



Paper Type: Original Article

Modern Physics and Hyperrealism-antirealism Tendency

Victor Christianto ^{1,*}  and Florentin Smarandache ² 

¹ Malang Institute of Agriculture, East Java, Indonesia; victorchristianto@gmail.com.

² University of New Mexico, Mathematics, Physics and Natural Sciences Division 705 Gurley Ave., Gallup, NM 87301, USA; smarand@unm.edu.

Received: 22 Sep 2024

Revised: 25 Oct 2024

Accepted: 16 Nov 2024

Published: 19 Nov 2024

Abstract

This paper delves into the philosophical implications of modern physics, particularly theoretical physics, and its tendency towards hyperrealism-antirealism. Inspired by Baudrillard's concept of hyperreality, we argue that certain aspects of contemporary physics, such as the interpretation of quantum mechanics and the pursuit of theories of everything, exhibit characteristics of a hyperreal state. This hyperreal state is characterized by the detachment from reality, the dominance of simulation over the real, and the loss of a clear distinction between the real and the imaginary. We explore how this trend has led to a departure from a balanced realist perspective, hindering the pursuit of a complete and coherent understanding of the physical world.

Keywords: Modern Physics; Philosophical; Hyperrealism-antirealism; Hyperreality.

1 | Introduction

Modern physics, with its exploration of the quantum realm and the cosmos, has pushed the boundaries of human understanding. However, along with its groundbreaking discoveries, it has also introduced profound philosophical questions. One such question concerns the nature of reality itself. While physics has traditionally sought to describe the real world objectively, certain interpretations and theoretical frameworks have led to a departure from this realist perspective.

This paper examines the emergence of a hyperrealist-antirealist tendency within modern physics, drawing inspiration from Baudrillard's concept of hyperreality. Hyperreality, as described by Baudrillard, is a condition in which the simulation of reality becomes more real than reality itself. In the context of physics, this can be observed in the increasing reliance on mathematical models and abstract concepts, which often overshadow the underlying physical reality.

We argue that certain interpretations of quantum mechanics, such as the Copenhagen interpretation, and the pursuit of theories of everything, such as string theory, exhibit characteristics of a hyperreal state. These interpretations and theories often involve counterintuitive and seemingly paradoxical concepts, which can lead to a loss of touch with the tangible world. The focus on mathematical elegance and theoretical consistency, while essential for scientific progress, can sometimes overshadow the need for empirical verification and a clear connection to observable phenomena.



Corresponding Author: victorchristianto@gmail.com



<https://doi.org/10.61356/j.mawa.2024.5428>



Licensee **Multicriteria Algorithms with Applications**. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0>).

By exploring the implications of this hyperrealist-antirealist trend, this paper aims to highlight the importance of a balanced realist perspective in physics. A healthy balance between realism and idealism is crucial for a comprehensive understanding of the physical world. By recognizing the limitations of current theories and interpretations, and by fostering a critical approach to scientific inquiry, we can strive for a more grounded and meaningful understanding of reality.

2 | Hyperreality and Physics

Hyperreality, a concept popularized by the French philosopher Jean Baudrillard, describes a condition in which the simulation of reality becomes more real than reality itself. In the context of physics, this can manifest in various ways. For instance, some interpretations of quantum mechanics, such as the Copenhagen interpretation, prioritize mathematical formalism over physical intuition. While this approach has been incredibly successful in making accurate predictions, it can also lead to a detachment from the underlying reality of the quantum world.

Furthermore, the pursuit of grand unified theories, such as string theory, often involves highly abstract mathematical constructs that are difficult to test experimentally. While these theories may offer elegant solutions to fundamental problems in physics, they can also lead to a situation where the theoretical framework becomes more important than the empirical evidence.

3 | Hyperreality and the Quantum Conundrum: A Baudrillardian Critique of Modern Physics

Jean Baudrillard, the renowned French philosopher, introduced the concept of hyperreality, a condition in which the simulation of reality becomes more real than reality itself. This concept, while seemingly abstract, has profound implications for understanding the philosophical underpinnings of modern physics, particularly quantum mechanics.

Quantum mechanics, one of the most successful scientific theories of all time, has also been one of the most philosophically perplexing. Its counterintuitive predictions and probabilistic nature have led to a variety of interpretations, each with its own set of metaphysical assumptions.

The Copenhagen interpretation, for instance, while providing a practical framework for quantum mechanics, has been criticized for its operationalist stance. It suggests that we should not inquire into the underlying reality of quantum phenomena but rather focus on the measurable outcomes of experiments. This approach, while useful for making predictions, can be seen as a form of hyperreality, where the mathematical formalism and experimental results take precedence over any attempt to understand the underlying physical reality.

4 | The Hyperreal Tendency in Theoretical Physics

The tendency towards hyperreality in theoretical physics can be traced back to the influence of German idealism, particularly the work of Immanuel Kant and Georg Wilhelm Friedrich Hegel. These philosophers emphasized the role of the mind in shaping our understanding of reality. In a similar vein, many physicists seem to prioritize the mathematical elegance and logical consistency of their theories over their empirical adequacy.

This hyperrealist tendency can be seen in the pursuit of theories of everything, such as string theory. While string theory offers a mathematically sophisticated framework for unifying the forces of nature, it has yet to make any experimentally verifiable predictions. Nevertheless, many physicists continue to invest significant effort in developing this theory, often at the expense of more empirically grounded research.

The dominance of hyperreality in physics can have several negative consequences. First, it can lead to a loss of touch with the physical world. By focusing on abstract mathematical models and theoretical constructs, physicists may neglect the importance of empirical observation and experimentation. Second, it can stifle

creativity and innovation. When the emphasis is on adhering to established paradigms and mathematical formalisms, it becomes difficult to think outside the box and explore new ideas.

To counter this trend, it is essential to maintain a healthy balance between theoretical speculation and empirical investigation. Physicists should strive to develop theories that are not only mathematically elegant but also physically meaningful. They should also be open to the possibility that our current understanding of reality may be incomplete or even fundamentally flawed.

By recognizing the dangers of hyperreality and embracing a more critical and open-minded approach, physicists can help to ensure that their discipline remains grounded in the physical world and continues to make significant contributions to our understanding of the universe.

Jorge Luis Borges, the renowned Argentine writer, presented a chilling tale in his short story "*Tlön, Uqbar, Orbis Tertius*." In this narrative, a secret society discovers a fictional planet, Tlön, and its inhabitants, who possess a unique worldview, one that prioritizes idealism over empiricism. This fictional world, with its peculiar laws of physics and metaphysics, challenges our understanding of reality and raises questions about the limits of human knowledge.

While Borges' tale is a work of fiction, it offers a sobering reflection on the potential dangers of excessive idealism and the role of empirical evidence in scientific inquiry. In the realm of physics, particularly in the realm of theoretical physics, there is a growing concern that a similar trend toward hyperreality may be taking hold.

5 | The Risk of a Fictional Universe

By prioritizing theoretical elegance and mathematical consistency over empirical verification, physicists risk creating a fictional universe, much like the planet Tlön. This could lead to a situation where scientists become so engrossed in their theoretical models that they lose sight of the real world. In such a scenario, the pursuit of knowledge could become an end in itself, rather than a means to understand the natural world.

To prevent this from happening, it is essential to maintain a healthy balance between theoretical speculation and empirical observation. Physicists should always strive to ground their theories in experimental data and to critically evaluate the assumptions underlying their models. By doing so, they can avoid the pitfalls of hyperreality and ensure that their work remains firmly rooted in the physical world.

In conclusion, while theoretical physics is a powerful tool for understanding the universe, it is crucial to use it responsibly. By recognizing the limitations of our current knowledge and by remaining open to new ideas and empirical evidence, we can avoid the dangers of hyperreality and continue to make progress in our understanding of the natural world.

6 | Another Example

As a case example, let us tell the story of a group of young experimental physicists who at the time frequently discussed with us their results on the real shape of electrons. While initial experiments seemed quite promising, after a few months they told us that their supervisor suggested that they not conduct more experiments on electron shape anymore, instead, they shall take a more "theoretical" learning path. As a result, later on, we read a draft paper of them trying to describe electrons in terms of mini-blackholes or sort of that. That is quite devastating in comparison to their promising initial experiment results.

7 | More Hidden Problems Causing Hyperrealism-antirealism: Obscurantism and Bourbakiism

It is known that there are more hidden problems, for instance, Nicolas Bourbaki (French: [nikɔla buʁbaki]) is the collective pseudonym of a group of mathematicians, predominantly French alumni of the École normale

supérieure (ENS). Founded in 1934–1935, the Bourbaki group originally intended to prepare a new textbook in analysis.

Shortly speaking, the rise of hyperrealism-antirealism in theoretical physics is a complex issue with roots in various philosophical and methodological factors. One such factor is the increasing influence of obscurantism and Bourbakiism in mathematical physics.

Obscurantism, a tendency to make something unnecessarily complex or difficult to understand, has become a pervasive problem in modern physics. Some physicists seem to take pride in the complexity of their theories as if the difficulty of understanding them is a measure of their intellectual depth. This trend can be seen in the proliferation of highly technical jargon and arcane mathematical formalism, which can obscure the underlying physical reality.

Bourbakiism, named after the collective pseudonym of a group of French mathematicians, refers to a highly formal and axiomatic approach to mathematics. While this approach can be useful for establishing rigorous foundations, it can also lead to a loss of intuition and a focus on abstract structures over concrete reality. In the realm of physics, Bourbakiism can manifest in the excessive use of mathematical formalism, which can obscure the physical meaning of equations and lead to a disconnect between theory and experiment.

8 | The Dangers of Obscurantism and Bourbakiism

Both obscurantism and Bourbakiism can contribute to the rise of hyperrealism-antirealism in physics. By obscuring the physical meaning of theories and prioritizing mathematical formalism over empirical evidence, these trends can lead to a situation where physicists become more concerned with the elegance of their theories than with their ability to explain the real world. This can result in the development of highly abstract and speculative theories that are difficult to test experimentally, and which may ultimately prove to be misguided.

To combat the influence of obscurantism and Bourbakiism, it is essential to prioritize clarity and simplicity in scientific communication. Physicists should strive to explain their ideas in clear and concise language, avoiding unnecessary jargon and technicalities. They should also be willing to engage in open and honest debate with their colleagues and to be critical of their assumptions and beliefs.

By adopting a more critical and empirical approach to physics, we can help to ensure that the field remains grounded in reality and continues to make significant contributions to our understanding of the universe.

9 | Discussion

9.1 | How to Consider a Spectrum from Healthy Realism to Antirealism from a Neutrosophic Logic Perspective

As we discussed in previous sections, Modern physics, with its exploration of the quantum realm and the cosmos, has pushed the boundaries of human understanding. However, it has also introduced profound philosophical questions about the nature of reality. These questions have led to a spectrum of approaches, ranging from hyperrealism to antirealism, with healthy realism as a middle ground.

A novel perspective to understand this spectrum is through the lens of Neutrosophic Logic, a logical system that deals with indeterminacy and uncertainty. This approach can help us to appreciate the nuanced interplay of realism and antirealism in various physical theories.

The Spectrum of Approaches

1. Hyperrealism:

- Characterized by: A strong emphasis on empirical evidence and a skepticism towards speculative theories.

- Example: Early quantum mechanics, which focused on the observable properties of particles.
- Neutrosophic Perspective: A predominantly T (True) component, with minimal I (Indeterminate) and F (False) components.

2. Healthy Realism:

- Characterized by: A balanced approach that acknowledges the limitations of our knowledge while striving for a realistic understanding of the world.
- Example: Classical mechanics, which provides a robust framework for understanding macroscopic phenomena.
- Neutrosophic Perspective: A balanced combination of T, I, and F components, reflecting the interplay of knowledge, uncertainty, and ignorance.

3. Hyperrealism and Antirealism:

- Characterized by: A tendency to prioritize theoretical elegance and mathematical consistency over empirical evidence.
- Example: String theory, which postulates the existence of tiny, vibrating strings as the fundamental building blocks of the universe, but lacks experimental verification.
- Neutrosophic Perspective: A predominantly I and F component, with minimal T component, indicating a high degree of uncertainty and speculation.

A Neutrosophic View of Quantum Mechanics

Quantum mechanics, perhaps the most perplexing theory in physics, offers a fascinating case study in the interplay of realism and antirealism. The Copenhagen interpretation, for instance, is often criticized for its antirealist stance, as it suggests that quantum states do not correspond to physical reality until they are measured. However, other interpretations, such as the many-worlds interpretation, offer a more realist perspective, positing that all possible outcomes of a quantum measurement occur in different universes.

A Neutrosophic analysis of quantum mechanics would acknowledge the inherent indeterminacy of the quantum world. It would recognize that both realist and antirealist interpretations have their merits and limitations. By embracing the indeterminacy of quantum phenomena, we can avoid the pitfalls of both hyperrealism and antirealism.

9.2 | How to Consider a Spectrum from Healthy Realism to Antirealism from a Philosophical Anthropology Perspective

Philosophical anthropology, a field that explores the nature of humans and their place in the world, provides a valuable lens through which to examine the spectrum of scientific approaches, from healthy realism to antirealism. This perspective emphasizes the cultural, social, and psychological factors that shape scientific inquiry, and suggests that the choice of a particular approach may be influenced by broader cultural and historical contexts.

9.2.1 | Cultural Factors and Scientific Approach

Different cultures have distinct attitudes toward authority, tradition, and innovation. These cultural factors can significantly impact the way scientists approach their work. For instance, in cultures that value tradition and authority, there may be a tendency towards a more conservative, realist approach to science. In contrast, cultures that embrace innovation and challenge the status quo may be more receptive to antirealist and speculative ideas.

A classic example of this cultural influence can be seen in the different approaches to scientific inquiry in Britain, Germany, Russia, and Italy. As the saying goes:

- Britain: Everything is permitted except what is forbidden.
- Germany: Everything is forbidden except what is permitted.
- Russia: Everything is forbidden, including what is permitted.
- Italy: Everything is permitted, including what is forbidden.

These cultural stereotypes, while exaggerated, highlight the different attitudes towards rules and regulations in these countries. These attitudes can also be applied to the realm of scientific inquiry. A British scientist may be more inclined to take risks and explore unconventional ideas, while a German scientist may be more cautious and adhere to established norms.

9.2.2 | The Role of the Scientific Community

The scientific community itself is a cultural entity with its norms, values, and traditions. These norms can influence the way scientists approach their work, and can also shape the broader cultural attitudes towards science. For example, the rise of hyperrealism in certain fields of physics may be partly attributed to the influence of a particular school of thought or a specific cultural milieu.

The history of science is replete with examples of ideas that were initially considered heretical or absurd but eventually became accepted as mainstream. The discovery of heliocentrism, Newtonian dynamics, and quantum mechanics are just a few examples of scientific breakthroughs that challenged the prevailing worldview. These examples demonstrate the importance of a culture of open-mindedness and intellectual freedom, which can encourage innovation.

10 | Concluding Remark

The dominance of hyperreality in physics can have several negative consequences. First, it can lead to a loss of touch with the physical world. By focusing on abstract mathematical models and theoretical constructs, physicists may neglect the importance of empirical observation and experimentation. Second, it can stifle creativity and innovation. When the emphasis is on adhering to established paradigms and mathematical formalisms, it becomes difficult to think outside the box and explore new ideas.

To counter this trend, it is essential to maintain a healthy balance between theoretical speculation and empirical investigation. Physicists should strive to develop theories that are not only mathematically elegant but also physically meaningful. They should also be open to the possibility that our current understanding of reality may be incomplete or even fundamentally flawed.

By adopting a Neutrosophic perspective, we can gain a deeper understanding of the complex interplay between realism and antirealism in modern physics. This approach allows us to appreciate the nuanced nature of scientific inquiry and to avoid dogmatic adherence to any particular worldview. As we continue to explore the frontiers of knowledge, it is essential to maintain a healthy balance between empirical evidence and theoretical speculation. By doing so, we can ensure that physics remains grounded in reality and continues to make significant contributions to our understanding of the universe.

Last but not least, we shall also consider that by considering the cultural, social, and psychological factors that shape scientific inquiry, we can gain a deeper understanding of the spectrum of approaches, from healthy realism to antirealism. A philosophical anthropology perspective can help us to appreciate the complex interplay between individual and collective factors, and to recognize the importance of a balanced approach to scientific investigation. By embracing a diversity of perspectives and encouraging open-minded inquiry, we can ensure that science continues to thrive and contribute to the betterment of humanity.

Acknowledgments

The author is grateful to the editorial and reviewers, as well as the correspondent author, who offered assistance in the form of advice, assessment, and checking during the study period.

Discussions with other fellow physicists including Robert Neil Boyd, PhD, and Prof Jean de Climont, PhD are gratefully acknowledged.

Author Contributions

All authors contributed equally to this work.

Funding

This research has no funding source.

Data Availability

The datasets generated during and/or analyzed during the current study are not publicly available due to the privacy-preserving nature of the data but are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that there is no conflict of interest in the research.

Ethical Approval

This article does not contain any studies with human participants or animals performed by any of the authors.

References

- [1] Jos de Mul (ed.) Plessner's philosophical anthropology. Amsterdam: Amsterdam University Press B.V., 2014. ISBN: 978 90 8964 634 7
- [2] Sabine Hossenfelder. Lost in Math (2021).
- [3] Jean de Climont. The two polarization angles of the K coronal layer of the Sun within its equatorial plane. Unpublished personal communication (2024)

Disclaimer/Publisher's Note: The perspectives, opinions, and data shared in all publications are the sole responsibility of the individual authors and contributors, and do not necessarily reflect the views of Sciences Force or the editorial team. Sciences Force and the editorial team disclaim any liability for potential harm to individuals or property resulting from the ideas, methods, instructions, or products referenced in the content.