

# Spatialization of Time from the Perspective of Information Philosophy <sup>†</sup>

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**Abstract:** The spatialization mechanism of time is one of the important ways to explore the essence of time. The theory of cognitive linguistics holds that metaphor and metonymy are two ways of the spatialization of time concept. However, from the perspective of information philosophy, the above research only stays at the level of regenerative temporal and spatial information (concept) and does not trace back to the source of objective ontology to explain the spatialization process of time. According to the ontology theory of information philosophy, information can be divided into three different forms and the concept is just the third form of information. Thus, we can analyze the spatialization process of time under the objective time and space, in-itself, for-self, and regenerative space-time information form, revealing the inevitability spatialization of human's perception of time. This informational perspective shows the ontological source of the human's perception of "past, present, and future" and deepens the study of the essence of time.

**Keywords:** spatialization of time; objective time-space; information space-time; ontology; intrinsic conversion

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## 1. Introduction

Spatialization of time is an important field in the study of the essence of time. People usually use familiar stuff to simplify the perception of strange things, the same theory of applying space to describe time. The cognition of time is also based on spatial understanding. In the field of cognition, scholars have proposed the "metaphor and metonymy" theory of spatialization of time concept. In 1973, Clark proposed two metaphor theories: "the Moving Time Metaphor" and "the Moving Ego Metaphor" [1] (pp. 27–63). Since the concept of space is the starting point of many abstract concepts, and it is one of the basic thinking ways. By mapping from source domain to target domain, people achieve to utilize spatial category and relation to map the relatively unfamiliar time category. Clark's metaphor theory is indeed a deep understanding about mapping from time concept to space concept. However, this theory is just show the process in the level of subjective concept. We need to explain the spatialization of time from a macro and multilevels perspective. In other words, the objective spatialization of time should be added to enrich the theory.

Although modern nature science has described the relationship between time and space from the objective ontological category. Isaac Newton proposed the static space-time view of time and space in 17th century. In 20th century, Elbert Einstein's relative theory show us the interaction of space and time from the objective existence. While it is only an external unity and transformation, because relativity is a unified relationship under the background of static cosmology [2] (p. 200). The concept of "internal time" in Prigogine's theory of dissipative structure reveals that things have evolved in an orderly direction while absorbing external matter and energy. In the direction of

orderly evolution, spatialization of time happens. Space has gained a time dimension, and spatial structure has formed temporal continuity [3] (pp. 197–209). The problem is, how does the spatialization of time dynamically change in the objective aspect? Is there any other level of spatialization of time in addition to the cognitive conceptual aspect? This paper attempts to answer the above questions from the perspective of Information Philosophy. As a direct existence state (objective reality existence), time and space should have its transformation process in three other different levels, which means space and time in information-in-itself, information-for-itself and regenerated information [2] (pp. 47–57). From this four dimensions, we can explore the theory of spatialization of time more completely.

## 2. Spatialization of Time in the Category of Direct Existence

Time and space information is the self-display of direct-existing time and space. According to the Information Philosophy (IP), Information has three different forms or states, so the time and space information also have three levels of indirect-existence states. Firstly, we will discuss the spatialization of time in the form of objective in-itself-information. Information-in-itself is the sign of objective in-direct existence, and it is the initial state of self-display information from the material. This kind of information has not been recognized or grasped by human. There are two forms of in-itself-information, namely, information field, the assimilation and alienation of information [2] (pp. 47–50). The storage process of in-itself-information makes it possible for the transmission of in-itself-time-information to in-itself-space-information. The infinite difference of direct-existing space will produce the difference in-itself-space-information. The in-itself-time-information is the transition, transmission, and interaction of the difference of the in-itself-space-information. The disappeared in-itself-time-information (IITI) is kept by the stored form of in-itself-space-information (IISI). People's memory is the result of body's assimilation from outside in-itself-information. This process changes the memory's structure and state. The in-itself-information becomes for-itself-information.

## 3. Spatialization of Time in the Form of Objective For-Itself-Information (FII)

When the information-in-itself becomes perceptive by human, the state of information gets changed into for-itself-information. This kind of information belongs to the initial phase of mind, and it is an intuitive grasp of objective and indirect existence. The for-itself-information contains perception (intuitive recognition by human) and sensible memory (subjective storage of information) [2] (pp. 51–54). The for-itself-space-information (FISI) is produced by the percept of human being's recognition to In-Itself-Information (III). Similarly, the for-itself-time-information (FITI) is the result of memory storage by sensible Nero-information-system of the body. What describes and changes of life organism above is the process of spatialization of time in the FII state. The phenomenon of Spatialization of time exists not only in visible matters, but also in invisible psychological structure.

The transformation of instinct and immediate sensible recognition information, the information of the thinking process, and the information created by thinking to memory information is by nature the psychological structure changes process from the state of time-consuming to the space-condensed state. The extract of stored memory information is the psychological structure varying from condensed space state to time-consuming state. From the common life experience, an intuitive feeling of space is produced through the contact with natural things by five senses, and a certain subjective sense of time is produced through the movement of things or events.

The sense of time refers to the intuitive perception of the continuity and sequence of objective phenomena (things or events). This perception comes from external timing tools, periodic changes in the cosmic environment, and rhythmic physiological processes and psychological activities inside the body. A certain state can also be a source of time signals. This intuitive perception and grasp reflect the subjective for-itself-space-time-information. The coexistence of in-itself-spatial-information differences and the in-itself-time-information displayed by the interaction make it possible for the subject to develop a sense of time and space. The in-itself-time-information assimilated partially by

the human nervous system is transformed into for-itself-time-information. Same theory for the for-itself-space-information. The recognition and memory makes the spatialization of time come true in the for-itself-information state. When the for-itself-information is changed into the regenerate information, space-time also realizes the spatialization of time in the form of regenerated information [2] (p. 55).

#### **4. Spatialization of Time Concept in the Regenerated Information (GI)**

Only humans have self-consciousness and complicated abstract conscious activities. Human thinking is not only a simple process of intuitively sensing and recognizing the memory information, but a created, multilevel, deep transformation of the subjective for-itself-information. We call it regeneration information. At present, imaginative thinking and abstract thinking are two common ways of human thinking [2] (pp. 55–58). The new image generated by image thinking is called the imaginative information. The accumulation of the same kind of imaginative information will gradually form the abstract thinking, and form the symbolic information, which is mainly expressed as language.

The concept is the most basic unit of language. In this section, we discuss the concept of time and space as symbolic information in this context of information philosophy. We will explore why the concept of time must be spatialized in order to be understood. During growth, people develop a large number of space-based imaginative information. Further, abstraction of such imaginative information implements the spatial concept, which is one kind of symbolic information. Spatial imaginative information is the foundational principle and cornerstone in the process of developing the concept of space.

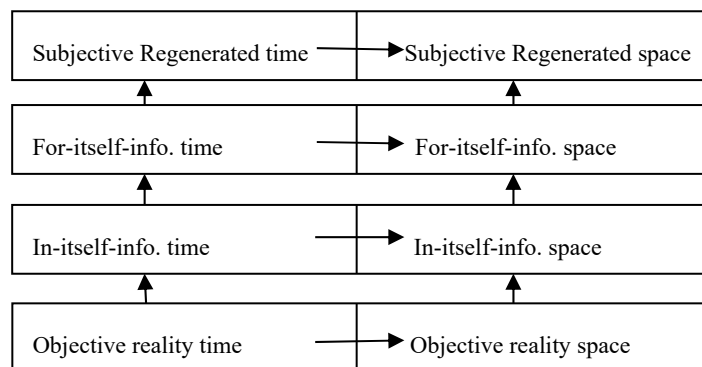
However, compared with the cognition of space, people's understanding and grasp of time is quite a big challenge and more difficult. The first cause is that the existence of time is quite abstract. There is no instinctive image or specific object to refer to time from the common life experience. Time cannot be sensed by humans from the first sight and people have to grasp it from various intermediaries in the reflection of consciousness. The second reason is that the properties of fluidity, one-dimensionality, and irreversibility of time make it harder to "focus on" or "stare at" the study of time. Last but not the least, people can only propose the concepts of relative meaning, such as "past, present, and future" to refer to the sequence of time. This kind of relative and changeable reference requires humans to have a higher understanding and higher level of thinking [4] (pp. 19–24).

Due to the particular essence of time and the limited ability of human senses, the primary stage of time-regeneration information, just like "space image", cannot be developed. Meanwhile, it requires an intermediary to transition from the intuitive sense of time to the abstract concept of time. At the same time, the spatial schema is one of the most prominent cognitive schemas. Under the strong push of habits, the categories and relationships of space are projected into non-spatial categories and relationships. Therefore, the concept of "unfamiliar" time will be mapped to the "familiar" spatial category for understanding.

This explains the inevitability of the spatialization of time concept from the perspective of ontology. In other words, the for-itself-spatial information (sense of space) is developed by the assimilation of the recognized in-itself-spatial information. The regenerated spatial information is produced through the consciously active processing, and after further abstraction of the reconstructed spatial image information, the concept of space occurs. The human nervous system develops the for-itself-time information (time sense) after adopting the in-itself-time information. However, at the level of regenerative information, for-itself-time information cannot be transformed into the regenerative time information in the primary stage. Although people have formed the time concept through the high abstraction, this process is not so smooth. The understanding of the concept of time must be transferred to the concept of regenerative space and imaginative space information to understand and manipulate the time concept.

## 5. Conclusions

The metaphor and metonymy theory of spatialization of time are just at the concept level of regenerative information. This paper studies the process of spatialization of time from the perspective of different forms of information. It can enrich the understanding of time. The spatialization mechanism of time is shown as Figure 1. From the beginning of human history, no one has stopped thinking about the essence of space and time. However, we consider it is more reasonable and plausible to study them from the perspective of information philosophy.



**Figure 1.** The Spatialization mechanism of time from the perspective of Information Philosophy.

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