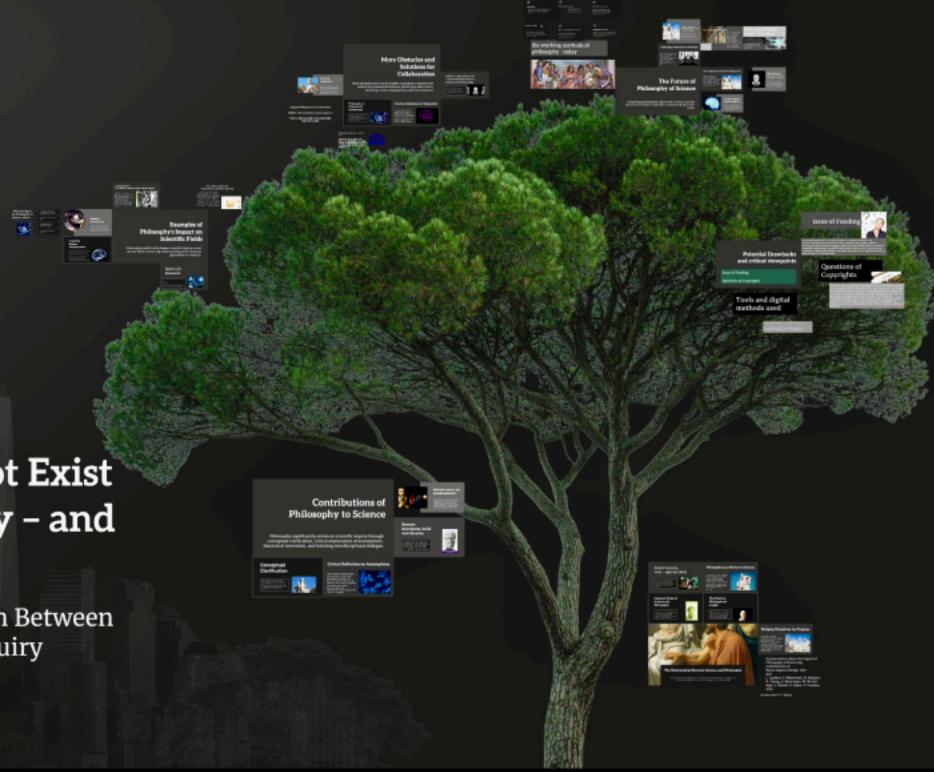


# Why Science Cannot Exist Without Philosophy – and Vice Versa

Exploring the Interconnection Between  
Philosophy and Scientific Inquiry





## The Relationship Between Science and Philosophy

Science and philosophy share a historical connection that enhances the understanding of both disciplines, creating a foundation for a richer inquiry into truth and knowledge.

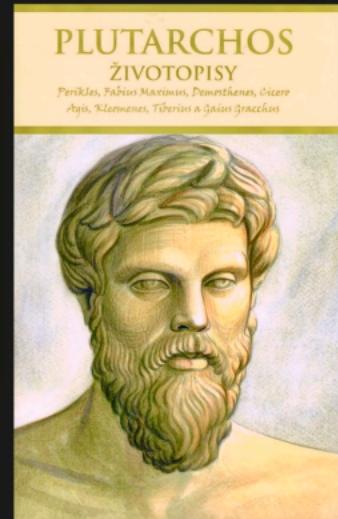
A presentation about the impact of  
Philosophy of Science by  
contributions of  
Mario Augusto Bunge, 1971  
and

L. Laplane, P. Mantovani, R. Adolphs,  
H. Chang, A. Mantovani, M. McFall-  
Ngai, C. Rovelli, E. Sober, T. Preadeu ,  
2019

by Alexandra T. N. Osburg

# Common Roots of Science and Philosophy

Philosophy and science originated from the same intellectual inquiries, seeking to answer fundamental questions about existence and the natural world. Understanding this connection reveals how philosophical frameworks have shaped scientific methods and reasoning throughout history.



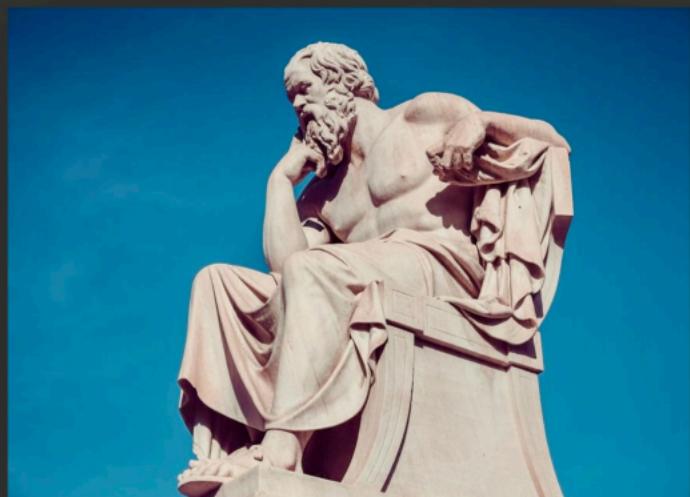
# Albert Einstein, 1944 – appropriately

Historical and philosophical knowledge grants scientists independence from the biases of their time, allowing for innovative thought. This independence is vital for genuine seekers of truth to develop new perspectives and challenge existing paradigms.



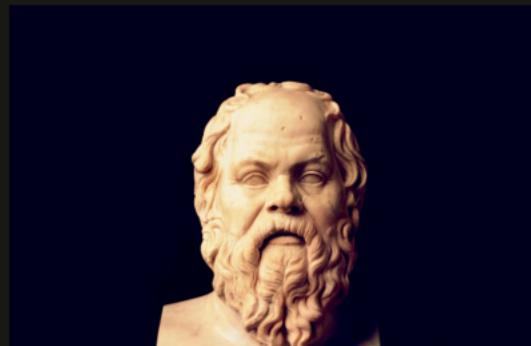
# Philosophy as a Partner to Science

Philosophy is not an adversary but a collaborator in scientific inquiry, fostering clarity, critique, and innovation. It prompts scientists to reflect on their methods, concepts, and the implications of their work, enriching the scientific narrative.



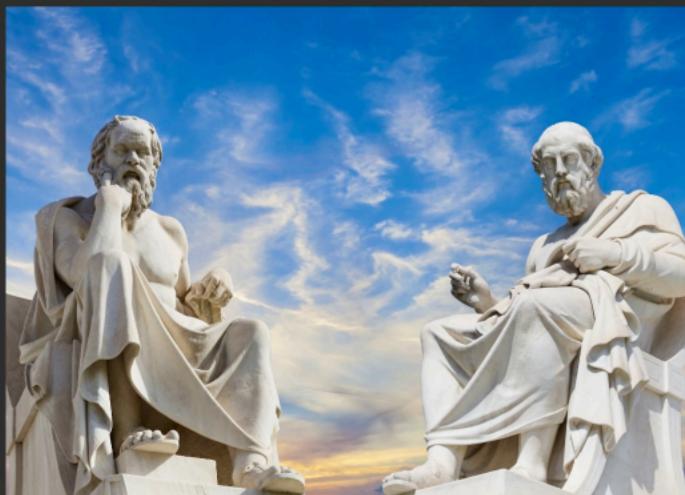
# The Need for Philosophical Insight

Philosophical insight is essential for addressing complex scientific problems. By understanding the broader philosophical implications, scientists can ensure that their research is grounded in a deeper understanding of knowledge and truth.



# Bridging Disciplines for Progress

Collaboration between philosophy and science leads to advancements across disciplines. Interdisciplinary initiatives can stimulate innovative research and enhance the richness of scientific inquiry by drawing from philosophical methodologies.

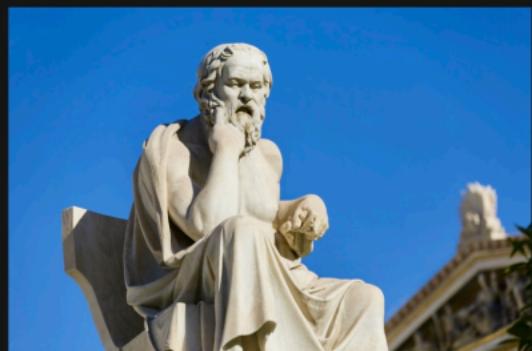


# Contributions of Philosophy to Science

Philosophy significantly enhances scientific inquiry through conceptual clarification, critical examination of assumptions, theoretical innovation, and fostering interdisciplinary dialogue.

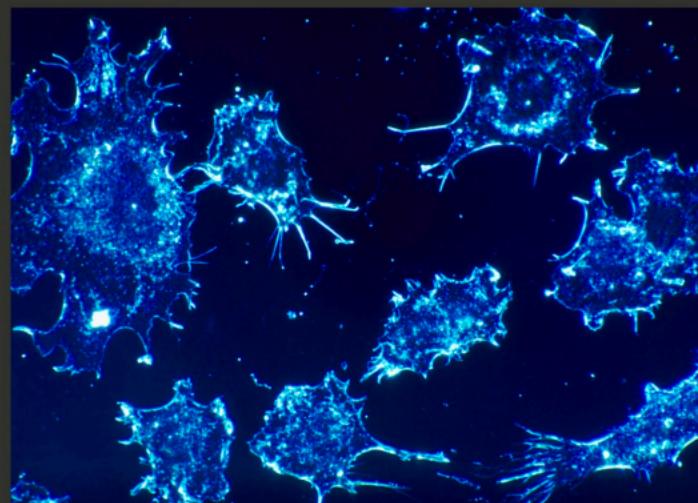
# Conceptual Clarification

Philosophy aids in refining scientific terminology and concepts, ensuring precise definitions that are crucial for accurate experimentation and communication. This clarity helps prevent misunderstandings and misinterpretations within scientific discourse.



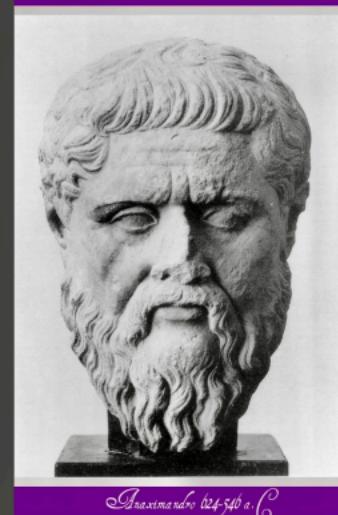
# Critical Reflection on Assumptions

Philosophical inquiry prompts scientists to reflect on their foundational assumptions, questioning their validity and relevance. This critical approach can lead to more robust methodologies and experiments, enhancing overall scientific integrity.



# Remove boundaries, build new theories

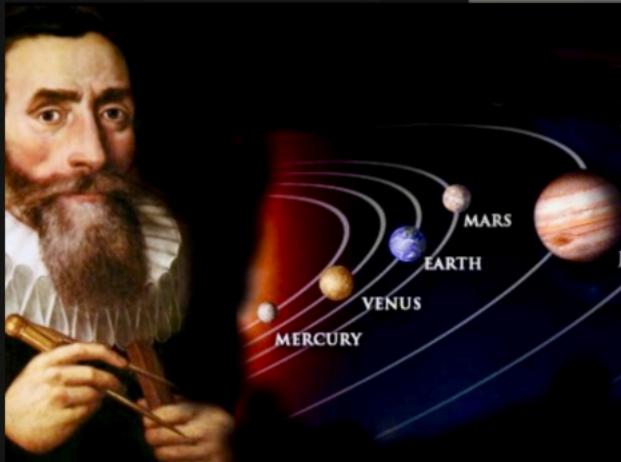
Philosophical frameworks encourage the formulation of innovative theories that push the boundaries of existing scientific paradigms. These new theories often arise from a philosophical critique of current scientific practices and findings.



Pythagoras 570 a. C.

# Rethink science, act interdisciplinary

Philosophy fosters meaningful dialogue between various scientific disciplines, breaking down silos and encouraging collaborative approaches. This dialogue leads to comprehensive solutions and enriches understanding across fields.



# Examples of Philosophy's Impact on Scientific Fields

Philosophy significantly shapes scientific inquiry across various fields, enhancing understanding and innovative approaches in research.

# Stem Cell Research

The concept of 'stemness' is defined philosophically into four categories: categorical, dispositional, relational, and systemic.

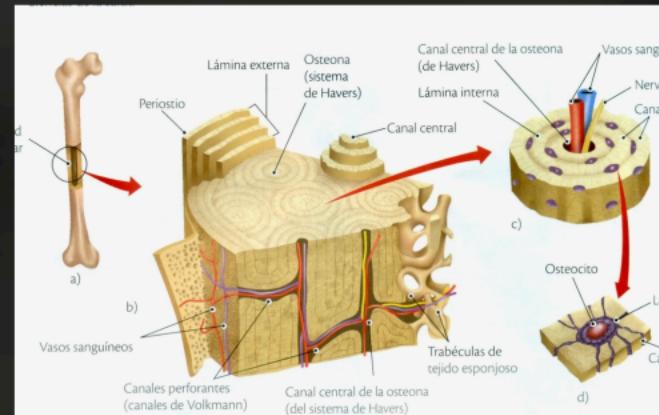
This precise classification promotes more effective cancer treatment strategies by allowing scientists to differentiate terms accurately, thereby improving therapeutic outcomes.



# Four types of stem cell characteristics and their meaning

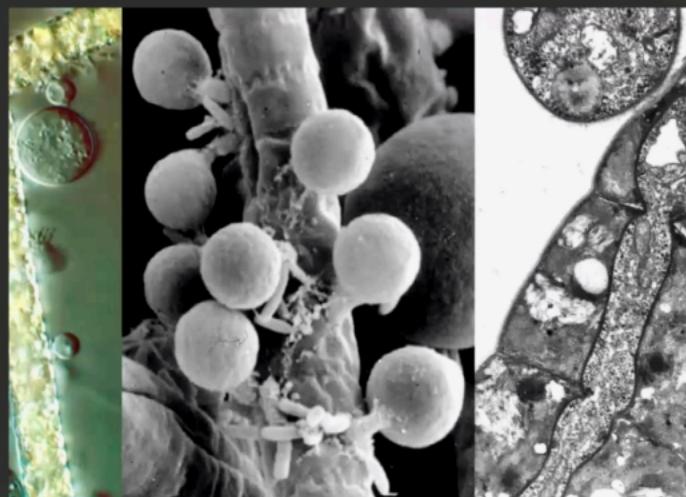
They play a central role in scientific discussion and practice. The categorical property describes the intrinsic nature of stem cells, while the dispositional property encompasses environmental dependencies.

Relational properties consider the interactions within cell populations, and systemic properties reveal how the interplay of different factors creates emergent properties. This differentiation is crucial for the development of more precise therapies



# Organoid Research - Philosophical Analysis for inspiring genetic research?

Organoids, as mini-organs cultivated in the lab, showcase the dispositional traits of cells. The philosophical analysis enhances the understanding of their formation, contributing to advancements in high-throughput genetic research and improved reproducibility in experimental results.





## Example Immunology

Challenging the traditional Self vs. Non-Self theory, the Discontinuity Theory offers new perspectives in immunology. Its applications are profound, impacting autoimmunity, tumor immunology, and vaccine responses, redefining human health as a microbial ecosystem.

# Cognitive Science Developments

Influential philosophers like Jerry Fodor and Daniel Dennett significantly shifted cognitive science from behaviorism to cognitivism.

Their theories on the modularity of the mind and false belief tasks provide foundational insights for numerous empirical studies in psychology and artificial intelligence.



# More examples for Philosophy of Science, which....



... illuminates the practise of  
psychological and psychiatric  
treatment of mentally ill persons



... questions the concept of  
gene



... discusses the time  
concept in Physics



...analyses Evolutionary  
altruism

# More Obstacles and Solutions for Collaboration

Identifying barriers and actionable strategies is essential for enhancing cooperation between philosophy and science, fostering a more integrated research environment.

# Lack of cooperation and communication between Science and Philosophy

Scientists often possess limited understanding of philosophical concepts, while philosophers may lack insight into scientific methodologies, creating a disconnect. This gap hampers effective collaboration and stifles interdisciplinary innovation.



# Practical Solutions for Integration

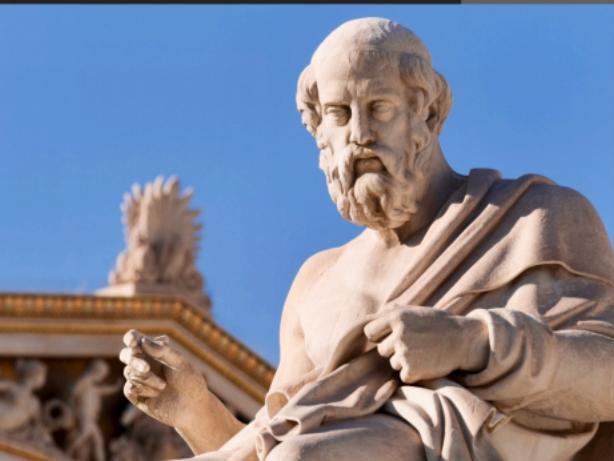
Creating interdisciplinary workshops and collaborative platforms can bridge the knowledge gap. Initiatives like joint research projects enhance communication, fostering an integrated approach to complex scientific questions.



# Philosophy in Professional Conferences

Integrating philosophical discussions into scientific conferences can facilitate dialogue between disciplines. Philosophy sessions can highlight the importance of critical reflection on scientific assumptions.





## Practical suggestions

Establishing joint doctoral supervision involving philosophers and scientists encourages comprehensive research training.

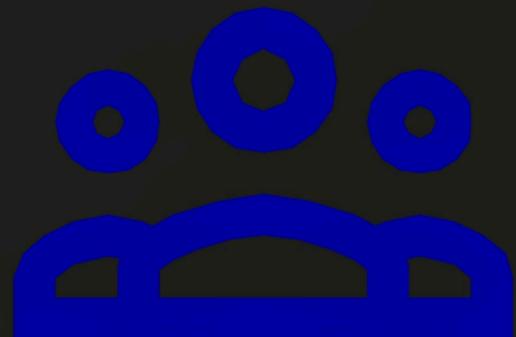
This collaboration promotes a balanced understanding of both disciplines, enhancing critical and analytical skills.

- Integrate Philosophers into laboratories
- Establish interdisciplinary degree programs
- Meet in Journal Clubs with expert talks from various sides

# Philosophy as a partner of science

## CCIC

**Cooperation of Philosophy and  
Science improves Clarity (Concepts),  
Criticism (Reflection), Innovation  
(Theory Building) and Connection  
(Dialogue)**



# The Future of Philosophy of Science

Integrating philosophical inquiry with scientific practice  
addresses challenges and enhances understanding in both  
fields.

# Six working methods of philosophy - today





# Apriorism

Apriorism emphasizes that certain knowledge exists independently of experience and can be acquired through logical reasoning. This method is fundamental to the development of theories that go beyond empirical observation.

# Preface Analysis



Preface analysis involves examining the introductory sections of academic texts to identify key assumptions and the authors' objectives. This method helps understand the underlying arguments.



# Textbook Analysis

Textbook analysis examines popular textbooks to understand how scientific concepts are presented in simplified form. This method reveals problems and gaps in teaching.



## Historical-philosophical Analysis

Historical-philosophical analysis examines significant events in the history of science to gain philosophical insights from past developments. This method promotes understanding of the evolution of scientific ideas.



## Isolated Item Analysis

Isolated Item Analysis examines specific cases within science to understand their significance and impact on theory. This method allows for deeper insight into specific scientific questions.



## Systematic Analysis

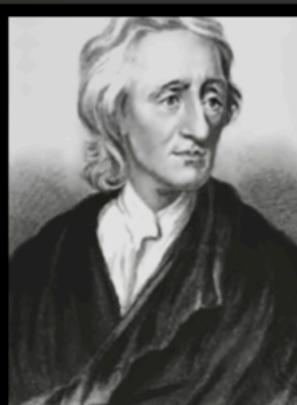
Systematic analysis focuses on the structure of theories and their logical deductions. This method aims to bring clarity to complex scientific arguments.

# Addressing Contemporary Challenges

Philosophy of science grapples with its identity and relevance in modern research environments. It must confront the disconnect between theoretical debates and practical, empirical inquiries that scientists engage with daily.



Rousseau



Locke



Hobbes



## **A return to Philosophy strengthens Science - Science increases Philosophy**

New technologies like data analytics and machine learning significantly enhance philosophical inquiry. With tools such as statistical analysis and digital text mining, philosophers can address complex scientific questions effectively, leading to richer insights.



# Avoiding Text Overload

We are no longer capable to read the exponentially growing amount of literature and miss therefore a deep understanding of its content. Instruments of Artificial Intelligence offer the means to extract relevant information of millions of publications.

# Don't avoid Digital Tools - Use them

More digital tools help to answer existing questions but also enable the possibility to ask completely new and complex questions on a metalevel.



# The Importance of Scientific Engagement

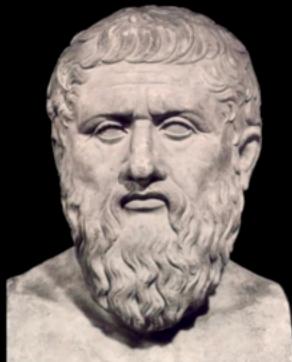
Engaging with scientific practices is essential for philosophers of science. Without practical experience in scientific methodologies, philosophers risk becoming detached from the realities of scientific inquiry, limiting their relevance.





## Let philosophers become adaptive

Establishing robust interdisciplinary frameworks is critical for the future of philosophy of science. Philosophers must remain adaptive to the evolving landscape of science, ensuring their analyses remain relevant and impactful.



PLATÓN

## Make Philosophy influence the ethical framework of science

As philosophy and science become more intertwined, ethical considerations play a crucial role. Philosophers must navigate the implications of scientific advancements, ensuring that ethical frameworks guide research and technology development.

# Potential Drawbacks and critical viewpoints

Issue of Funding

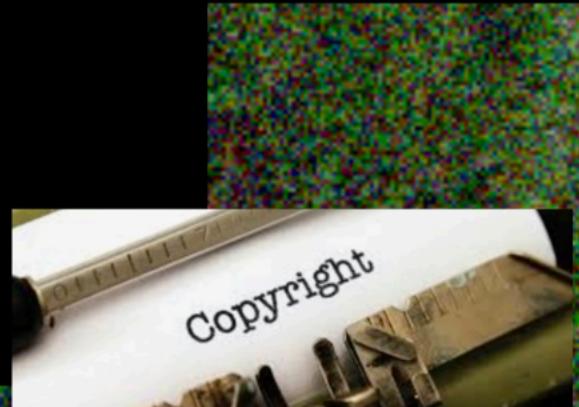
Questions of Copyrights

# Issue of Funding



On the one hand, the issue of funding remains unresolved. An historically unprecedented level of investment has been required to equip pupils, students, teaching staff, and university employees with appropriate technical devices, as well as to provide stable and high-speed WiFi infrastructure. Furthermore, instructors and researchers—some of whom had to cover these costs themselves—should be financially compensated in the medium term.

# Questions of Copyrights



Moreover, several regulatory issues particularly in relation to copyright remain unsettled. While the notion of an “open university” has become an aspirational standard within contemporary academic discourse, the risks associated with misquotation, whether inadvertent or deliberate, pose significant legal and ethical challenges. The widespread integration of digital tools and AI-powered research software further complicates this landscape, as the verification and evaluation of outputs now demand considerable resources, both in terms of time and expertise.

# Tools and digital methods used

For translation into English --> <https://translate.google.com>

For improving Power Point Foils and better presentation of information for different class levels --> <https://prezi.com>



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