

Explanation of Integral Thinking From the Contemporary Perspective of System

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Abstract

As a kind of thinking mechanism that grasps motion, change and development of objects on the whole, it has widely divergent content in development of human history and in practice of the times. When materialistic dialectics and contemporary scientific research go towards integration, integral thinking at a scientific level begins to have its embryonic form. Integral thinking contains a whole set of thinking principles, methods and operation procedures, plays the functions of guiding, selecting, evaluating and defending in scientific cognition and expands its "sphere of influence" in a wider scope.

Key words: Integral thinking; Theoretical construction; Functional scope; Value

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1. ESSENCE DEFINITION AND HISTORICAL DEVELOPMENT OF INTEGRAL THINKING

Integral thinking refers to the thinking mechanism that grasps motion, change and development of objects on the whole which contains a whole set of thinking principles, methods and operation procedures and which is aimed to direct people to come to understand objects and make thinking by regarding the cognitive objects as a whole.

This is the essence definition of integral thinking, which is also a general summary at its philosophical level. In the human history and in the practice of the times, as a result of the local differences in the operational process of concrete thinking, integral thinking often had widely divergent content.

In the ancient times, both China and the western world had extremely abundant integral thinking content, but their explanations on integral thinking were totally different. The Chinese ancient integral thinking was established on the basis of the concept of "theory that man is an integral part of nature", which emphasized "observing objects and obtaining their relevant images by reasoning" and what it focused on were the integrity, structure, relation and function of objects instead of the internal constituent of objects. Therefore, it usually adopted the research method that emphasized synthesis but ignored analysis. By contrast, the integral thinking of "unity from diversity" in the ancient Greece was aimed to "pursue one from multiple objects", that is, to pursue the common feature of objects from various phenomena. What it emphasized was internal composition of objects. Thus, the ancient Greek attached excessive importance to study on the entity, while they made light of study on the relationship between different objects and between all internal constituent parts.

With development of modern and contemporary science, the mechanical reductive thinking mode becomes a scientific thinking mode that occupies a leading position in scientific cognitive activities. However, given people's ideal and faith in and relentless pursuit of world uniformity, we can still detect the trace of integral thinking. Under the influence of classical theory paradigm, it is generally believed by scientific researchers that the integrity of an object equals to the sum of its parts and when components (constituent parts) of an integrity are split and observed, they play a totally equal role as they do in the integrity, while the components split in such way can again be integrated into a whole exactly the

same with the one before it is split. Obviously, this kind of integral thinking is the specific reflection of the integral concept of mechanism constitution, and apart from the efforts made in the process of integrating the whole; its essence is exactly identical with that of the mechanical reductive thinking mode.

The systematic science ever since the 20th Century, especially progress of complexity theory research since the 1980s, has facilitated materialistic dialectics and contemporary scientific research to go towards new integration and integral thinking at a scientific level has gradually had its embryonic form.

2. CONTEMPORARY THEORETICAL CONSTRUCTION OF INTEGRAL THINKING

At the contemporary times, as a kind of scientific thinking mode, integral thinking mainly reveals and establishes the ontology implication that the world is an “integral whole” on the theoretical basis of the integral research and method in systematic science and complexity theory and further expounds it at a meta-methodology level. It is aimed to direct people to internally integrate themselves into scientific cognitive activities and start out from the perspectives of openness, dynamism and diversification to make “trans-hierarchy” (Liu, 2000, p.19) structural observation on cognitive objects and make quantitative and unified statistical description, attempting to control cognitive objects in the “overall process” (Mao, 1991, p.67) and further grasping the optimal condition of the integrity.

Specifically speaking, it mainly contains the following several aspects.

2.1 Regarding Objects as an “Integral Whole”

People often use the concept of “whole” in a substantiality sense to describe a certain totality or collection that is constituted by all constituent parts contained inward, while the fact revealed by quantum mechanics that the world is becoming more and more “an integral whole” understands in the descriptivism sense. That is to say, it is believed that the whole is not equal to the sum of parts and the whole constituted by all parts possesses a new function that is different from the simple addition of functions of all parts. In scientific cognitive activities, to regard an object as “an integral whole” is to require people to build a self-conscious integral concept and to perceive the object on the whole, this is the primary step. Knowledge that is acquired at this time is just general, but in-depth knowledge is always perceived under observation of this whole. Just as Spinoza said, “If there is no concept in advance, there won’t be any method. Thus, a good method is one that directs us how to guide our soul to perceive in accordance with the standard of an actual

concept (Spinoza, 1960, p.31).” This is the primary principle of integral thinking.

2.2 Dedicating Itself to the World With an Idea of Internal Relationalism

The mechanical reductive thinking mode in the modern times has crossed an impassable gulf between human and the world and the world has become a ready-made entity that awaits people to discover, while selection of the reference system in relativity and the uncertainty principle of quantum mechanics indicate that scientific cognitive activities, essentially, are reflection of the internal relationship between human and multiple agents (generally refer to the so-called subject and object in the theory of knowledge) that “co-exists” in the world. Hence, in scientific cognitive activities, dedication to the world with an idea of internal relationalism is to require people to deepen people’s comprehension in and emphasis on internal interaction between the multiple agents in scientific cognitive activities and then break away from the traditional “pure objectification” and external perspective and realize dialectic unification of the subject and the object in scientific cognitive activities.

2.3 Starting Out From the Perspectives of Openness, Dynamism and Diversification

The self-organization theory certifies that the non-linear correlation between openness, dynamism and diversification is a necessary condition for its formation of an orderly structure. Moreover, any system is in an open and dynamic process and thus, is necessarily accompanied with existence and evolution pattern of diversification. Openness, dynamism and diversification are the basic research perspectives offered by integral thinking, so isolation of any of the three perspectives in scientific cognitive activities makes it difficult to grasp a cognitive object on the whole. Specifically speaking, to start out from the perspective of openness is to require people to continuously broaden their thinking space and research vision, and not only focus on the interactive relationship between the cognitive object and its background field, but also pay attention to expansion and diffusion of its thinking orientation and research problems in an interdisciplinary way. To start out from the perspective of dynamism is to require people to be aware that motionless, balance and stability are nothing more than fragmented and roughened cognition of objects by splitting them instead of the real mirror of the objects. Thus, the cognitive object should be regarded as a dynamic process and it is necessary to master in time its change of form in terms of time series and predict rationally as far as possible its development in the future. To start out from the perspective of diversification is to require people to overcome the traditional simplicity cognitive pattern, such as, the linear view of causation, the development outlook of continuity and absoluteness

of time and space, etc., treat with “surprised” and “novel” objects in a positive and tolerant attitude and endow these objects with the reasonable theoretical position and practical significance.

2.4 “Trans-hierarchy” Structural Observation

Complexity theory is based on emergence of complexity system as its core research content. The concept of “emergence” is usually expressed as “the whole not equal to the sum of parts” and is an important category in the relationship between the expression system element, the level and the environment. Mapped to the integral thinking, this idea requires people to make a “trans-hierarchy” structural observation on the multiple components, multiple levels and the environment of the objects and their interactive relationship.

First of all, it is necessary to get comprehensive mastery, and make a meticulous analysis and structural synthesis of the internal components of the cognitive object. The so-called comprehensiveness is to attempt to research all components within the research object and lay special emphasis on the components that play an important role in the whole, but, meanwhile, not to ignore other components. At the time when making a meticulous analysis of all components, it is important to find out the integral structure of the cognitive object and, furthermore, make a structural synthesis of the analysis result on the whole. Here, analysis of components and synthesis of structure are mutually premises and, moreover, both of them are under the integral observation of scientific cognitive activities. It is worth noticing that that the internal components of some complex objects (such as chaos) usually have a decentralized integral motion pattern, so it might be difficult to establish the control or leadership position of these components. Therefore, we should pay more attention to the integral structure of its synergy.

Then, it is necessary to make a “trans-hierarchy” double dimensional observation on the cognitive object. Study of the systematic science on the emergence theory (burst theory) embodies reaction of the top-down reductionism research method. CAS theory provides a limitation generative mechanism of agent based on initiative, which in turn provides a bottom-up dimensionality for research of the complexity system. In view of this, the so-called “trans-hierarchy” is to “apply the concept of component to explain the behavior of the system for the micro mechanism and the upward causal relationship” with a bottom-up dimensionality and to “apply the concept of system to explain the behavior of all individual components within the system for macro constraint and downward causal relationship” with a top-down dimensionality, and “make them co-exist in harmony”. (Ouyang, 2002, p.70) Reflected in the thinking mode, it is to make an in-depth analysis and reflection on the mutual relationship between the whole

and parts of the cognitive object and make an integral comprehension and explanation by combining the two.

Finally, it is necessary to make a “trans-hierarchy” double dimensional observation on the cognitive object. The idea of CAS theory that “adaptability brings up complexity” illustrates that as the subject of adaptability, the cognitive object’s adaptation to the environment, as a matter of fact, is to interact and adapt to each other interactively. Therefrom, the environment becomes an internal variable for the existence and evolution of the object. The openness feature of the system also tells us that it is necessary to surpass the isolated domain of the cognitive object, pay attention to observing the infinite communication between the material, energy and information of the cognitive object and the environment, grasp a dynamic gaming of the interactive objects, and, furthermore, form a “topographic map with layer tinting” that is able to portray the bi-directional correlation and circulatory feedback of the cognitive object and the environment.

2.5 Attempting to Control Objects in the “Overall Process”

More than one century ago, Engels put forward the viewpoint that “the world... is a collective body of processes” based on the natural science achievements in the 19th Century, and believed that, “this is a great fundamental idea”. (Marx & Engels, 1995, p.87) In study of system science and complexity theory, the concept of “time” also becomes an indispensable basic parameter, whereas relativity proves inalienability between time and space. Thus, in scientific cognitive activities, people should not only notice the dynamic feature of the cognitive object from the dynamic perspective, but should also add the research dimensionality of time to the dimensionality of space and push the evolving process of objects, or more precisely, the evolution and organization process of objects, to the most remarkable position.” (Zhan, 1992, p.88)

The primary principle of integral thinking is to emphasize that an object should be regarded as an “integral whole”, which, manifested in the study on the time series of the object, is to see the object as an “integral process”. To grasp the wholeness of a process needs to apply the concept of “overall process”, that is, to find inevitable all stages constituting a whole process by means of making an analysis of the process, control organic connection, transition and conversion in different stages and place each stage in the whole process for observation, so as to further grasp all these stages and their mutual connection on the whole. (Miao, 2004, p.9)

2.6 Adopting Quantitative and Unified Probability Statistical and Descriptive Approach

The probability statistical and descriptive approach is logically based on the quantum mechanics revealing the statistical rule of the natural material process. This

approach manifests that probability and discontinuity are the internal stipulation of an objective thing and cancels absoluteness of accurate knowledge in the features and details of an individual component and an individual process of a cognitive object, so as to aim at obtaining knowledge and description of the whole function, feature and evolution of the cognitive object. In scientific cognitive activities, application of the probability statistical and descriptive approach is an important sign of integral thinking. Especially for complexity system in which quantitative research is quite difficult to be used, descriptive approach of the strict determinism is invalid and only the descriptive approach of probability statistical descriptive approach is helpful.

At the same time, the probability statistical and descriptive approach of system science inspires us that in scientific cognitive activities, it is better to adopt the research method with combination of quantitative research and qualitative research. And the key is to choose an elementary variable on the basis of acquiring correct qualitative knowledge by means of metaphor and analogy, mathematize and quantify it by using numerical, calculating and virtual methods, and, at the time when some variables are unlikely to get purely quantity expression, to form a model or simulation method with combination of qualitative and quantitative.

2.7 Taking Control of the Optimal Integral Condition of Objects as the Aim

Aristotle at the ancient Greece treated the movement that was based on purpose as an important reason for change and development of the things, while pursuit of modern science in causal interpretation of a natural phenomenon becomes a scientific and reasonable sign, in which the concept of “purpose” is expelled out of the scientific cognitive domain as a mysterious concept. Nevertheless, with confirmation of system science and complexity theory research on the concept of wholeness, “purpose” is defined as a certain condition determined in advance a system is inclined to and thus again becomes an important concept in comprehending the integral behavior of the complexity system. Introduction of the concept of “purpose” by integral thinking is, on one hand, to direct people to break away from the thinking set of unidirectional view of causation, and, on the other hand, to direct people to play their subjective initiative and to run the concept of wholeness throughout selection of the objective of cognition and behavior.

The several principles and methods stated above merely generally describe the single and unidirectional operation procedure of integral thinking. However, cognition and practice is a process of infinite development. Thus, theoretically speaking, operation of integral thinking is supposed to be a cyclic process of infinite development. In addition, although here we put in order the content of integral thinking by itemization

and step by step, in specific cognitive and practical activities, they usually have a concrete arrangement order. Therefore, concrete analysis of specific issues is still an important principle in operation of integral thinking.

3. FUNCTIONS AND VALUE OF INTEGRAL THINKING FROM THE PERSPECTIVE OF EXPANSIBILITY

3.1 Functions of Integral Thinking in Scientific Cognitive Activities

The functions of integral thinking are prominently manifested in scientific cognitive activities. So far as the whole process of scientific cognition is concerned, functions of integral thinking are mainly manifested in the following several aspects.

3.1.1 Function of Guiding

When scientific cognitive activities are conducted, it is a primary requirement by integral thinking that an object should be regarded as an “integral whole” so as to have a whole concept of the cognitive object and even the entire world prospect, which provides the scientific researchers with a metaphysical feeling. However, this kind of feeling is obviously quite important, and just as the epistemology expert Erikson said, this feeling “certifies some historical truth that is only intuited in the first place... (thus, an individual) can boast that he has a feeling of world center and freedom of action”. (Chen, 2001, p.359) Hereafter, scientific cognitive activities are always conducted under an integral observation.

3.1.2 Function of Selecting

In scientific cognitive activities, the function of selecting of integral thinking is prominently reflected in directing people to start out from multiple dimensionalities to select a cognitive object and designate a cognitive demarcation line. In a relatively simple situation, a cognitive object is explicit and affirmative and it is quite easy to tell it apart from other things. However, under a relatively complex circumstance, it is not easy to precisely define what kind of cognitive object is needed and to what extent, and how long it should be observed. Both small but imprecise cognitive objects and big but useless cognitive objects are nothing more than presentation of operation of clumsy thinking. By contrast, integral thinking directs people to start out from the integral thinking, not only making a “trans-hierarchy” observation, but also making “hypsometric tint”, center on a certain issue and concentrate on those most meaningful objects that have the closest relationship and further make observations and descriptions dialectically and on the whole.

3.1.3 Function of Evaluating and Defending

One of the functions of scientific thinking mode is to make theoretical and empirical evaluation on whether a

certain hypothesis is scientific or not. So far as theoretical evaluation is concerned, integral thinking directs people to start out from an integral concept to treat with “surprised” and “novel” things. For instance, the phenomenon of “fractal” has, for a long time, not been detected by science. Nevertheless, whoever “is not familiar with fractal will not be considered a scientific cultural person”. (Wang & Li, 1996, p.2) So far as empirical evaluation is concerned, the integral thinking overcomes reductionism and strict determinism, converts research method and descriptive approach and then obtains the empirical evidence that can “certify” and “falsify” the hypothesis. For example, the former US Theosophical Society chairman Krippner ever said, “Super-feeling and psychokinesis might be the outcome of quite a lot of interaction and effects. Thus, in order to treat them fairly, it is obliged to adopt a system model instead of a simple causal model. In research of parapsychology, ... there have been a large number of parapsychology researchers who are dedicated to transferring from ‘evidence-based research’ to ‘process-based research’”. (David, 1995, p.169)

In addition, in the scientific cognitive process, the integral thinking also has the functions of standardizing specific cognitive operation and explaining the significance, feature and value of cognitive achievements.

3.2 Expansion of Function Scope of Integral Thinking and Its Value

There are usually two categories for distinction of scientific thinking mode, namely, “‘scientific thinking mode’ and ‘scientific mode of thinking’”. The former is a kind of thinking mode displayed by scientific community in specific cognitive activities, while the latter is expansion of scientific thinking mode to cognitive activities outside the research subject”. (Chen, 2001, p. 277-278) This proves that the functions of scientific thinking mode often “overflows” and “arrogates” the “domain” of other thinking modes. As one of the contemporary scientific thinking modes, the expansion of function scope of integral thinking is mainly manifested in the following several aspects.

3.2.1 Expansion to Function Scope of Philosophical Thinking Mode through “Scientific Ideation”

Engels ever mentioned, “Just as idealism, materialism has also gone through a series of development stages. Even with each epoch-making discovery in the natural science field, it is inevitable for materialism to change its own form”. (Marx & Engels, 1995, p.228) Development of science will necessarily stimulate progress of philosophy, which is not only manifested in the fact that philosophy makes “conceptualized” reflection on science which is the object of philosophical reflection so as to stimulate progress of philosophy itself, but is also manifested in generalization on and application of philosophy in scientific thinking mode. In the contemporary society, the theoretical description of integral thinking itself

is the “conceptualized” achievement of philosophical generalization and is, moreover, produced under the theoretical guidance of Marxism materialistic dialectics. When it returns to the domain of philosophy, it profoundly influences the mode of pondering over philosophical issues and provides more scientific factors.

3.2.2 Expansion to Function Scope of Engineering Thinking Mode Through “Scientific Substantiation”

Science is the achievement of people’s cognition in the world, which is in pursuit of authenticity of knowledge and the functions of scientific thinking mode are in the cognitive domain, while engineering is the outcome of people’s changing the world. The latter emphasizes application of knowledge and the functions of engineering thinking mode are in the practical domain. Scientific achievements can only be converted to engineering through “substantiation” to facilitate people’s progress in changing the world and, in the meantime, to push the function scope of scientific thinking mode to expand from the cognitive domain to the practical domain. Generally speaking, the functions of integral thinking in the practical domain are mainly manifested in the following facts. At the beginning of carrying out the practice, the integral thinking furnished an integral reference and a series of principles and methods for design of the blueprint of the practice, with the expectation of making a plan for fulfillment of the optimal whole condition of the objective; in the process of practice, the integral thinking directs people to take continuous control and make constant adjustment on divergence between the actual situation and the blueprint of the practice so as to ensure the successful running of practical activities; besides, the integral thinking also provides a whole set of thinking mechanism and integral concepts for people to make evaluation on the cognition and value of the practical objects.

3.2.3 Expansion to Function Scope of Common Sense Thinking Mode Through “Scientific Popularization”

In reality, “popularity” of integral thinking is usually fulfilled through the public universality of contemporary scientific knowledge. This is because the static state of the integral thinking is manifested in the exemplificative scientific knowledge achievement and its dynamic state is manifested in its concrete application. Once scientific knowledge is popularized and becomes knowledge of the public, then it will influence people’s view on the surrounding world and affect people’s opinion in knowledge and in the method to acquire knowledge. Hence, the integral thinking will “show its capacity” in the domain of the thinking mode of common sense, namely, daily life. Obviously, this approach is long-term and unconscious, which is far less rapid and effective than direct transmission of the theoretical description of integral thinking as the knowledge achievement of the system to the public.

Generally speaking, functions of integral thinking in daily life are not only manifested in cognition, but also in practice, which are mainly to direct people to overcome any wrong thinking set, change their ideological concept and form knowledge and living mode about the surrounding world that comply with development of the times. It is noticeable that, since daily life is the most complicated and diversified domain which people get in touch with, specific analysis of concrete issues is needed in specific functions of integral thinking.

To sum it up, functional domain of integral thinking is not merely confined to scientific cognitive activities. And since its functions have the feature of external expansibility, as a kind of meta-methodology, it has also obtained interdisciplinary and cross-domain application value.

As a matter of fact, integral thinking is especially suitable for research of all kinds of complexity factors, such as, human kind, the society and knowledge activities and offers brand-new and effective thinking principles, methods and procedures for preferentially resolving the issue of interrelation between human kind, the society, the nature and scientific technology in the complicated world on the whole. Accordingly, whether in people's daily life and practice or in production practice and social and political practice, especially in practice of science and technology, integral thinking will play an indispensable and important role.

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