Hermeneutics: A Broadening Scope of Inquiry

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Abstract

The field of hermeneutics has demonstrably co-evolved with the development of texts themselves, shaped by the advancements in science, technology, and various forms of inquiry that characterize our societies. Initially focused on interpreting specific classical texts, it has broadened its scope to encompass a wider range of textual analysis. The shift extends beyond literature, now also incorporating the concept of *Dasein* in philosophical inquiry. Furthermore, the field has moved from specializing in esoteric or religious texts to a focus on the vast realm of humanistic texts. This expansion continues to embrace scientific and technological discourse, including even the complexities of quantum mechanics. The understanding of these diverse areas – humanities, natural sciences, and technology – is fundamental. After all, both scientific discoveries and technological advancements rely on our ability to comprehend the world around us. This special issue delves into the exploration of science and technology through the multifaceted lens of hermeneutics. It features nine contributions exploring a wide range of topics. These contributions begin with fundamental inquiries into human interaction and communication with things, transitioning to examinations of general scientific hermeneutics and hermeneutics of more specific scientific subjects. These include the interpretation of quantum mechanics and the birth of molecular biology. The contributions then move on toward practical hermeneutics, discussing ancient Chinese technological thought, the current use of artificial intelligence in scientific research, and Technofutures.

Keywords: Hermeneutics; Science; Technology; Quantum; AI

Герменевтика: расширяющаяся сфера исследований

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Аннотация

Область герменевтики явно развивалась параллельно с развитием самих текстов, формируясь под влиянием достижений науки, техники и различных форм исследований, которые характеризуют наши общества. Первоначально ориентированный на интерпретацию конкретных классических текстов, она расширила сферу деятельности и включила в себя более широкий спектр текстового анализа. Сдвиг выводит за рамки литературы: теперь включая концепцию Дазайна в философских исследованиях. Более того, эта область перешла от специализации на эзотерических или религиозных текстах к сосредоточению внимания на обширной сфере гуманистических текстов. Это расширение продолжает охватывать научный и технологический дискурс, включая даже сложности квантовой механики. Понимание этих разнообразных областей – гуманитарных, естественных наук и технологий – имеет фундаментальное значение. В конце концов, как научные открытия, так и технологические достижения зависят от нашей способности познавать мир вокруг нас. Данный номер журнала посвящен исследованию науки и техники через многогранную призму герменевтики. В нем представлены девять статей, посвященных широкому кругу тем, начиная с фундаментальных исследований человеческого взаимодействия и общения с вещами, переходя к исследованиям общенаучной герменевтики и герменевтики более конкретных научных областей. К ним относятся интерпретация квантовой механики и рождение молекулярной биологии. Тематика затем переходит в практическую герменевтику, обсуждая древнюю китайскую технологическую мысль, современное использование искусственного интеллекта в научных исследованиях и технобудущее.

Ключевые слова: Герменевтика; Наука; Технологии; Квант; Искусственный интеллект; ИИ

Hermeneutics has evolved significantly from ancient exegesis to modern hermeneutics. It has progressed from the study of specific classical texts to broader textual analysis, encompassing not only literature but also human existence (*Dasein*), nature, and even extending to scientific and technological domains, including quantum texts. This evolution does not entail the abandonment of earlier methods but rather their expansion and coexistence with newer approaches. Initially, researchers like Dilthey envisioned hermeneutics as fundamental to the humanities, distinguishing between understanding and explanation, with understanding focusing on grasping the human psyche. However, in the 20th century, thinkers like Karl Popper and Thomas Kuhn underscored the relevance of hermeneutics in the natural sciences, recognizing that both fields require understanding (Kuhn, 2000, p. 222; Popper, 1979, p. 185). Scholars like Patrick Heelan employed hermeneutics to investigate the early history of quantum mechanics, introducing the concepts of weak and strong hermeneutics (Heelan, 1994, pp. 363-373). Weak hermeneutics directs attention towards textual material, while strong hermeneutics focuses on lived experience or practical application. Don Ihde further analyzed the interplay between technology and the world through a hermeneutical lens in *Technics and Praxis* (Ihde, 1979, pp. 4-6), and he puts forward "material hermeneutics" for the understanding of natural substances (Ihde, 2009, p. 63). In contemporary discourse, concepts such as pre-understanding, the hermeneutic cycle of understanding, and the fusion of horizons are important to both humanities and natural sciences. Understanding is essential not just for scientific discovery and technological innovation, but also for the broader interpretation of science and technology themselves, revealing inherent hermeneutic aspects within these fields. In brief, the intertwined nature of understanding in humanities, natural sciences, and technology necessitates a hermeneutic approach to interpreting and advancing these domains.

This special issue consists of papers examining science and technology through various hermeneutical lenses. The organization of these papers transitions from exploring the hermeneutics of science, encompassing topics such as the hermeneutics of quantum mechanics and molecular biology, to delving into the hermeneutics of practice and technology. This latter section includes investigations into technology in ancient China and explores the relationship between the *Tao* and ancient Chinese artifacts.

Sandra Würtenberger's (2024) paper "Communicating with Technical and Scientific Artifacts: Between Hermeneutics and Sociology of Science" discusses an attempt to bridge the gap between a traditional concept from philosophical hermeneutics and ideas from the sociology of science. The main aim is to describe a method for communication with technical and scientific artifacts. The article integrates insights from the hermeneutic concept developed by the German philosopher Hans-Georg Gadamer (1900-2002) with ideas from the sociology of science and technology that were presented by the French sociologist Bruno Latour (1947-2022) in his writings.

Guolin Wu's (2024) "A Hermeneutical Analysis of Quantum Mechanics" delves into the debate surrounding the difficulty of understanding quantum mechanics despite its successful calculations and predictions. The article explores how a hermeneutic perspective can shed light on new aspects of the understanding of quantum mechanics. In hermeneutics, interpretation encompasses two key aspects: explanation and explication.

"Interpretation," "explanation," "explication" respectively correspond to "*quán shì*," "*shuō míng*," and "*chǎn shì*" in Chinese. With insights from the Chinese understanding of these three notions, Wu argues that the development of quantum mechanics reflects a cyclical process of explication-explanation-explication-explanation (and so on).

Sadegh Mirzaei's (2024) "The Affinity between Feedback Mechanism and Hermeneutical Circle" distinguishes the realm of sense-making for human understanding from the scientific and technological realms of non-human experimentation and tool-making. He argues that this juxtaposition between the humane and the artifactual or the natural, linked with understanding and interpretation on one side and control and experimentation on the other, engenders what could be termed a Diltheyan schism. His paper seeks to address this schism by elucidating the connection between two pivotal concepts in engineering and the humanities: the feedback mechanism and the hermeneutic circle.

Arthur Wei-Kang Liu's (2024) "On Scientific Explanation and Understanding – A Hermeneutic Perspective" considers the intricate relationship between scientific explanation and understanding, proposing a hermeneutic framework to unite these two concepts. Liu examines the problem of irrelevance and the problem of symmetry faced by Carl G. Hempel's deductive-nomological (DN) model of explanation and various efforts to address these problems over the past seven decades. By examining understanding and explanation through the lens of hermeneutics and Kuhn's notion of paradigms, Liu suggests an approach to reconciling these issues.

Zhikang Wang's (2024) "Description, Understanding, and Explanation: How Scientific Interpretation Gave Birth to Modern Molecular Biology" discusses the intricate relationship between hermeneutics, scientific discovery, and technological progress, taking the emergence of modern molecular biology as a case study. The paper explores the distinct, yet interconnected, nature of "description-text," "understanding-text," and "explanation-text" within the scientific research process. By examining the hierarchical structure of thinking, the paper argues for a distinction of two complementary approaches to understanding phenomena through the mediation of natural language: the transformation and restoration between abstract concepts across different layers, and the interplay between intuitive images within these layers.

Tiantian Liu and Carl Mitcham's "Toward Practical Hermeneutics of Fourth Paradigm AI for Science" considers the integration of artificial intelligence and science which has ushered in a novel approach to scientific inquiry, prompting the question of how we should interpret the knowledge emanating from this fusion (Liu & Mitcham, 2024). Liu and Mitcham give an analysis of the knowledge generated through AI-driven science through the lens of the distinction between the theoretical and the practical hermeneutics which was made by Joseph Rouse. They propose that, from the theoretical hermeneutics perspective, scientific knowledge has not undergone a fundamental transformation at the theoretical level and views AI merely as another tool enhancing research efficiency, however, this perspective fails to account for the unique challenges posed by AI-enabled knowledge generation, including the emergence of data as a novel form of publication, AI-assisted writing, automated laboratories, and the opaque, unexplainable, and potentially biased nature of machine learning-derived knowledge. Liu

and Mitcham then suggest the adoption of practical hermeneutics to address the aforementioned issues and for comprehending the knowledge emanating from these novel research methods within the context of scientific practice.

In their etymological and historical exploration, Danfeng Zeng and Qiong Liu analyse the meanings of the Chinese term 'Jì Shù' for 'technology' (Zeng & Liu, 2024). Their paper "Hermeneutic Analysis of Ancient Chinese Technology" shows that the term 'Jì Shù' consists of two Chinese characters: 'Jì' and 'Shù'. The two characters reflects traditional Chinese thought which takes technology as a complex of two forms of knowledge: knowledge concerning the formless or non-material aspect of technology and knowledge of the form or material aspect of technology.

Pan Deng's (2024) "Hegel on the Steam-Engine" explores Hegel's unique perspective on the steam engine. Even though Hegel did not explicitly discuss the steam engine as an integrated technology, he examined its constituent elements, namely "steam" and "machine," by tracing the former from the ancient Greek theory of four elements to modern meteorological understandings, and by understanding the latter within the framework of dialectics. Deng argues that Hegel's comprehension of the steam engine, underscoring the dialectical nature of knowledge, encapsulates his concept of "pre-scientific hermeneutics," involving a continuous process of reflecting on concepts and reality informed by empirical validation.

Wenzel Mehnert's (2024) "The Futures Circle – An Applicable Framework for Hermeneutic Technology Assessment" finally turns to "Technofutures," that is, to statements about novel and emerging science and technologies (NEST) that disrupt our understanding of the world. Although Technofutures often adopt a hypothetical and speculative stance, they are not mere predictions of the futures, but reflect the current state of affairs and composition of existing knowledge, values, and attitudes, leaving a lasting impact on the development of actual technologies. Mehnert explores how diverse perspectives on Technofutures might offer a framework for the hermeneutic assessment of the futures.

Though the topics addressed in all these papers represent only a fraction of the wide-ranging concerns of hermeneutics, they foreground its importance for understanding a world of technical and scientific artefacts. We aim with this special issue to provide a reminder of the expansive nature of hermeneutics and to inspire further research regarding the Hermeneutics of Technology, broadly conceived.

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