

INFORMATION DIMENSION OF VIRTUAL COGNITION

LIU Qin¹, ZHANG Ru-liang²

^{1,2}School of Humanities and Social Sciences, Xi'an JiaoTong University, Shanxi, China

ABSTRACT: *Human cognition is a complex process, especially in the exploration of the unknown world. Computer technology is a kind of virtual reality computer digital processing technology, realizing the virtual construction of the cognitive object information and environment information to show people a world which can real experience, as perceptive world which can immerse. In the new cognition and practice mode of virtual reality system constructed by virtual technology, the three elements of subject, medium and object and their relations have a series of profound changes. Only making deep analysis and research to information dimensions of virtual cognition process in the realization of playing the fundamental and important role in achieving the change can we make correct understanding and evaluation to the essence and value of virtual cognition and the relationship between the virtual world and the real world. This kind of cognition and evaluation can not only discover the various insufficiency and the flaw of the previous practical epistemology, but also enrich and develop the practical epistemology of dialectical materialism.*

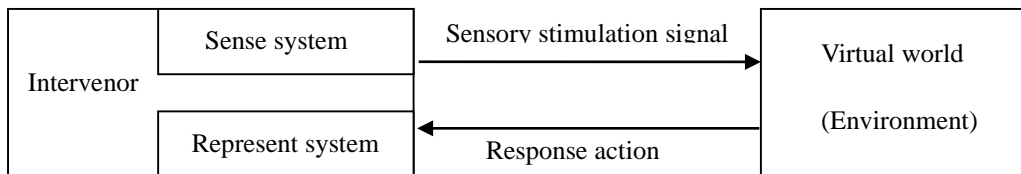
KEYWORDS: virtual reality; information dimension; virtual cognition

INTRODUCTION

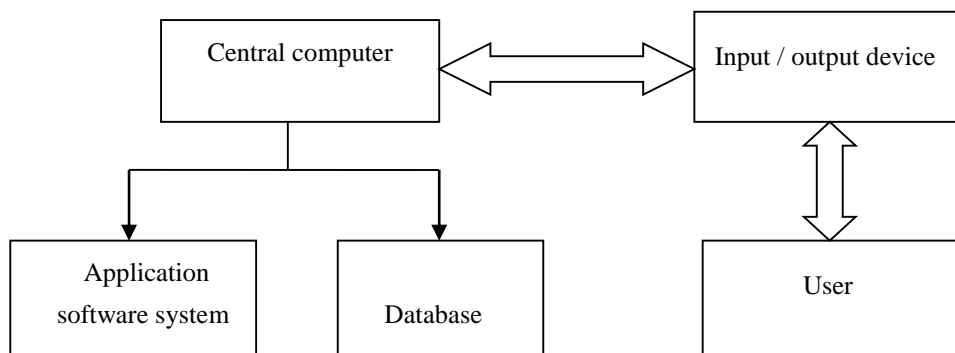
The Characteristics of virtual cognition

Virtual reality system is built on many related disciplines such as computer graphics, database design, electronics, robotics, controlling, multimedia technology and psychology and so on. It is a large system integrated a variety of modern high-tech. In this system, virtual reality technology will depend on the specific information to make simulation environment, visual system and simulation system get together to reproduce a particular real world and specific things, or show a pure vision world and the specific things, namely, the creation of virtual environment and virtual object. In the virtual environment, the operator interacts with virtual information environment and virtual object through the sensing device and mobilizes the various senses in order to obtain a variety of visions, such as hearing, touch, smell, and taste, resulting in an "immersive" feeling, following their wishes to change the virtual environment. Virtual reality system shows people a real experience. In this process, the realization of virtual reality is material property, namely, the copy, description and creation of the objective information. The virtual reality system is composed of two parts: one part is the virtual information environment which provides people a variety of sensory stimulation, and another part is the participant (the person who knows the subject). The core of the virtual reality system is to emphasize the information interaction between the two, which reflects the experience of human beings in the virtual information world.¹ The concept model of the virtual reality system

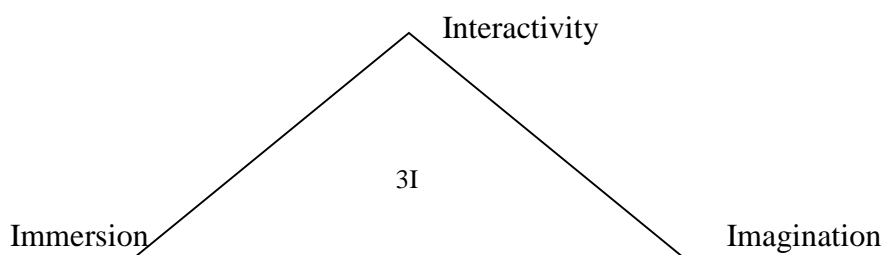
can be expressed in the following graph: ²



The virtual reality system emphasizes the interaction between human beings and virtual environment, reflecting all kinds of sensory stimulation signal provided in the virtual environment and a lot of actions that people take in the virtual environment. From the point of view the role of the virtual environment on human beings, the concept model of virtual reality system can be seen as a "display / detection" model. From the point of view of the role of human beings on the virtual environment, the conceptual model can be seen as an "input / output" model. ³



The hardware of the virtual reality system consists of four parts: the virtual world generating equipment, sensing devices, tracking devices and interactive devices based on natural mode. The software of virtual reality refers to the modeling and the database of virtual reality, it includes the following aspects: geometry and surface information of virtual object, motion modeling, collision detection, hierarchical modeling of objects, perspective problems of three dimensional world, the physical model of the object, the establishment and management of virtual environment database, it stores all the various aspects of the information of the virtual environment. ⁴ The virtual reality system exhibits three prominent features³: Immersion, Interactivity and Imagination. As shown in figure:



Immersion is also known as immersion, it refers that the users are completely immersed in the virtual world, making the users become a part of the virtual world, and participate in a variety of activities in the virtual world. Interaction indicates that the function between human beings and the virtual world is mutual. It can produce the same feeling in the real world. Imagination is that the virtual environment is imagined by human beings, it can be a copy of the real world, it also can be a pure vision of the world. The reason why designers design the virtual world is that they want to achieve a certain purpose. The characteristics of "Immersion", "Interaction" and "Imagination" in virtual reality system makes participants immersed in the virtual world, and interact with each other. Therefore, some scholars believe that virtual reality system is an advanced user interface that feels the designer's thought through the visual, auditory, tactile and other information channels.

The process of virtual cognition

The emergence and development of virtual reality technology has led to many new problems of epistemology. It urges people to rethink some basic characteristics and process of human cognition. In the cognitive aspect of things, the unique way of virtual space makes us have the opportunity to re-explore human perception way in the space. Kant believed that space is an intuitive form of human mind, he said: "My intuitive only follow a kind of way to advance the objects of reality and become the priori knowledge, that is, it only contains the sensuous form. The perceptual form in my subjective was infected with the object of all real impression.....The intuition is space and time."⁵ Obviously, Kant believes that the foundation of experience intuitive of sensory objects is pure intuition of space and time, and the foundation is possible, because it is just a pure form of sensibility. Therefore, the key of cognition in the specific time and space lies to grasp perceptual intuitive form of things.

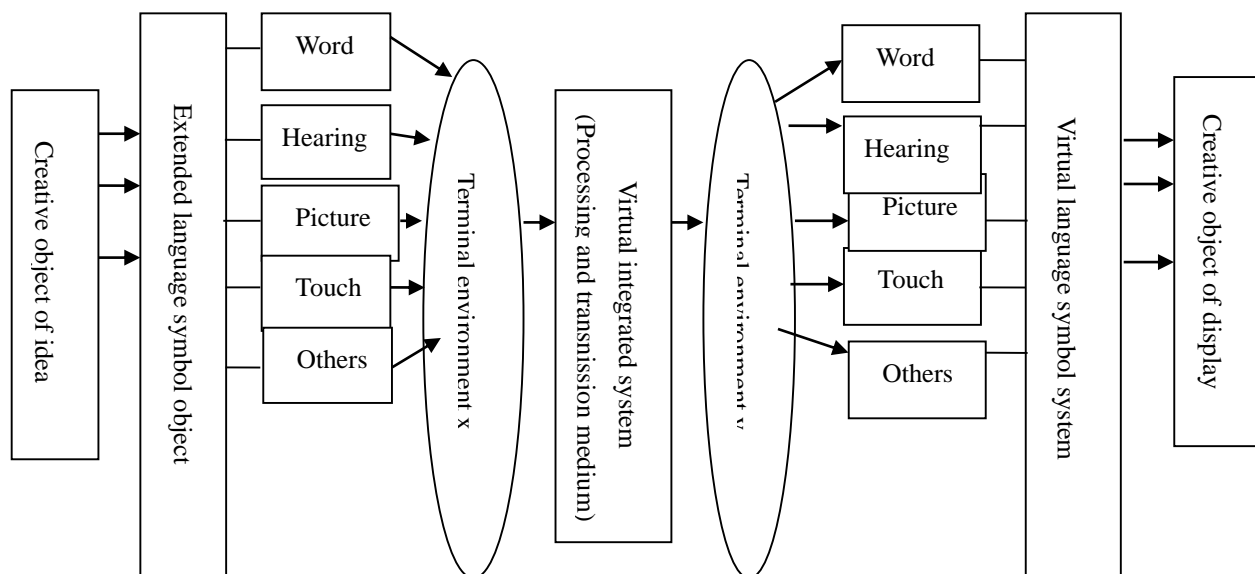
In fact, in the conditions of virtual reality, the subjective cognition is to experience the human experience, and this experience process is based on the construction of technology. In fact, in the conditions of virtual reality, the subjective cognition is to experience the human experience, and this experience process is based on the construction of technology. Virtual cognition is dependent on immersion structure of perception. In this structure, the sensory perception of the subject is not only the purely stimulate reflection on environment, but also takes the subject itself as a part of the virtual world, and participates in all activities in the virtual world. In the process of cognition, the subject adjusts their perceptive state by means of memories of previous experience knowledge or creative imagination of existing virtual object of creative imagination accompanied by the change of virtual object to better take actions on the virtual objects.⁶

In the traditional system of epistemology, human practical activity should be understood from the interaction between the subject and the object, human and matter. In the process of human cognition, the boundary of subject and object is quite clear, only when the subject and the object present a kind of direct realistic perceptual activity, human beings carry on the practical activity. However, in the virtual environment, human cognitive process has brought a big change. The whole process of cognition is realized through the interaction between the interface and the

virtual world.⁷ Because of the existence of the interface, the object of the subject's perception is related to both the hardware equipment and the software related to the system nature with a logical symbol.

Due to the nature, the subject shows the practice nature which is different from the traditional practice view in the behavior mode of virtual cognition. Although the object of human practice is still the perceptual world, the kind of perceptual world is the product of the spirit and the object of thought to some extent, it is not the realistic and perceptual world.⁸

In the virtual cognitive activities, the human practice activities, which occurred with the help of the interface, have not completely belonged to the direct reality. At this time, the world of object has not entirely belonged a sensual material world, however, it has become a part of the product of the concept of human beings. The virtual perceptual world has become an extension of human consciousness. Even under the conditions of virtual technology, logic deductive of prior knowledge has got many phenomena that do not exist in the real world, or so far human practice has not related to the phenomenon, but these can be implemented in computer system. Therefore, we cannot take the object of practice as human perceptual material world. In the meanwhile, we think that people's practical activities should also be understood from the technical construction of the relationship between the subject and the object because of the existence of the interface. The object of human practice is not only the object of physical reality, but also the object of thought. Human practical activities can not only have a direct reality, but also a feeling of immersion. Virtual reality system provides a huge open digital platform for the subject of cognition, making the subject take virtual practice and cognitive activities in a new way on this digital platform. The objectification of virtual practice must rely on multimedia and multimodal integration technology such as pattern recognition, holographic images and natural language understanding and sensing means to improve natural and efficient of human-computer interaction and realize the realistic output of three-dimensional space and immersion. In the virtual world, human activity itself also constitutes the virtual practice. Virtual practice makes the object of practice be no longer an external material world, but takes the information symbol processing conversion as practical way, using virtual language symbol system to build the object created by human beings.⁹ The realization process structure of virtual practice and virtual cognitive activity can be expressed in the following graph:¹⁰



Due to the nature language symbol system can compatible with sensing elements such as hearing, sight, touch, smell, taste, it provides a realistic source and practical basis for reconstruction of virtual integrated system and language symbol system of expansion of the virtual. That is to say, mental activity included in the virtual practice cannot do without the material carrier, it cannot be separated from human beings and exist independently. The subject must rely on the structure platform including all the technical elements of man-machine interface and contact with the information of external world. And virtual intermediary activities is actually a process of human-computer interaction and human-machine symbiosis that subject actively participate in the massive information, sewerage and dissemination. The process makes the subject use the man-machine interface to link with natural language. The information of human social activities are processed and synthesized by computer system to place the subject in a new relationship. In this relationship, the essential relationship between human and virtual world is not a simple interaction between the subject and the object, but a construction process of the symbolization of information world. It is in the process of the construction that the subject completes the cognition of the object.

Relationship between the Subject and the Object of virtual cognition

The subject and the object are the two poles of the cognitive activity, but only the subject and the object cannot form the actual practice. Cognitive activity is a dynamic development system on the basic of the subject, the medium and the object. The medium of cognition produces and develops to adapt the ways and characteristics of the interaction between the subject and the object. The relationship between the subject and the object and the relationship of the places in the virtual technology also have close connection. In the virtual technology, people usually call the space of virtual object Cyberspace. Cyberspace is taken as the intermediary of the interaction between the subject and the object. On the one hand, it sends the initiative of the subject to the object. On the other hand, Cyberspace is taken as the intermediary of the interaction between

the subject and the object. On the one hand, it sends the initiative of the subject to the object. On the other hand, it sends the restriction of the subject to subject, it is a tool and bridge which contacts between the subject and the object.¹¹ Its basic properties are described by computer systems processed information and size of information. It provides the basic "place" of existence for the virtual object, in the meanwhile, it provides the foundation and condition for the relationship between the subject and the object.¹²

In the system of virtual reality, the relationship between the subject and the object is mainly characterized as a kind of cognition. The kind of cognition is that the subject has the reflection on the virtual object by means of the cognitive intermediary of the synthetic integration. It is a kind of special cognitive relationship in the process of digital information transmission and operation. Therefore, in essence, the relationship of cognition in the virtual reality system is that people in the real world use the virtual reality technology to take part in the cognitive activities of digital information without the physical elements. The object, methods and process of cognition are given by realistic people, it is virtual to the realistic cognitive relationship.¹¹ In the system of virtual reality, the subject interacts with virtual information world through man-machine interface to achieve the virtual practice and cognitive activities on objective information.

Cognition is constructed in the intermediary, it is the reflection of the object on the basis of practice. This kind of process of reflection is that the subject constructs the information of the object. In fact, there is a close relationship between the construction of the object information and virtual reality. Modern epistemology research shows that the reflection of the object from the subject is not a simple intuitive mirroring that objective phenomenon exists in the mind of the subject, objective object through the reselection, organization and structure of the objective information for the subject. From the point of view of information interaction, the construction takes subjective initiative as a kind of cognitive mechanism and sector, it exists in the cognitive activities. From the perspective of the cognitive formation process, construction is that the subject has the selective reconstruction on the information of the object in mind. In the meanwhile, the construction of the object information from the subject should take a certain way and code and show different development stages because of the way and different codes of the construction: concrete physical construction stage, symbol character construction stage and digital construction stage. Digital construction stage, namely, virtual construction stage. That people understand the world is evolving because of changes in the way of cognition. Virtual, as highly embodiment of the subjective initiative in the thinking process, forms human cognitive mechanisms and links together with the construction thinking.¹¹

It needs to be pointed out that in spite of virtual reality technology expands the cognitive field of the subject and brings many changes in the way of the subject's cognition, but the essential feature, which virtual is based on the reflection of objective reality, will not change. Away from the foundation that people have the reflection on the objective reality world, human cognition

initiative will lose the foundation of existence. Therefore, from the concept of the construction¹³, virtual reality uses the intelligent and network technology to timely deal with input and output information in the sense organ of the subject. Virtual reality system can deal with obtained and controlled data information, creating a virtual environment to re-product various phenomena over a long distance. The attribute of object, which wandering in cyberspace, is nothing more than a large amount of information in the virtual reality. Although the expression way of information is realized by symbol, the essence is information.

Unification of virtual and reality

Virtual reality technology has expanded our cognitive field and changed the way we cognize the real world, But it cannot dispel ontology framework and epistemological structure of the duality of subject and object. The reality is the starting point of thinking. Virtual reality has hidden the social nature of human beings, resulting in the loss of spirit of the subject, but it cannot deny all the way of thinking from the actual starting point of view. Whether it is the virtual to real information world or the virtual information world is using digital information technology to simulate in the virtual space. It is the manifestation of the real world and the concrete things or the exhibition of pure vision world and the specific things. In essence, it is still a virtual world.

In fact, because virtual reality technology is virtual to the real information world, it makes people experience the feeling in the virtual world that cannot get in the real world. The feeling helps people recognize the world and human themselves. Therefore, in the sense of ontology, virtual reality and objective reality are equal. As a special philosophical category, virtual and reality is dialectical unity. They both reflect the unity of phenomenon and essence. We believe that virtual and reality can realize the unification under certain conditions. That is to say, virtual reality technology represents the form of virtual and the nature of reality. As the two attributes of the network society, virtual and reality unifies in the virtual information world created by virtual reality system. The nature highlights in the information dimension in the process of virtual cognition.

REFERENCE

- Shi 004Aiaoying(2002,March). *The foundation and practical algorithm of virtual reality*. Beijing: Science Press.
- Latta J N,Oberg D I(1994, January). *A conceptual virtual reality model* (pp.23-29).IEEE CG&A.
- Hu Xiaoqiang(2005,June).*Virtual reality technology*. Beijing: Beijing University of Posts and Telecommunications Press.
- Zhou Xiaoqi(1996). *The connotation and the key technologies of virtual reality*, (11): 7-8. Electronic Science and Technology Review.
- Kang De(1982). *Any kind of future metaphysics that can be used as a science* (pp:41-42). Beijing: commercial press.
- Mcluhan Frank, Qin Gelong Eric(2000). *Mcluhan fine fall*(pp:422). Nanjing: Nanjing

University Press.

Zhang Yi(2004). *Epistemological interpretation of virtual phenomena*,(12) . Social Sciences. 2004, (12).

James JGibson(1979). *The ecological approach to visual perception* (pp:15), Houghton Mifflin Company.

Wang Jianjiang(2006). *Research on the new characteristics of the epistemology of philosophy in information*,(12). Social Sciences.

Zhang Zhu, Wu Zhijian(2001). *Probing the philosophy of the relation between subject and object in Cyberspace*,(1) . Journal of Nanjing University.

Yang Jianqiang(2006). *Epistemology problem study of virtual reality*,(8). Group Economic Research.

Michael Haim(2000). *From the interface to the Cyberspace: the Metaphysics of the Virtual Reality* (pp.79-91). Shanghai: Shanghai science and Technology Education Publishing House.

Zhang Yi(2001). *Virtual reality theory*, (6). Philosophical Studies.