

COGNITIVE MECHANISMS OF TIME PERCEPTION IN HUMAN CONSCIOUSNESS

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Abstract

This article analyzes the main cognitive mechanisms of time perception in human consciousness based on a philosophical and integrative approach. The study examines the formation of temporal perception through phenomenological experience, predictive coding, neurophysiological processes, cultural memory, and the concept of the extended mind. It is argued that the process of time perception is not linear but represents a dynamic and probabilistic cognitive construct. In addition, social-narrative and mythological models of time are analyzed, revealing its multi-layered nature. The findings emphasize the necessity of interpreting time perception as a complex and multi-level system.

Keywords: Time perception, phenomenology, predictive coding, neurophilosophy, cultural memory, extended mind, narrative thinking, mythological thinking, synergetic approach, cognitive science, subjective experience, ontology of time.

Introduction

The problem of understanding time is one of the most complex and fundamental issues in the history of philosophy, occupying a central place in explaining the relationship between being, consciousness, and experience. In classical metaphysical approaches, time was often interpreted as an objective and universal category [1.5], whereas in contemporary philosophy and cognitive science it is reconsidered as a product of the active constructive activity of human consciousness. In this regard, the process of time perception appears as a complex

phenomenon associated not only with ontological but also with epistemological and cognitive mechanisms.

The relevance of this issue lies in the fact that today human perception of time is no longer merely a biological or individual psychological process, but has evolved into a multi-layered system determined by neurophysiological, cultural, and technological factors. In particular, the development of predictive coding theory demonstrates that consciousness functions not simply by reflecting external reality, but by modeling and predicting it in advance [2.103]. This allows time to be interpreted not as a linear sequence but as a dynamic process based on probability and expectation. At the same time, the phenomenological approach reveals the subjective structure of temporal experience, substantiating the unity of past, present, and future within consciousness [3.126]. Neurophenomenology, in turn, attempts to explain this subjective experience in conjunction with neurobiological processes [4.330].

Moreover, the process of time perception is closely connected with the socio-cultural context. Through cultural memory and historical narratives, society reconstructs the past and thereby organizes time semantically [5.87]. For example, collective memory, archives, and historical discourses not only preserve time but also shape it as a meaningful structure [6.78; 7.232]. This indicates that time perception transcends individual consciousness and becomes a socio-cognitive phenomenon.

Another important aspect of the problem is related to the extended nature of consciousness. According to the concept of the “extended mind” proposed by Clark and Chalmers, human cognitive processes are intrinsically linked with external environments, technologies, and symbolic systems [8.8]. Consequently, time perception is not solely an internal psychological process but a complex system formed through external tools such as calendars, clocks, and digital technologies. The limitation of existing research lies in the fact that time perception has often been studied in isolation – either from a phenomenological or a neurophysiological perspective. However, it is a multi-component cognitive system requiring an integrative approach.

Therefore, analyzing time perception comprehensively – within the framework of phenomenological experience, predictive mechanisms, cultural memory, and the extended mind – constitutes an important scientific task.

The scientific novelty of this study lies in the integrative analysis of time perception in human consciousness based on phenomenology, neurophilosophy, cultural memory theory, and predictive coding. This makes it possible to substantiate that time perception is not a single mechanism but a multi-layered and dynamic cognitive process. The aim of the study is to identify the main cognitive mechanisms of time perception, reveal their interrelations, and systematically analyze their philosophical essence.

Methods

In preparing this article, a synthesis of several methodological approaches was employed, including phenomenological, neurophilosophical, cultural-historical, epistemological, and synergetic approaches. As a result, the integration of these methodologies enabled the interpretation of time perception in human consciousness as a multi-level and dynamic cognitive system.

Results

The results of the study indicate that time perception in human consciousness is formed through a complex, multi-layered, and interconnected system of cognitive mechanisms. These mechanisms emerge through the integration of phenomenological experience, neurophysiological processes, cultural constructions, and external cognitive tools.

According to the phenomenological approach, time appears in consciousness not as isolated segments but as a continuous flow of experience [3.126]. This flow consists of three main components: retention (the preservation of past experience), protention (anticipation of future events), and presentation (the immediate perception of the present moment). This triad forms time not as a linear sequence but as a dynamic and continuous structure. Each “present moment” is reconstructed in consciousness together with traces of the past and expectations of the future, resulting in time being experienced as a subjective phenomenon.

Modern neurophilosophical approaches interpret consciousness not as a passive system of reflection but as an active predictive system. Friston’s predictive coding model demonstrates that the primary function of consciousness is to model the external world in advance [2.30]. According to this model, the brain continuously generates “future scenarios,” compares them with sensory data, and updates perception based on discrepancies.

Thus, time perception acquires an anticipatory rather than retrospective character. Consciousness shapes present experience through expectations of the future, allowing time to be interpreted as a probabilistic and uncertain cognitive construct.

The study also shows that memory plays a central role in time perception. However, memory is not a passive storage system but a reconstructive mechanism. According to Assmann, cultural memory represents a selectively reconstructed past [5.173]. This process is carried out through narratives, archival documents, and social memory practices. As a result, time becomes not an objective history but a socially constructed and meaningful phenomenon.

According to Clark and Chalmers' theory of the extended mind, human cognition extends beyond biological boundaries [8.5]. Time perception is also expanded through external tools: clocks standardize time, digital devices automate time management, and information systems synchronize time in real-time. This demonstrates that time perception has a hybrid nature, combining internal and external components.

Furthermore, the study shows that time perception occurs not only in scientific-rational forms but also in narrative and mythological forms [9.176]. Historical time is structured through narrative discourse, while mythological thinking interprets time as cyclical and existentially meaningful [10.67]. As a result, two models of time coexist in human consciousness: linear-rational and cyclical-mythological.

Neurophenomenology explains time perception as the integration of subjective experience and neurobiological processes [4.129]. Churchland emphasizes that understanding consciousness requires analyzing its neurobiological foundations [11.23]. This confirms that time perception is a complex, multi-level system.

The synergetic approach interprets time perception as a self-organizing system characterized by nonlinearity, uncertainty, and interaction of multiple cognitive processes. Consequently, time in human consciousness emerges as a complex, open, and dynamic system.

Discussion

The problem of time perception has been interpreted differently across philosophical paradigms, and the results of this study allow its reconsideration from an integrative cognitive perspective. In classical philosophy, particularly in

Descartes' view, time was regarded as an objective and universal category independent of the subject's consciousness [1.65]. However, modern cognitive science reinterprets time as a construct of consciousness.

Chalmers emphasizes the subjective nature of temporal experience, linking it to the internal structures of consciousness [12.143]. The phenomenological model remains fundamental, while neurophilosophy deepens it by explaining predictive mechanisms. Cultural memory, extended cognition, and mythological structures further expand the understanding of time.

The findings demonstrate that time perception is not a single mechanism but a complex, multi-level system integrating subjective experience, biological processes, and socio-cultural factors.

Conclusion

The study demonstrates that time perception in human consciousness is a complex, multi-layered, and integrative cognitive system. It is shaped by phenomenological experience, predictive mechanisms, neurobiological processes, cultural memory, and external cognitive tools. Therefore, time should be understood not as an objective and independent entity, but as a dynamic construct formed by consciousness and culture.

Time perception involves not only rational-logical thinking but also narrative, mythological, and intuitive components, indicating the coexistence of multiple temporal models. In addition, the concept of the extended mind shows that time perception is closely connected with technological environments, acquiring a hybrid character.

In conclusion, explaining time perception requires an integrative methodology combining phenomenology, neurophilosophy, cultural theory, and cognitive science. This approach provides a deeper understanding of both the nature of time and the functioning of human consciousness.

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