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Research article

Hermeneutics and Science: Taxonomies, Interpretations, Subjectivity

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Abstract

This article is written in response to a position that sees hermeneutics as not just a method of interpreting texts, but rather as a fundamental cognitive strategy that opposes the scientific type of knowledge. This approach implicitly includes the ideas of the essence of science, its language and subject as consequences. In short, we can call the position which opposes hermeneutic and scientific approaches the "hermeneutic-scientific divide (HSD)" view. The purpose of this research is to examine critically the ideas of the representatives of the HSD approach to science as an area of experimentally verified interpretations, the clarity of scientific language, which eliminates the need for interpretation, and the neutrality of cognitive subjects, where scientists act as intermediaries transmitting knowledge without changing their personalities. We also aim to show that hermeneutical approaches remain an integral part of science despite science's desire for objectivity. As an argument, we propose to consider examples from the history of science. These include the dispute between Camillo Golgi and Santiago Ramón y Cajal about the structure of the nervous system; Charles Walcott's research in taxonomy and paleontology; and the debate about the phoneme between the Leningrad and Moscow schools of phonology. These cases show that even when using the same methods and data, interpretations of results can vary depending on the assumptions of researchers. They also demonstrate the impossibility of neutral, unbiased language in science. The article concludes that scientific language cannot completely avoid interpretation, despite its efforts to be objective and formal. Scientific texts always contain hidden contexts related to the historical, social and methodological conditions of their creation, as well as the value aspects of scientific work and the implicit knowledge of the author, along with his subjective assessments. Hermeneutic analysis is also essential for the formation of a scientific identity and the transmission of scientific traditions. Interpretation remains a key element in scientific knowledge, while science appears as a dynamic process in which objective data and subjective interpretations go hand in hand to form new knowledge.

Keywords: Hermeneutics; Science communication; Taxonomies; Classifications; The subject of science; Experiment; Interpretation

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Научная статья

Герменевтика и наука: Таксономии, интерпретации, субъективность

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Аннотация
Настоящая статья написана как ответ на позицию, которая рассматривает герменевтику не просто как метод интерпретации текстов, но как фундаментальную познавательную стратегию, противопоставленную научному типу познания. Этот подход имплицитно включает в себя представления о сущности науки, ее языке и предмете в качестве следствий. Эту позицию, противопоставляющую герменевтику и науку мы можем для краткости условно обозначить как “hermeneutics-science divide (HSD)”. Цель нашего исследования – критически рассмотреть тезисы представителей HSD о сущности науки, ее языке и субъекте. Цель нашего исследования – критически рассмотреть тезисы автора о науке как области экспериментально проверяемых интерпретаций, ясности научного языка, исключающего необходимость герменевтики, и нейтральности субъектов познания, где ученые выступают как посредники, транслирующие знания без изменения своей личности, и показать, что герменевтические подходы остаются неотъемлемой частью научного процесса, несмотря на стремление науки к объективности. В качестве аргументации мы предлагаем рассмотреть примеры из истории науки, такие как спор между Камилло Гольджи и Сантьяго Рамон-и-Кахалем о структуре нервной системы, исследования Чарльза Уолкотта в области таксономий и палеонтологии, а также дискуссия о фонеме между Ленинградской и Московской фонологическими школами. Эти кейсы демонстрируют, что даже при использовании одних и тех же методов и экспериментальных данных интерпретация результатов может существенно различаться в зависимости от теоретических предпосылок исследователей, а также показывают невозможность нейтрального, не нагруженного теоретически и этически, научного языка. Основные выводы статьи заключаются в том, что научный язык, несмотря на стремление к формализации и объективности, не может полностью исключить интерпретацию. Научные тексты всегда содержат скрытые контексты, связанные с историческими, социальными и методологическими условиями их создания, ценностными аспектами научной работы, неявным знанием автора и просто его субъективными оценками. Также герменевтический анализ необходим для формирования научной идентичности и передачи научных традиций. Таким образом, интерпретация остается ключевым элементом научного познания, а наука предстает как динамичный процесс, в котором “объективные” данные и субъективные интерпретации всегда идут рука об руку, формируя новое знание.

Ключевые слова: Герменевтика; Научная коммуникация; Язык науки; Таксономии; Классификации; Субъект науки; Эксперимент; Интерпретация

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INTRODUCTION

The article proposes to consider some theses regarding the language of science and the role of hermeneutics within it. There is a view that describes hermeneutics not only as a set of techniques related to the interpretation and comprehension of texts, but also as a fundamental cognitive approach - a hermeneutic type of cognition, contrasting with a scientific approach to knowledge. For simplicity, we can refer to this view that contrasts hermeneutics with science as the "hermeneutics-science divide" (HSD). Both types of knowledge seek to find "truth" in their own way. Hermeneutical knowledge sees truth as the product of human understanding through interpretation, while scientific knowledge presupposes acquiring relevant knowledge about its subject. "Interpretation functions through the creation of meaning through common action and theory, and language contributes an abstract element, while common action adds a cultural or practical element" (Heelan, 1998, p. 287). Scientific knowledge is never definitive. Hermeneutics and science as cognitive concepts imply certain images of the world. By interpreting these images, we can draw conclusions about what the author means when using the language of science, how scientific subjects appear, and how to define the boundaries of scientific knowledge. I would like to discuss three propositions with the author: all are related to understanding "the language of science" and its features. The first proposition is related to experimental interpretation; the second concerns the use of real language without hermeneutical interpretation; and the third introduces the impact of scientific texts on readers.

1. Science as a field of experimentally verifiable interpretations. From the HSD perspective, science is defined as a field where the meaning and correctness of the interpretation of a theory or data can be verified experimentally. If there are different interpretations of the phenomenon, they should lead to empirical consequences that can be confirmed or refuted. Hermeneutic issues in science are temporary and eliminated in the experimental verification process. The experiment reveals the properties of the world and clarifies scientific concepts, forming the language of science.

2. Clarity of Scientific Language. Scientific language is designed to ensure that scientists can understand each other without the need for additional interpretation or explanation. The terms and symbols used in scientific communication are formalized and agreed upon within the scientific community, reducing ambiguity and subjectivity in communication. This eliminates the need for scientists to ask questions such as "what did you mean when you used this word in this context?" (Nordmann, 2025, p. 5). Science supports the idea that a shared language automatically ensures mutual comprehension without interpretation.

3. "Neutral" subjects of cognition. Unlike fiction or philosophical literature, where the author plays an active role in the process of meaning formation, a scientific text aims to eliminate subjectivity. The author of a scientific text acts more as a mediator, transmitting knowledge, while the reader assimilates information and remains unchanged in this process:

> Philosophical hermeneutics considers the making of meaning as a process that involves how we understand ourselves and a notion of who we are. <...> There is none of this in science, supposedly. Scientists may come up with a changed understanding of nature but they are not looking to change themselves, to develop their character or grow as a person. They are what they always are: Impersonal knowing subjects who experiment and observe, perhaps interpret, and draw conclusions. (Nordmann, 2025, p. 5-6)

These three aspects are closely interconnected. The language of science defines the boundaries of scientific discourse and shapes the boundaries of science itself. It is intrinsically linked to the process of cognition, involving both the speaker and the listener. The central question is whether it is possible to imagine a language that eliminates the need for hermeneutics.

EXPERIMENTS AND INTERPRETATIONS

At the ceremony of awarding the Nobel Prize in Physiology or Medicine in 1906, a rare event happened: the two prize winners were not colleagues, but irreconcilable opponents. Camillo Golgi and Santiago Ramon y Cajal, both awarded the highest scientific award, stood on opposite sides of one of the main disputes in the history of neuroscience. They had one thing in common – the silver staining method, which allowed them to see the structure of the nervous system with unprecedented detail for that time. But the paradox was that using the same experimental method these two scientists, whose qualifications we simply cannot doubt, saw completely different things. Golgi, a staunch proponent of the reticular theory, saw that the nervous system is a single, continuous network. Cajal, in turn, came to the conclusion that it consists of individual cells – neurons that transmit signals to each other through specialized contacts.

This case shows that, in science, an experiment does not put an end to disputes about interpretations once and for all. Golgi and Cajal worked with the same data – visual images produced by silver staining – but their theories were not limited to “testable empirical consequences.” They interpreted what they saw through the lens of their beliefs. Golgi, who supported the concept of the integrity of the nervous system, saw confirmation of the reticular theory. Cajal saw neurons, as he was looking for cellular units. The experiment didn't determine a result that needs to be interpreted once and forever, because science isn't just a series of confirming or refuting experiments and accumulating data. It's also a field where objective knowledge forms through a clash of interpretations and human beliefs.

Another example of the dependence of scientific data on interpretation is the case of fossil classification. The research of Charles Walcott, who discovered many previously unknown fossils in the Burgess Shale at the beginning of the 20th century, demonstrates how crucial the use of accurate hermeneutical procedures in taxonomy is. Based on the linear view of evolution that prevailed during his time, from simple to complex, Walcott interpreted fossils through the lens of existing taxa. He attempted to fit new forms into existing classes, turning them into precursors of modern worms,

jellyfish, and other animals. Instead of allowing for the possibility of modifying the model itself, Walcott adjusted his data to fit the existing theoretical framework. Thus, he flattened his findings and failed to appreciate their true significance. An analysis of the collection conducted by a group of British scientists half a century later revealed that the fossils discovered by Walcott possessed unique anatomical features and belonged to taxa unrelated to modern classes (Bryson, 2019, pp. 217-219).

This case shows that taxonomies are not just a neutral reflection of natural diversity, but complex constructions that depend on the researcher's interpretative framework. Without a proper hermeneutic procedure aimed at identifying the meanings hidden behind original classifications, scientific knowledge may be distorted. Data does not exist in a vacuum; it is always embedded in cultural and theoretical contexts that determine its perception and use.

In this sense, taxonomy requires not only empirical observation, but also significant work with data – work that takes into account the limitations of current paradigms and allows for their possible revision. The correct hermeneutic approach in taxonomy is not merely a methodology, but a crucial tool for adequately representing biological diversity and creating accurate scientific models.

Thus, the idea that science is a field where the meaning and correctness of interpretations can be experimentally verified is too narrow. Science also includes interpretations that cannot be resolved experimentally. Firstly, empirical data that resolves uncertainty depends on interpretation itself. Secondly, unambiguity does not occur when we conduct experiments: different scientists interpret results differently. These ideas call into question the possibility of absolutely neutral scientific language and show that hermeneutic aspects are an integral part of scientific knowledge. While the processes of interpretation and re-interpretation occur in science, they remain alive; they cannot be excluded from the process of knowledge, they are an essential part of science itself.

THE LANGUAGE OF SCIENCE AND ITS SUBJECTIVITY

Let's turn to the question of scientific language, which does not require interpretation according to the HSD representatives. A scientific text is not just a set of protocol sentences that directly correspond to reality. It also contains a “collapsed” image of scientific reality, including both facts and methods, theories, values, and science practices, as well as the implicit knowledge and cognitive features of the author. A scientific text can be interpreted and deciphered, requiring hermeneutical analysis since it is more than just a collection of protocol sentences correlated with reality but also includes contexts of utterance, such as conditions of production, historical contingency, and the author's affiliation with a particular paradigm. The contexts can vary greatly: science is not monolithic or unified, but rather a complex variety of discourses and methods. This multiplicity creates the need for interpretation from historical, ethical, social, and methodological perspectives.

The normative ideal of science implies, of course, the complete elimination of the external social context and the internal subjective principles from the scientific text.

This ideal is difficult to achieve, but it is important to strive for it. There is always a last frontier – the human language that is used to write scientific articles. “Probably the first powerful multiplier of the image of science was language, which emerged as a fundamental instance at the very heart of the work of scientists and broke Western modern science into paradigms based on theoretical constructions” (Varkhotov, et al., 2018, p. 6).

Note that the reason for subjectivity, which in turn presupposes the inevitability of interpretation, is the cognitive features of the language of science: it is both the metaphorical nature of language (including scientific) and the conceptual nature of scientific terms. Terms are not words with unambiguous dictionary meanings but concepts with many linguistic features rooted in reality. This includes the need to present and interpret visual data as the result of an experiment as well as implicit knowledge embedded in scientific texts. This means it is impossible to create an "objective" language of science completely separated from humans and as a result does not require hermeneutics.

To be more specific, Nordmann's (2025) thesis connects to this idea by suggesting that they do not, however, interpret each other in what they say and write – they do not usually ask, 'what did you mean when you used this word in this context?' hardly corresponds to reality. There have been persistent disputes over the definition of key terms in scientific discussion. A notable example is the debate between the Leningrad and Moscow phonology schools about what should be considered a phoneme. This disagreement has led to a need to pay close attention to the concept of phoneme being used and the criteria behind its definition when reading texts on the subject, as it affects the classification of phonemes and the overall number in the Russian language.

The question of the meaning of the phoneme is central to phonological theory, but it is impossible to give an unambiguous definition of the phonemes: the interpretation of this term varies significantly within the frameworks of the two leading schools of Russian phonology – the Moscow and Leningrad phonological schools.

According to the Moscow Phonological School, a phoneme is an abstract sound type that combines all possible sound realizations (allophones) depending on the phonetic environment. A phoneme does not have a specific sound but manifests itself through its variations in speech. The main criterion for phonemic affiliation is the role of a sound within a morpheme. If different sounds are interchangeable within the same morpheme, then they are considered to be allophones of the same phoneme. This leads to a more compact taxonomy, as many phonetic differences are seen as positional variants of a single phoneme. For example, the soft sounds /g', k', x'/ (/г’, к’, х’/) are not considered separate phonemes, and the sound /y/ (/ы/) is considered variant of the phoneme /i/ (/и/). The Moscow School thus identifies 39 phonemes based on this approach.

The Leningrad School of Phonology defines phonemes based on their perceptual properties and functional roles in language. A phoneme is the smallest unit of sound that can distinguish between words and their different forms. The most important criterion for defining a phoneme is not only its position in the structure of a word, but also the awareness of native speakers that it makes a difference.

In this regard, the Leningrad school recognizes a larger number of phonemes, including /g', k', x', y/ ((/г’, к’, х’, ы/)), which have an independent status and lead to a classification with 41 phonemes.

The debate surrounding the meaning of key terms, such as “phoneme,” illustrates that scientific language cannot be entirely objective or free from interpretation. The differences between the Moscow and Leningrad schools of phonology highlight that even within the same discipline and language, the understanding of terms can vary dramatically based on theoretical assumptions and methodological approaches. This shows that scientific terms are not neutral or unambiguous; they must be interpreted according to the context, paradigm, and cognitive perspectives of researchers. Therefore, hermeneutic analysis is an essential part of the scientific process, even in fields that strive for maximum formalization and objectivity.

SCIENTIFIC TEXTS AS A SPACE FOR THE FORMATION OF THE SUBJECT

Our position is that a scientist is not just an observer who captures objective reality and transmits his ideas, but an active participant in scientific communication. This opinion is opposed to the HSD approach. For example, Nordmann, referring to Hertz, describes the ideal image of a scientist who is not involved in “mere empty discussions about words” as a figure “left alone with nature.” Perhaps such an ideal was suitable for 19th-century science, but in modern science, a scientist (especially a natural scientist) is inevitably embedded in a network of scientific interactions. Their research is discussed outside the scientific community, inside science at conferences, reviewed by experts, commented on by editors of scientific journals, and then becomes public, subject to interpretation, discussion, and even controversy. All this represents the necessary stages of unified scientific communication. This multi-stage communication does not interfere with scientists, but it is a fundamental and most important part of the formation of scientific knowledge. Communication in science is not just the transfer of knowledge, but also the process of its collective creation, interpretation, and refinement. Scientific texts play a key role in this process, influencing not only readers' knowledge, but their ethical attitudes, worldviews, and scientific identities.

Alfred Nordmann on the controversy speaks about the immutability of the subject of scientific research (both for the author and for the reader): “As opposed to the knowing subjects of scientific research, the subjects of hermeneutic exegesis do not remain unchanged in their course of inquiry” (Nordmann, 2025, p. 4). It is difficult to agree with this statement, since in scientific texts the idea of scientific ethos, the procedure for carrying out scientific experiments, and a set of values and rules for a scientist's behavior are laid down. Reading scientific texts conveys not only methodological knowledge but also shapes a scientist's personality, determining his attitude towards science, colleagues, and society.

> Scientific vocation acts as a gift in this context (divine or initiated by a teacher), and this gift requires reciprocal gifts – a scientist must impart knowledge to his students and those around him. His obligations are limited to broadcasting not

> only knowledge but also the gift of vocation, which is the basis for selfless relationships within science and the involvement of newcomers into it. (Kasavin, 2020, p. 252)

It is interpretation, conscious or subconscious, that makes it possible to identify the “second layer” of a scientific text containing ideas about values, virtues, and ethical norms in the scientific community. When reading a scientific text, researchers not only assimilate information, but also encounter models of scientific behavior, forms of argumentation, and styles of presentation that reflect specific ideals of science. Therefore, interpretation not only helps comprehend the content but also changes the reader, contributing to his or her formation of scientific identity and ethos.

A scientific text, therefore, is not a neutral means of transmitting knowledge. It is a space where, through interpretation, the next generation of scientists are educated, scientific traditions are consolidated, and values are transmitted that determine the perception of science and its place in society.

RESULTS

In this article, we have presented a critical analysis of the “hermeneutics-scientific divide” position in which scientific and hermeneutic forms of knowledge are contrasted. We emphasize the special role of language in scientific knowledge and the unavoidable role of interpretation in scientific research. The main findings of our study can be summarized as follows.

Using the example of the debate between Golgi and Cajal, as well as Walcott's research, we demonstrated that the experiment does not eliminate the need for interpretation. Even when using the same methods and data, scientists can arrive at different conclusions. This highlights the role of theoretical assumptions and cognitive attitudes in scientific cognition. The experiment is not the ultimate arbiter in disputes about interpretations, and scientific knowledge is shaped through a clash of diverse viewpoints.

Scientific language, despite striving for formalization and objectivity, cannot be completely free from interpretation. The example of the confrontation between Moscow and Leningrad phonological schools shows that even within the same discipline, the understanding of key terms can vary dramatically. This indicates that scientific terms are not neutral and require hermeneutical analysis to identify their meaning in specific contexts. A scientific text does not simply convey knowledge but also shapes the reader's scientific identity. Through the interpretation of scientific texts, scientists learn not only methodological knowledge but also ethical norms, values, and traditions of their scientific community. Therefore, scientific texts act as a means of educating new generations of scientists and preserving scientific traditions.

Thus, hermeneutics remains an integral part of scientific knowledge, since the interpretation of data is a key process in science. Scientific language, despite its striving for objectivity, always contains elements of subjectivity, making hermeneutical analysis a necessary tool for understanding scientific texts and constructing scientific knowledge.

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