered in a short term, the coexistence of humans with the nature in harmony urgently needs to clarify the substance content or boundary suitable for human survival in the binary system $K_2^L[M,U]$, whose mechanism is that assume there are n substances suitable for human survival in the nature, expressed as a vector $(\omega_1,\omega_2,\cdots,\omega_n)$, $L(v,u)=(L_1(t),L_2(t),\cdots,L_n(t))$ is the influent vector of human activity on the n content of natural substance at the time t and $\mathcal{R}^P[t]=(\mathcal{R}_1[t],\mathcal{R}_2[t],\cdots,\mathcal{R}_n[t])$ is the corresponding natural absorbable vector. Then, the cumulative intrusion of human activities on the content of natural substances is an integral

$$A(M,U) \ = \ \int_{t=0}^{t}(L_1(s),L_2(s),\cdots,L_n(s))\,ds.$$

At this time, if the vector composed of maximum content of natural substances allowable for human survival is $\mathcal{T}^P_{\max}=(\mathcal{T}_1^{\max},\mathcal{T}_2^{\max},\cdots,\mathcal{T}_n^{\max})$, then the inequality

$$\int\limits_{t=0}^{t}\big(L(v,u)[s]-\mathcal{R}^P[s]\big)\,ds \ \leq \ \mathcal{T}^P_{\max} \tag{3.5}$$

is a natural allowable condition for human activities. Otherwise, it is an intrusion of humans into the nature, and may cause the nature's reaction to humans or natural disasters known by humans. Consequently, while discovering the closed substance evolving system G^L of human activities, it is necessary to find the range or limitation of natural substances $(\omega_1,\omega_2,\cdots,\omega_n)$ suitable for human survival, reduce the emission of human wastes until the zero emission of them to the nature and then, form the closed substance evolving system G^L. In this process, if the current disposal process or technology on wastes of humans do not meet the discharge of natural allowing, the waste should be effectively sealed for waiting the progress of disposal technology after it completely complies with the natural allowing.

3.3.Reflecting on Human Civilization. The coexistence of humans with the nature in harmony requires us to reflect on human activities led by science, actively take the corresponding measures for making up all mistakes in the past and adjust misconduct of humans ourselves.

The first is to review on scientific research and human activities led by science that excessive intrude to the nature, strictly restrict or end those of them, including ①Affecting the operating order of universe. Today, unless some hypotheses and phenomenology on the operating of universe, humans do not really know the internal rule or mechanism of universe. Until today, various aircrafts launched for space exploration have formed garbage in space after being scrapped, which increase the probability of collision with asteroids or human vehicles and should be properly handed. Furthermore, a few of ambitious humans plan to seize rare metals such as the gold and other precious metals on extraterrestrial planets or capture asteroids in order to pursue the economic interests, which will eventually affect the operating of universe or change the universe order and may have an immeasurable impact on the earth, including humans ourselves; ②Destroying the biodiversity. An outstanding manifestation of biodiversi-

ty is the survival of the fittest living in environment. And so, the destruction of biodiversity directly affects the food chain and climate on the earth. So far, humans have only a limited understanding on most other creatures, do not fully know their living conditions. In this case, the application of local scientific conclusion is easy to induce the destruction on the biodiversity. For example, the pesticides can effectively control pests and diseases, eliminate weeds, improve crop yields and quality. However, most pesticides can be not or difficult to be naturally degraded, which results in environmental pollution and pesticide residues on crops, destroys the soil structure, pollutes terrestrial water resources and kills the creatures or microorganisms in soil and water to a certain extent; ③Changing the natural operating order of human body. Notice that human is the product of the environment. But, *why was human born on the earth, not on other planets?* The answer is that there are environmental conditions on the earth that are suitable for human existence. In this case, the first should be to protect the earth's environment, including to restrict or end those behaviors that may destroy the earth's environment for capital profit and the second, is to protect the human body itself, limit or terminate those scientific research with applications that try to change the laws of reproduction and operating of human because whether it is the impact on the earth's environment or on human body, the impact of such an application of science on humans has a time delay effect, which will affect the descendants of humans for generations. Thus, under the coexistence of humans with the nature in harmony, those of scientific researches with applications, including genetic engineering, gene editing and the deep integration of AI with the human body must be strictly restricted or ended.

Secondly, it is to find scientific solutions for the coexistence of humans with the nature in harmony, correct and eliminate the harm caused by excessive intrusion of humans into the nature in the past. Certainly, the industrial civilization is too dependent on non-renewable resources of the earth, which throws waste and aggravates the intrusion of human activities to the nature. For example, there is a threshold R_{human} in air, by which humans can only survive on the earth if the amount R_{air} of carbon dioxide in air satisfies $R_{air} \leq R_{human}$. Thus, if the nature is not enough to absorb the carbon dioxide emitted by human activities, the redundant carbon dioxide will float in air, and it is necessary to artificially reduce the carbon dioxide emissions to meet the living condition $R_{air} \leq R_{human}$. And meanwhile, even if it holds with $R_{air} \leq R_{human}$ but the accumulation of carbon dioxide in air to a certain amount will cause also the destruction of atmospheric ozone layer, result in the natural phenomena such as those of the rising of global temperature, melting ice sheets, rising sea levels, extreme weather, drought, virus mutation and others, affect the human survival also. To this end, the first is to study the scientific mechanism of carbon neutrality, reduce or absorb carbon dioxide in air using for humans, restore the content of carbon dioxide in air under R_{human} below; Next is to improve the equipment and facilities in human production and living, collect and dispose of the carbon dioxide produced by each of them in a centralized manner, no longer directly discharge it into the nature; And again is to extend the cultivation of green plants, especially to those of occupied for production or living as the roofs, exterior walls of buildings and extending water areas further, etc.

Thirdly, it is the self-examination and self-discipline on behavior of humans. Indeed, science

has promoted the civilization of humans in material and the spiritual. But how science should lead the coexistence of humans with the nature in harmony is a major problem that humans need to reflect on and solve. First of all, the coexistence of humans with the nature in harmony is an overall step of humans while science is human's local recognition or conditional truth on laws of things; Next, the only criterion for the promotion of human progress by science lies in the fact that science increases the well-being of humans but without intruding on the nature; And again, it should be the human self-discipline. Certainly, realizing the coexistence of humans with the nature in harmony lies in the correct understanding and human actions, i.e, depends on humans ourselves. For this objective, humans need to follow other creatures on the earth, consciously comply with the natural laws, quit human's subjective greed, abandon those of seemingly glamorous flashes with the philosophy that the clothes, food, residence and traveling are for living only, which needs one to consciously self-discipline on spiritual needs. And meanwhile, it needs to examine all of scientific researches with achievements, and all human activities led by science, actively ends those of actions that are too intrusive to the nature such as those of only for the temporary interests or luxury of a few humans as well as the resource plundering, harm to humans ourselves or the ecological environment, correctly understand and apply the conditions of scientific conclusions, promote the science combinatorization in closed systems, change the intrusion on nature in existing technological path and then, construct the substance evolving system G^L of human activities. This is a biggest problems of science for promoting human progress in 21st century, which is the foundation of coexistence of humans with the nature in harmony and so, needs to be faced by all humans on the earth.

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