

HPS&ST Newsletter

December 2022

35(9)

ISSN: 2652-2837

CONTENTS

# Introduction	1
# Thomas Kuhn and Science Education: Learning from the Past about the Importance of HPS	1
# Subjects, Power, and Knowledge: Critical Perspectives on the Philosophy of Helen Longino	2
# The Gravitational Constant: From the Local to the Universal	3
# HPS&ST in Latin America	3
# International Committee for the History of Technology (ICOHTEC) 50 th conference, 14-18 August 2023	4
# HPS&ST in Asia	4
# Opinion Page: Charles Sanders Peirce (1839-1914): The American Aristotle?*	5
DANIEL EVERETT, Cognitive Science, Bentley University, MA, USA.	
# Varia	12
# Linda Hall Library Fellowships	13
# Recent HPS&ST Research Articles	14
# Recent HPS&ST Related Books	16
# Newsletter Assistant Editor (Europe) Required	24
# Coming HPS&ST Related Conferences	24
# HPS&ST Related Organisations and Websites	25

Introduction

The HPS&ST Newsletter is sent monthly to about 10,300 emails of individuals who directly or indirectly have an interest in the contribution of history and philosophy of science to theoretical, curricular and pedagogical issues in science teaching, and/or interests in the promotion of innovative, engaging and effective teaching of the history and philosophy of science. The newsletter is sent on to different international and national HPS lists and international and national science teaching lists. In print or electronic form, it has been published for 40+ years.

The Newsletter, along with RESOURCES, OBITUARIES, OPINION PIECES and more, are lodged at the website: [HERE](#)

The newsletter seeks to serve the diverse international community of HPS&ST scholars and

teachers by disseminating information about events and publications that connect to concerns of the HPS&ST community.

Contributions (publications, conferences, Opinion Piece, etc.) are welcome and should be sent direct to the editor: Michael R. Matthews, UNSW, m.matthews@unsw.edu.au .

Thomas Kuhn and Science Education: Learning from the Past about the Importance of HPS

Thomas Kuhn has had, beginning 60 years ago, a significant impact on philosophy, many academic disciplines, and on culture more generally. He has had a great impact on science education research, theorizing, and pedagogy. For most educators, the second edition (1970) of his *Structure of Scientific Revolutions* (1962) articulated the very nature of science; the

discipline they were teaching and to which they were introducing students.

More particularly, Kuhn's relativism and anti-realism directly influenced four burgeoning research fields in science education: Children's Conceptual Change, Constructivism, Science-Technology-Society studies, and Cultural Studies of Science Education.

A just-published paper (70 pages, 400 references) looks back to the Kuhnian years in science education and to the long, and in large-parts unfortunate, shadow they cast. The paper argues that the discipline of science education needs to learn from this past so that comparable mistakes might be averted in the future.

The paper points to a systematic, disciplinary deficiency that needs to be addressed by raising the level of philosophical knowledge and competence in the field, beginning with the inclusion of appropriate HPS in teacher education and in education graduate programmes.

Matthews, M.R. (2022), 'Thomas Kuhn and Science Education. Learning from the Past: The Importance of History and Philosophy of Science' *Science & Education* online
Springer have made the full paper available: [HERE](#)

Subjects, Power, and Knowledge: Critical Perspectives on the Philosophy of Helen Longino

Abstracts are invited for a workshop and edited volume on the philosophical contributions of [Helen Longino](#). The editors seek proposals for papers that advance a new generation of scholarly engagement with Longino's work. Proposals should advance current scholarship by framing critical questions or exploring and expanding Longino's work in any of the following areas: social epistemology, philosophy of science, feminist epistemology, feminist science and technology studies, and philosophy of biology, including biological explanations of human behavior.



Workshop spots are limited. The volume aims to be international and interdisciplinary in scope. We seek new scholarship from a diverse group of people at a wide range of career stages. Interested contributors should submit paper proposals in the form of a 500-word abstract and a 1-page CV by January 15, 2023. Additionally, applicants are invited, but not required, to submit a statement as to how they might contribute to the diversity of the workshop. These statements might refer to diversity of ability status, gender identity, sexuality, nationality, racial identity, etc., as well as diversity of geographical region, career stage, discipline, and perspective.

Important dates

- Abstracts due by **January 15, 2023**
- Invitations for full papers for the workshop will be extended by February 15, 2023
- Full draft of workshop papers (a moderately polished draft of approximately 5,000-7,000 words, which will be read by other participants prior to the workshop) is due November 15, 2023
- Workshop at Stanford University, TBA winter/spring, 2024
- Selected papers from the workshop will be invited for consideration for inclusion in the edited volume, summer 2024.

[Submit Your Abstract Here](#)

Full CfP

<https://www.genderscilab.org/longino-workshop>

Inquiries

longinoworkshop@gmail.com

The Gravitational Constant: From the Local to the Universal

Workshop on *The Gravitational Constant, from the Local to the Universal*, [St Andrews, UK](#), 20-21 April 2023.

The workshop is part of *The Gravitational Constant, from the Local to the Universal*, an interdisciplinary collaborative project between St Andrews and the Lichtenberg Group for History and Philosophy of Physics, University of Bonn (<https://www.gravconstant.net/>).

The project brings perspectives from transnational history, philosophy, mathematics and physics to bear on the question of how the constant, G , was transformed from a controversial innovation in the 1880s to an unquestioned fundamental constant of nature by 1915. The aim of the workshop is to explore the wider context and foster collaborations around emerging research questions.

The two-day workshop will treat gravitation as a case study in a wider context of interpretational moves at the turn of the 19th to 20th century from the local to the universal that took place through:

- measurement
- circulation practices
- ideas about the role of laws
- translation

Each theme will start with an invited speaker who sets the scene; followed by contributed papers; concluding with a discussion led by one of the project team on where the specific case of gravitation fits into the emerging context.

Invited speakers are:

- Daniel Mitchell (Measurement)(IEEE History Center, Piscataway, NJ)
- Richard Staley (Circulation Practices)(Cambridge and Copenhagen)
- Bryan Roberts (Role of Laws)(London School of Economics)
- Michael Gordin (Translation)(Princeton)

We invite contributed papers of 20 minutes that address one of the above themes from a historical or philosophical standpoint. Proposals should include an abstract (c.250 words), state which theme they are addressing, and give a brief biography of the speaker.

Funds are available to provide some support for early career scholars.

Proposals should be submitted to Isobel Falconer (ijf3@st-andrews.ac.uk) by **15 December**. Decisions will be notified at the beginning of January.

HPS&ST in Latin America

YouTube Live with Zuraya Monroy (IHPST president elect) and Andreia Guerra (IHPST former president)

In 2023, the IHPST-LA conference will be held in Porto Alegre – Brazil, and its theme will be HPS&ST in times of science-denial. Information about the event (dates, work submission, costs) are already available [HERE](#)

On December 14th at 7 p.m. (Brasilia time zone), 2022, Zuraya Monroy (president elect of IHPST) and Andreia Guerra (former president of IHPST) talked about HPS&ST in times of science-denial – why should we participate of IHPST-LA? The discussion was broadcasted on youtube in Portuguese and Spanish. [HERE](#)

Latin American Studies on the Life Sciences and Medicine

We are pleased to announce the publication of the book *Handbook of the Historiography of Latin American Studies on the Life Sciences and Medicine*, edited by Professor Ana Barahona, with an introduction by Professor Kapil Raj and the editor.

Details [HERE](#)

IHPST-LA 2023: HPS&ST in times of science denial

The IHPST-LA will be held in Porto Alegre (Brazil) from August 9th to 11th, 2023. It will gather researchers from all Latin America to discuss HPS&ST and its contemporary challenges.

Following the recent discussions in the field, the conference theme will be “HPS&ST in times of science denial”. The meeting is being planned by researchers from different countries in Latin America, aiming to provide a plural and collective event.

Registration and work submission is already available. More information is available [HERE](#).

ENPEC 2023 (Encontro Nacional de Pesquisa em Educação em Ciências).

The XIV ENPEC will be held in Caldas Novas, Goiás (Brazil) from October 2nd to 6th.

Conference paper submission is available until November 15th, 2022. More information is available [HERE](#).

Do you have any contributions about HPS&ST in Latin America?

Do you have any contributions about HPS&ST in Latin America? If you have any information about events, publications, research groups, books about HPS&ST in Latin American and want to submit a brief note to be published in the HPS&ST Newsletter, please contact first Nathan Lima [here](#) or secondly Michael Matthews [here](#).

International Committee for the History of Technology (ICOHTEC) 50th conference, 14-18 August 2023, Tallinn University of Technology and the University of Tartu, Estonia

The 2023 [ICOHTEC](#) annual conference invites scholars to reflect on the complex, mutual relations between technology and the environment, culture, and politics, as well as the ways in which they are entangled at the local, regional, transnational, and global levels. The crises we face today as a consequence of climate change, wars, or the COVID pandemic expose the reality that no institution, company, country, community, or body is independent. They all depend on diverse others within various networks, e.g. production and distribution systems; supply chains, especially of food, energy, materials, and medical products as well as human workers; support and care systems created at the global, national, and interpersonal levels.

We invite scholars working on different aspects of the history of technology, various historic periods, different geographical areas, and welcome researchers working at the intersection of history of technology or philosophy of technology, and other fields, including anthropology, design studies, film and media studies, social sciences, minority and identity studies, to share their perspectives and analyses. We look forward to opening new avenues for exploring the

interdependencies between disciplines, paradigms, research methods and theories that relate to technology.

Individual paper proposals must include: (1) the presenter's name and email address; (2) the title of the paper; (3) an abstract (max. 300 words); (4) the presenter's bio (max. 250 words).

We strongly support the submission of proposals for *pre-constituted panels* of 3 or 4 papers. Panel organizers are asked to submit: (1) an abstract of the panel theme (max. 300 words); (2) a list of presenters that includes their names, email address, and paper titles, as well as the name and email address of the session chairperson; (3) abstracts for each paper (max. 300 words); (4) a bio for each contributor and the chairperson (max. 250 words each).

Submit all session and individual paper proposals by **15 January 2023** via the ICOHTEC paper submission system: [HERE](#)

We especially encourage and welcome proposal submissions from graduate students and early career researchers and their participation in the symposium. Limited travel grants will be available.

HPS&ST in Asia

- From October 20 to 21, 2022, the Ministry of Science and Information Communication Technology of Japan, the National Association for Science and Technology Research, and the Department of Education of Daejeon City held the 7th World Science and Culture Forum in Hall 2 of Daejeon Convention Center (DCC). The forum carried out exchanges and discussions on global scientific topics with great social impact on the future of Korean society, aiming to promote the integration of science and culture and the popularization of science.

Details of the conference can be found [here](#)

- On November 5, 2022, Japan held a seminar on "What kind of planet is our Earth—Exploring the Earth through Hybrid Science" at the Telecenter. Through presentations by front-line researchers and dialogues with the audience, this conference aims to make the public understand the interest of basic science and the challenges of exploring atmospheric science based on observations and

calculations and the stars that nurture life as Earth-like planets together.

Details of the conference can be found [here](#)

- From January 10 to January 11, 2023, the Jeju Institute of Future Education and the National Science Teachers Association will hold a big gathering of Korean science teachers at Jeju High School in Korea. The gathering is divided into six areas, include student-centered class operation cases, process-oriented evaluation operation cases, experiment development case show, science festival experience program, Jeju nature exploration, and special session (experience classes for children of participants).

Details of the conference can be found [here](#)

- If you have any information about events, publications, research groups or books about HPS&ST in Asia and want to submit a brief note to be published in the HPS&ST Newsletter, please contact first Xiao Huang (Zhejiang Normal University) [here](#) or secondly Michael Matthews [here](#).

Opinion Page: Charles Sanders Peirce (1839-1914): The American Aristotle?*

DANIEL EVERETT trustee professor of cognitive sciences, Bentley University in Massachusetts.

Daniel L. (Dan) Everett holds a ScD and a Masters of Linguistics from the Universidade Estadual in Campinas (UNICAMP), both based upon years of field research among the Pirahã people of the Brazilian Amazon jungle.



He taught as an instructor and later Assistant Professor at UNICAMP, 1981-1986, until leaving Brazil to return to the USA. He next was appointed full professor of linguistics and anthropology at the University of Pittsburgh, where he also chaired the Department of Linguistics until 1999. At that time, Everett moved to the Amazon to live the majority of the next three years in the jungle among the Pirahãs. He left the jungle when the University of Manchester, England, offered him the position of Professor of Phonetics and Phonology. Following several years in England, Dr. Everett spent the 2005-2006 academic year as a visiting scientist at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany. He went on to chair the Department of Languages, Literatures, and Cultures at Illinois State University from 2006 - 2010. From 2010-2018 he served as the Dean of Arts and Sciences at Bentley University. He is currently Trustee Professor of Cognitive Sciences at Bentley.

Everett has lived in the Amazonian jungle for nearly eight out of the last thirty years, studying more than a dozen little or never previously studied Amazonian languages. He has published more than 100 scientific articles as sole author and eleven books. In 2008 his book, *Don't Sleep There are Snakes: Life and Language in the Amazonian Jungle*, was published in eight languages, becoming a best-seller in English, Japanese, Mandarin, Korean, and German. That book was selected by National Public Radio in the US as one of the best books of 2009. It was also selected by Blackwells booksellers in the UK as one of the best books in the UK for 2009. His [Language: The Cultural Tool](#), was published in 2012. It has been reviewed in various publications, published in three languages, and was a NY Times Editor's Choice. Dan has appeared numerous times on the BBC and NPR, and has been profiled in newspapers around the world. A documentary about his life and work, *The Grammar of Happiness*, was released in 2012. Everett's recent books are [Dark Matter of the Mind: The Culturally Articulated Unconscious](#) (2016), with University of Chicago Press and [How Language Began: The Story of Humanity's Greatest Invention](#) (2017) with Liveright Books. His books are published in many languages.

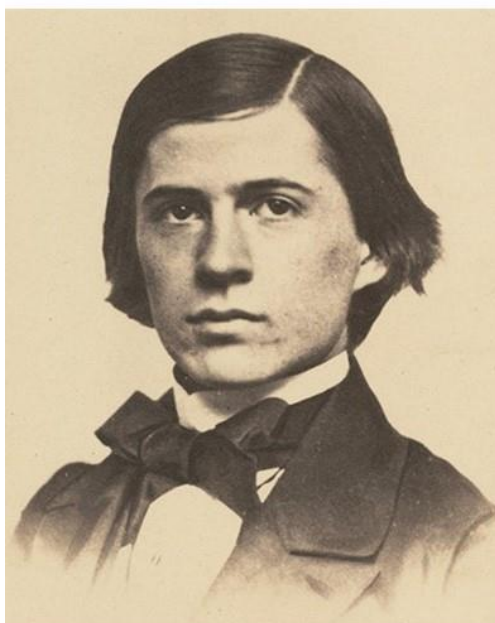
[I intend] to make a philosophy like that of Aristotle, that is to say, to outline a theory so comprehensive that, for a long time to come, the entire work of human reason, in philosophy of every school and kind, in mathematics, in psychology, in physical science, in history, in sociology and in whatever other department there may be, shall appear as the filling up of its details.
C S Peirce, *Collected Papers* (1931-58)



Charles Sanders Peirce *Courtesy Harvard University Archives*

The roll of scientists born in the 19th century is as impressive as any century in history. Names such as Albert Einstein, Nikola Tesla, George Washington Carver, Alfred North Whitehead, Louis Agassiz, Benjamin Peirce, Leo Szilard, Edwin Hubble, Katharine Blodgett, Thomas Edison, Gerty Cori, Maria Mitchell, Annie Jump Cannon and Norbert Wiener created a legacy of knowledge and scientific method that fuels our modern lives. Which of these, though, was ‘the best’?

Remarkably, in the brilliant light of these names, there was in fact a scientist who surpassed all others in sheer intellectual virtuosity. Charles Sanders Peirce (1839-1914), pronounced ‘purse’, was a solitary eccentric working in the town of Milford, Pennsylvania, isolated from any intellectual centre. Although many of his contemporaries shared the view that Peirce was a genius of historic proportions, he is little-known today. His current obscurity belies the prediction of the German mathematician Ernst Schröder, who said that Peirce’s ‘fame [will] shine like that of Leibniz or Aristotle into all the thousands of years to come’.



Some might doubt this lofty view of Peirce. Others might admire him for this or that contribution yet, overall, hold an opinion of his oeuvre similar to that expressed by the psychologist William James on one of his lectures, that it was like ‘flashes of brilliant light relieved against Cimmerian darkness’. Peirce might have good things to say, so this reasoning goes, but they are too abstruse for the non-specialist to understand. I think that a great deal of Peirce’s reputation for obscurity is due, not to Peirce *per se*, but to the poor organisation and editing of his papers during their early storage at and control by Harvard University (for more on this, see André de Tienne’s insightful [history](#) of those papers).

Such skepticism, however incorrect, becomes self-reinforcing. Because relatively few people have heard of Peirce, at least relative to the names above, and because he has therefore had a negligible influence in popular culture, some assume that he merits nothing more than minor fame. But there are excellent reasons why it is worth getting to know [more](#) about him. The leading Peirce scholar ever, Max Fisch, described Peirce’s intellectual significance in this fecund paragraph from 1981:

Who is the most original and the most versatile intellect that the Americas have so far produced? The answer ‘Charles S Peirce’ is uncontested, because any second would be so far behind as not to be worth nominating. Mathematician,

astronomer, chemist, geodesist, surveyor, cartographer, metrologist, spectroscopist, engineer, inventor; psychologist, philologist, lexicographer, historian of science, mathematical economist, lifelong student of medicine; book reviewer, dramatist, actor, short-story writer; phenomenologist, semiotician, logician, rhetorician [and] metaphysician ... He was, for a few examples, ... the first metrologist to use a wavelength of light as a unit of measure, the inventor of the quincuncial projection of the sphere, the first known conceiver of the design and theory of an electric switching-circuit computer, and the founder of 'the economy of research'. He is the only system-building philosopher in the Americas who has been both competent and productive in logic, in mathematics, and in a wide range of sciences. If he has had any equals in that respect in the entire history of philosophy, they do not number more than two.

Family

Peirce came from a well-to-do, prominent family of senators, businessmen and mathematicians. His father, Benjamin Peirce, was considered the greatest US mathematician of his generation, teaching mathematics and astronomy at Harvard for some 50 years. Charles's brother, James, also taught mathematics at Harvard, eventually becoming a dean there. C S Peirce was, on the other hand, despised by the presidents of Harvard (Charles Eliot; where Peirce studied) and Johns Hopkins University (Daniel Gilman; where Peirce initially taught). Eliot and Gilman, among others, actively opposed Peirce's employment at any US institution of higher education and thus kept him in penury for the latter years of his life. They falsely accused him of immorality and underestimated his brilliance due to input from jealous rivals, such as Simon Newcomb.

Though the story of Peirce's life and thinking processes is inspiring and informative, this story is not told here. (I recommend Joseph Brent's 1998 [biography](#) of Peirce as an excellent beginning. My own planned intellectual biography of Peirce intends to trace his life from his Pers family roots in Belgium in the 17th century to the history of the influence of his work on modern philosophy and science.) The objective here is rather to highlight some portions of Peirce's thought to explain why his theories are so important and relevant to contemporary thinking across a wide range of topics.

Polymath

The importance and range of Peirce's contributions to science, mathematics and philosophy can be appreciated partially by recognising that many of the most important advances in philosophy and science over the past 150 years originated with Peirce: the development of mathematical logic (before and arguably better eventually than Gottlob Frege); the development of semiotics (before and arguably better than Ferdinand de Saussure); the philosophical school of pragmatism (before and arguably better than William James); the modern development of phenomenology (independently of and arguably superior to Edmund Husserl); and the invention of universal grammar with the property of recursion (before and arguably better than Noam Chomsky; though, for Peirce, universal grammar – a term he first used in 1865 – was the set of constraints on signs, with syntax playing a lesser role).

Beyond these philosophical contributions, Peirce also made fundamental discoveries in science and mathematics. A few of these are: the [shape](#) of the Milky Way galaxy; the first precise [measurement](#) of the Earth's gravity and circumference; one of the most accurate and versatile [projections](#) of the 3D globe of the Earth onto 2D space; the [chemistry of relations](#) and working out the consequences of the discovery of the electron for the periodic table; the axiomatisation of the law of the excluded middle, or Peirce's Law: $((P \rightarrow Q) \rightarrow P) \rightarrow P$; [existential graphs](#) and the [transformation](#) of mathematics into an (quasi-)empirical component of studies on cognition; one of the first studies of the stellar spectra, particularly the spectral properties of [argon](#); the invention of the then most accurate gravimetric pendulum; the first standardisation of the length of the metre by anchoring it to the length of a wavelength of light (which he figured out via his own experiments in multiple stations around Europe and North America). This is by no means an exhaustive list.

Logician

In spite of his varied accomplishments, however, Peirce considered himself to be mainly a logician and a semiotician. He often said that his achievements were due to his peculiar way of thinking as well as his method of thinking. To get a flavour of these aspects of Peirce's overall

‘architectonic’ of logic and science, consider an excerpt from his [article](#) ‘How to Make Our Ideas Clear’ (1878):

The very first lesson that we have a right to demand that logic shall teach us is, how to make our ideas clear ... To know what we think, to be masters of our own meaning, will make a solid foundation for great and weighty thought.

The essence of his proposal followed:

Consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then, our conception of these effects is the whole of our conception of the object.

This view, that our conceptions of something are determined by their practical effects is of fundamental importance to how we understand the world around us. It influenced the Vienna Circle’s positivism, Ludwig Wittgenstein’s philosophy of language, Karl Popper’s falsificationism and much more. This statement, now known as the ‘pragmatic maxim’, became the founding doctrine of American pragmatism, arguably the only uniquely American contribution to philosophy.

Semiotician

But how are we humans capable of reasoning about weighty items such as truth in the first place? Because we generate and interpret *signs*. Peirce was always concerned to understand how we know things. He argued that cognition, language and indeed the entire functioning of nature derives from signs – each sign being a triad of *object*, *form* and *interpretation*.

Consider a Stop sign. It is a red octagon on a post with the letters ‘S-T-O-P’ printed on it. It has a particular interpretation (the active interpretation is applying the brakes, while the mental/logical interpretation is the thought ‘stop a few feet before the sign’). The object is the command to stop, and the form – connecting object and interpretation – is the particular form of the Stop sign itself. Or consider the shortening days of fall. The lesser daylight is a sign of the change of seasons, interpreted by trees via shedding their leaves and other inner preparations for winter.

When people discuss the connections between language and cognition such as the possible existence of language in nonhuman species,

communication in nature, language acquisition, thinking and human language more generally, cognitive scientists and evolutionary anthropologists usually appeal to concepts such as *symbol* and *sign*. A couple of decades *after* Peirce’s semiotics, Saussure invented his own theory of signs that he also called semiotics though unfortunately with little understanding of Peirce’s work. (Both Peirce and Saussure borrowed the name and interest in semiotics from the 17th-century philosopher John Locke; the term derives from the Greek word *σημείον*, or *semeion*, for ‘sign’, ‘miracle’, etc.)

Perhaps because Saussure was a linguist, wealthy and held a secure academic post, while Peirce was an unemployed, poor, eccentric polymath, Saussure’s work became better-known to linguists, and through them to other cognitive scientists (though the linguist Roman Jakobson was an [exception](#)). But symbols have no particular status in Saussure’s theory. Rather, Saussure writes only about signs as a largely undifferentiated single concept, where each sign has two components: form + meaning. Saussure had no special place in his theory for symbols. Those informed primarily by Saussure’s theory, therefore, tend to use *symbol* and *sign* interchangeably, and so all too often the important differences in these concepts are used unclearly in the literature (or worse, they try to reinvent semiotics on the fly, as did the anthropologist Leslie White in 1949 with his own notion of a symbol, muddying the waters further to little added benefit). Peirce’s definitions were clear, formally precise and immensely interesting. This is unsurprising since ‘Charley’ gave decades to continuously testing and refining his semiotics, and because for him semiotics was the basis of all cognition.

Signs and Symbols

Peirce’s theory of signs recognises three foundational types of signs and three components to each of these signs. A Peircean sign requires a signalling form to link an object with an interpretation. Smoke is a sign of fire when a mind links the smoke (the form) with the interpretation that the form indicates: fire (the object). Peirce argued for three foundational signs: *icons*, *indexes* and *symbols*.

An icon is a sign that is structurally isomorphic in some way (eg, physically resembling its object); an index is a sign that is (loosely) physically connected to its object, such as smoke connected to fire; smell connected to onions; or pointing physically towards an object. Finally, a symbol is almost always a cultural convention that all objects of a cultural *type* (an individual instance of a type is a *token* – another distinction we owe to Peirce) are to be referred to by a particular form and interpreted in a particular way. All domesticated canine creatures are to be referred to as *dogs*, for example, a form linked to its canine object via a culturally warranted interpretation.

If Peirce is correct, nonhumans of any species, plant or animal, are unlikely to possess symbols to the degree that they lack culture and the ability to generalise that undergird all cultures, though this is an open research question. This distinction of signs has been influential, but apparently insufficiently so, because one sees confusion throughout the literature on what a symbol is. At times, this reminds me of Inigo Montoya's comment in the film *The Princess Bride* (1987): 'You keep using that word. I do not think it means what you think it means.'

A recent [paper](#) on symbol-recognition in bees illustrates the need for a better understanding of Peirce's semiotics in science more generally. This study claims that bees can be taught symbols:

Here we show that honeybees are able to learn to match a sign to a numerosity, or a numerosity to a sign, and subsequently transfer this knowledge to novel numerosity stimuli changed in colour properties, shape and configuration. While honeybees learned the associations between two quantities (two; three) and two signs (N-shape; inverted T-shape), they failed at reversing their specific task of sign-to-numerosity matching to numerosity-to-sign matching and vice versa.

But the article confuses what are symbols for humans with what are almost certainly indexes for bees. The paper shows that bees can recognise particular numerical symbols and correctly associate these human symbols with the correct quantities, for example, learning that the symbol '7' means *seven objects*. However, while the researchers have clearly trained bees that $x \rightarrow y$; $y \rightarrow x$ – ie, if you see an x expect a y – they don't seem to have taught the bees anything other than indexes, which we already know all animals

recognise (as they use smells, footprints, broken branches, etc to track other animals).

However, even if x and y are symbols to humans, they need not be for bees. For bees, there is no compelling reason to believe that members of the Apoidea insect family have learned anything other than the kind of stimulus of an index for an object, as with Pavlov's dogs. Bees can learn that the appearance of one sign *indicates* the presence of a particular kind of object (whether that object is another sign or simply a natural object): ie, that the first sign is an index (not a symbol) of the latter. Symbols require culture but indexes do not. This inaccurate understanding of symbols faces the same difficulty that the philosopher John Searle in 1980 [pointed](#) out in his Chinese room experiment – it confuses indexes (based on physical connection between sign and object) with symbols (based on a cultural or meaning-based connection).

If you take one squiggly line (a Chinese character, unbeknown to the computer) as an index of another (English), you are not using symbolic meaning but only indexical reference. So far as we know, only humans have the former, but all animals have the latter. If I train my dog to get seven things when she sees '7', it is significant that she can distinguish seven things, but since there is no dog culture, there is no pre-symbolic 'agreement' between dogs that the sign '7' means *seven things*. The behaviour simply shows a response to the stimulus of an index to a particular referent. It is learning, of course, but with no need to invoke symbols.

I think it is reasonable to investigate the hypothesis that some animals might be able to learn symbols. It is possible that bees can learn symbols. But that is not shown in the experiment because the experimenters failed to take Peirce's ideas into account. To put it another way, Pavlov's dog did not interpret the bell as a symbol of food, but as an index of food. When you see one, you see the other. But symbols are more abstract. They do not require an immediate connection between an object and a form for effective use. Only Peirce's semiotics captures this distinction.

Correct Reasoning

In my opinion, such applications to the understanding of reasoning in general terms

render semiotics Peirce's most important contribution. Although Peirce always considered himself first and foremost a logician, his view of logic was that it was ultimately about correct reasoning and thus crucially relied upon his semiotics. Semiotics is key to our understanding of culture, language, evolution, biology and many other domains of enquiry. Within his larger philosophical system, Peirce's semiotics derives from his phenomenology (philosophy of things we experience). He was the first to develop a philosophical theory of phenomenology, which he called *phaneroscopy* from *φανερῶς*, what is visible or manifest. Husserl developed his own theory of phenomenology, and ironically became better-known for this than Peirce did, though Peirce's theory of experiencing objects is arguably superior.

For Peirce, humans know all things in one of three ways: By *firstness*, *secondness* or *thirdness*.

Roughly speaking, firstness is an initial impression, eg 'I see something red.' An icon is a sign of firstness. Secondness is a clearer perception of the distinctive features of the object, based on contrast or comparison with another perceptual experience, what Peirce referred to as a 'resistance' of one object to another (as in my hand pressing on a weight, or red vs green in thought or perceived in succession, etc). In the opposition of two, each becomes clearer.

An index is a sign of secondness. I have my eyes stimulated by a red thing in an experience of firstness. But in comparing a red thing to other things, its individual identity becomes clearer. When I understand something well enough to generalise about it, my knowledge is of the level of thirdness. Signs of thirdness are symbols. Thus Peirce successfully derives his semiotics from his phaneroscopy, something that no other theory of signs has ever done, merely stipulating the nature of signs.

Firstness, secondness and thirdness are crucial to all science. In linguistics, for example, the analysis of sound systems requires each of these ways of seeing. First a sound is recognised for some of its physical characteristics. Only by opposing this sound to other sounds, however, can we begin to more clearly understand the sound. Linguists would say that this is how one figures out the sound systems of understudied languages,

and how children learn the sounds of their first language. We perceive a sound that could be a 'p' (firstness) (or a 't' or a 'b', etc) but eventually we narrow down our perception of this sound by comparing it to other sounds, such as 't' or 'b', learning by this comparison ('resistance') that the sound was made either with the tongue ('t') or the lips ('p' and 'b'), or with the vocal cords vibrating ('b') or not ('t' and 'p').

From the initial firstness of our impression of the sound 'p' we can, by secondness, view or understand it with clearer resolution. However, once we have further identified via resistance the sound 'p', linguists will want to know how it fits into different systems of sounds – what is the role of 'p' in Spanish? What is the role of 'p' in English? The answer will vary. This systematisation of knowledge provides the perspective of thirdness on an object.

Systematism

Peirce embedded his ideas about signs and phaneroscopy into an even larger system. This larger system or 'architectonic' included and classified all of the sciences. The architectonic includes not only Peirce's more famous contributions, such as pragmatism, phaneroscopy and semiotics, but also more specific contributions to different fields that he made. Ultimately, it includes all of science.

To highlight other aspects of Peirce's thought, which extends far beyond what we have already discussed, Peirce was considered by many to be the leading mathematician of his day, inheriting that title from his father, Benjamin Peirce. Charles argued that mathematics epistemologically precedes all other fields of study, including logic, and that only studies imbued with a strong mathematical foundation were worthy of the label 'science'.

Because of his view of mathematics as the foundation of other disciplines, Peirce considered the *Principia Mathematica* (1910-13) by Bertrand Russell and A N Whitehead – who used Peirce's logical notation, rather than Frege's – to be seriously misguided, because the latter attempted to derive mathematics from logic when it should have been, according to Peirce, the other way around. The failure of the Russell-Whitehead programme would not have surprised Peirce.

Another vital contribution of Peirce's is his *fallibilism*, the idea that we cannot guarantee truth for any beliefs (though there is some dispute as to whether to extend this idea to mathematics and logic). Fallibilism is important because it means that no matter how much evidence we have collected, induction doesn't guarantee that the next bit of data won't show us to be mistaken. However, Peirce did not take this to mean that truth is never possible. For Peirce, enquiry is a community activity, and it is unbounded by time, in principle. Thus, truth is whatever the community of enquirers would agree to be the case by the end of enquiry – ie, by the end of time. This is not the same as denying the existence of Truth, but Peirce's views require a certain humility and acceptance of the idea that all knowledge is subject to revision.

Peirce also gave a great deal of thought to the role of chance in life and science, based in part on his reflections on Darwinism. He referred to this sub-theory of his architectonics as *tychism*. By asserting that chance is fundamental to the Universe and permeates science, philosophy and all else, Peirce in effect directly contradicted an aphorism [attributed](#) to Einstein that 'God does not play dice with the Universe.' Well, actually, in the sense that life is partially dependent on randomness, yes, he does. But, in this sense, Peirce anticipates the work of another famous physicist, Werner Heisenberg and his 'uncertainty principle'.

Holism

A further foundational contribution from Peirce was his doctrine of *synechism*, the idea that everything in the Universe is connected, that nothing can be understood in isolation, not even people. This is expressed well in statements such as the following from his [paper](#) 'Immortality in the Light of Synechism' (1893):

Nor must any synechist say: 'I am altogether myself, and not at all you.' If you embrace synechism, you must abjure this metaphysics of wickedness. In the first place, your neighbours are, in a measure, yourself, and in far greater measure than, without deep studies in psychology, you would believe. Really, the selfhood you like to attribute to yourself is, for the most part, the vulgarest delusion of vanity.

There is much more to say about Peirce. We could look at all the modern philosophers, mathematicians, geologists, chemists and others who trace some of their most important working ideas, often the foundational assumptions of their fields, back to Peirce. We could look at his example of fortitude and hard work in the face of adversity, poverty, and rejection; and how alone, with almost no positive reinforcement at all, he singlehandedly created a body of work that is without precedent in the history of the Earth. But perhaps he would be most pleased to be remembered as one of us all, a part of who we are becoming and the world that is to be. He would be the last to fall for the vulgarity of vanity in his own accomplishments, recognising that we all, whatever our gifts and our training, are moving in this Universe of signs and chance together.

A Modern Aristotle?

Did Peirce accomplish his goal of building a system like Aristotle? According to the [Stanford Encyclopedia of Philosophy](#), Aristotle's:

extant writings span a wide range of disciplines, from logic, metaphysics and philosophy of mind, through ethics, political theory, aesthetics and rhetoric, and into such primarily non-philosophical fields as empirical biology, where he excelled at detailed plant and animal observation and description. In all these areas, Aristotle's theories have provided illumination, met with resistance, sparked debate, and generally stimulated the sustained interest of an abiding readership. ([HERE](#))

A tough challenge for Peirce to emulate.

But consider the evidence. In his lifetime, Peirce published at least 800 articles for a total of 12,000 published pages, publications that outstrip most scholars by far in quantity and quality. However, it is to a large degree Peirce's unpublished oeuvre, more than 100,000 handwritten pages-worth, that is the foundation of his reputation.

Influence

Peirce's influence today is seen in the hundreds of books published about him, actions such as the christening of the ship *Peirce* by the National Oceanic and Atmospheric Association for his many contributions to geodesics, geography and physics; the worldwide impact of his semiotics, the impact of his 'existential graphs' in

mathematics and logic, and methods adopted in several sciences that Peirce developed. For [example](#), in 1898 Peirce wrote the first-ever American paper in experimental psychology, using quantitative methods.

Peirce's influence in logic is second only to his work in semiotics. For example, while Frege's notation was hardly ever used, the Peirce-Schröder notation was largely adopted by others. The important results of the mathematicians Leopold Löwenheim and Thoralf Skolem at the beginning of the 20th century were presented in the Peirce-Schröder system without any trace of influence by Frege or Russell. Giuseppe Peano's use of the existential and universal quantifiers derives from Schröder and Peirce, not from Frege.

Unlike Frege, Peirce recognised the utmost importance of dependent quantifiers, and experimented with that idea in various ways in the algebra of logic and in existential graphs, proposing new systems and dimensions of quantification that involve independent quantification. Peirce's overall influence upon the development of modern logic was considerable, though its nature and scope remained ill-understood for a long time.

Before he moved to Milford, Peirce lived in Cambridge, Massachusetts. When Whitehead – one of Britain's greatest philosophers, mathematicians and theologians – moved there himself many years later, he was so deeply impressed by the intellectual level of the new world that he drew a comparison with the greats of antiquity. With regard to Charles Peirce and William James, he claimed that, not only were they the equals of any European philosophers but that: 'Of these men WJ is the analogue to Plato, CP to Aristotle.'

Peirce's goal was ambitious, almost arrogant in initial appearance. And at his death in 1914, at the age of 74, there was little evidence that would have led anyone to believe that he had succeeded in developing his own Aristotelian system. It was only after Harvard, at the request of Josiah Royce – its eminent philosopher and former student of Peirce – purchased his papers that Peirce's reputation began to grow. As students and more mature scholars began to examine those papers, they started to realise that Peirce might have in fact built just the Aristotelian system he had

promised. Today there are some who would say that he surpassed Aristotle.

* Reproduced with permission from [Aeon Magazine](#). Originally, [15 August 2021](#)

Invitation to Submit Opinion Piece

In order to make better educational use of the wide geographical and disciplinary reach of this *HPS&ST Note*, invitations are extended for readers to contribute opinion or position pieces or suggestions about any aspect of the past, present or future of HPS&ST studies.

Contributions can be sent direct to editor. Ideally, they might be pieces that are already on the web, in which case a few paragraphs introduction, with link to web site can be sent, or else the pieces will be put on the web with a link given in the Note.

They will be archived, and downloadable, in the OPINION folder at the HPS&ST web site [HERE](#):

Varia

- **Robert Nola** (1940-2022) died in October this year. He was a leading New Zealand philosopher of science who through books, book chapters, articles, and diligent reviewing, made significant contributions to science education theory and research. An obituary detailing his life and achievements is available [HERE](#).

- **Peter Fensham** (1927-2021) died in August 2021. He was an internationally-known Australian science educator, who had been appointed in 1967 to Australia's first chair of science education at Monash University. The journal *Research in Science Education* has several online first issues on his life and work. They are available [HERE](#)

- [European Society for the History of the Human Sciences](#) (ESHHS). The board of the ESHHS and local organizers Renato Foschi and Marco Innamorati are delighted to announce the dates for the next conference of the ESHHS Tuesday 4 July to Friday 7 July, 2023. Held at Villa Mirafiori in central Rome, which is home to the [Philosophy Department](#) of the Sapienza University.

- **History of Science Society (USA)** Newsletter, available [HERE](#)

PhD Award in HPS&ST:

We welcome publishing details of all PhDs awarded in the field of HPS&ST. Send details (name, title, abstract, supervisor, web link) to editor: m.matthews@unsw.edu.au

Linda Hall Library Fellowships

The [Linda Hall Library](#) is now accepting applications for its 2023-24 fellowship program. These fellowships provide graduate students, postdoctoral researchers, and independent scholars in the history of science and related humanities fields with financial support to explore the Library's outstanding science and engineering collections. Fellows also participate in a dynamic intellectual community alongside in-house experts and scholars from other Kansas City cultural and educational institutions.



The Linda Hall Library holds nearly half a million monographs and more than 43,000 journal titles documenting the history of science and technology from the 15th century to the present. Its collections are exceptionally strong in the engineering disciplines, chemistry, and physics. In addition, the Library boasts extensive resources related to natural history, astronomy, earth science, environmental studies, aeronautics, life science, infrastructure studies, mathematics, and the history of the book.



The Library will once again be offering **residential fellowships** to support on-site research in Kansas City, as well as **virtual fellowships** for scholars working remotely using resources from the Library's digital collections. In either case, applicants may request up to four months of funding at a rate of \$3,000 per month for doctoral students and \$4,200 per month for postdoctoral researchers.

The Library is also offering several fellowships intended for specific groups of researchers, including:

- The **National Endowment for the Humanities (NEH) Postdoctoral Fellowship**, which provides nine months of residential funding (\$5,000 per month) to a postdoctoral scholar whose research explores the intersection of science and the humanities
- The **History of Science and Medicine Fellowship**, offered in partnership with the [Clendening History of Medicine Library](#) at the University of Kansas Medical Center, which provides one month of residential funding (\$3,000 per month) to a doctoral student whose research examines the intersecting histories of science and medicine
- The **Pearson Fellowship in Aerospace History**, which provides up to two months of residential funding (\$4,200 per month) to a postdoctoral scholar studying any aspect of aerospace history
- The **Presidential Fellowship in Bibliography**, which provides up to four months of residential funding (\$4,200 per month) to a postdoctoral scholar whose research focuses on the study of books and manuscripts as physical artifacts
- The **Ukraine Fellowship**, offered in partnership with the [UK-Ukraine Twinning Initiative](#), which provides up to two months of

virtual funding (\$5,000 per month) to a Ukrainian doctoral student or postdoctoral scholar whose research would benefit from the Library's holdings.

Please share this announcement with graduate students, colleagues, or anyone else who might be interested in the Linda Hall Library's fellowship program. All application materials are due no later than January 20, 2023. For further information, visit the [Fellowships](#) page on our website or e-mail fellowships@lindahall.org.

Recent HPS&ST Research Articles

Anantanukulwong, R., Chiangga, S., Pongsophon, P. et al. (2022). Enhancing Students' Learning of the Concept of Equilibrium Through a Culturally Responsive Inquiry of the *Bulan Kite*. *Sci & Educ*, 1-24.

<https://doi.org/10.1007/s11191-022-00398-0>
online first

Atakan, M., Akçay, B. (2022). Representation of Changes about Nature of Science in Turkish Middle School Science Textbooks. *Sci & Educ*, 1-30. <https://doi.org/10.1007/s11191-022-00403-6> online first

Barak, M., Ginzburg, T. & Erduran, S. (2022). Nature of Engineering: A Cognitive and Epistemic Account with Implications for Engineering Education. *Sci & Educ*, 1-19. <https://doi.org/10.1007/s11191-022-00402-7> online first

Coelho, R.L. (2022). Comment on Eisenthal's 'mechanics without mechanisms'. *Studies in History and Philosophy of Science*, 95, 104-107.

Coelho, R. L. (2022). Pendulum: the partial and global approach. *Physics Education*, 57(2). doi: 10.1088/1361-6552/ac4849

Dubinsky, J.M., Roehrig, G., & Varma, S. (2022), A Place for Neuroscience in Teacher Knowledge and Education. *Mind, Brain, and Education*, 16: 267-276. <https://doi.org/10.1111/mbe.12334>

Gai, L. Li, Y., Zheng, C., et al. (2022) The progression of students' views about nature of scientific inquiry. *International Journal of Science Education*.

<https://doi.org/10.1080/09500693.2022.2138623>

Halawa, S., Hsu, YS. & Zhang, WX. (2022). Inquiry Activity Design from Singaporean and Indonesian Physics Textbooks. *Sci & Educ*, 1-27. <https://doi.org/10.1007/s11191-022-00396-2> online first

Hochman, A. (2022). Has social constructionism about race outlived its usefulness? Perspectives from a race skeptic. *Biol Philos* 37, 48. <https://doi.org/10.1007/s10539-022-09883-w> online first

Koumara, A. (2022). History of Pressure Implemented in a Nature of Science Professional Development Program for Science Teachers. *Sci & Educ*, 1-34. <https://doi.org/10.1007/s11191-022-00401-8> online first

Khayat, N., & Kozma, L. (2022). Medicine and Arabic literary production in the Ottoman Empire during the nineteenth century. *The British Journal for the History of Science*, 1-10. <https://doi.org/10.1017/S0007087422000413> online first

Kim, M. & Jin, Q. (2022) Studies on visualisation in science classrooms: a systematic literature review. *International Journal of Science Education*. <https://doi.org/10.1080/09500693.2022.2140020>

Kostøl, K.B., Bøe, M.V. & Skår, A.R. (2022). Nature of Science in Norway's Recent Curricula Reform: Analysis of the Biology, Chemistry, and Physics Curricula. *Sci & Educ*, 1-21. <https://doi.org/10.1007/s11191-022-00399-z> online first

Kranz, J., Baur, A. & Möller, A. (2022) Learners' challenges in understanding and performing experiments: a systematic review of the literature, *Studies in Science Education*, 1-48. <https://doi.org/10.1080/03057267.2022.2138151>

Lesperance, R., & Kuhn, D. (2022). Breadth and Relevance of Multivariable Inquiry Supports Deep Understanding of Science Practice. *Science Education*, 1– 18. <https://doi.org/10.1002/sce.21778>

Li, C., Yu, J. & Li, G. (2022). Development of the Representation of the Nature of Science in Textbooks: the Case of High School Biology Textbooks in Mainland China. *Int J of Sci and Math Educ*, 1-20.

- <https://doi.org/10.1007/s10763-022-10327-w>
online first
- Ma, Y. (2022). The Effect of Inquiry-Based Practices on Scientific Literacy: the Mediating Role of Science Attitudes. *Int J of Sci and Math Educ*, 1-22.
<https://doi.org/10.1007/s10763-022-10336-9>
online first
- Matthews, M.R. (2022), 'Thomas Kuhn and Science Education. Learning from the Past: The Importance of History and Philosophy of Science' *Science & Education*
online first [HERE](#)
- Meyer, V. (2022). Innovations from the Levant: Smallpox inoculation and perceptions of scientific medicine. *The British Journal for the History of Science*, 1-22.
<https://doi.org/10.1017/S0007087422000322>
online first
- Møgelvang, A., Nyléhn, J. (2022). Co-operative Learning in Undergraduate Mathematics and Science Education: A Scoping Review. *Int J of Sci and Math Educ*, 1-25.
<https://doi.org/10.1007/s10763-022-10331-0>
online first
- Mocellin, R.C., & Zaterka, L. (2022). Materials and their Biographies: The Case of Titanium and its Dioxide. *Transversal: International Journal for the Historiography of Science*, 13, 1-18 <http://dx.doi.org/10.24117/2526-2270.2022.i13.04>
- Narbona, M.V., Nieto, P.N. & Mardones, H.C. (2022). Understanding of Nature of Science (NOS) in pre-service teachers with different science content knowledge, before and after an intervention. *International Journal of Science Education*,
<https://doi.org/10.1080/09500693.2022.2152294>
- Palmgren, E., Rasa, T. (2022). Modelling Roles of Mathematics in Physics: Perspectives for Physics Education. *Sci & Educ*, 1-18.
<https://doi.org/10.1007/s11191-022-00393-5>
online first
- Parrish, J.C., Pleasants, J., Reid, J.W. et al. (2022). Using Card Sort Epistemic Network Analysis to Explore Preservice Teachers' Ideas About the Nature of Engineering. *Sci & Educ*, 1-26. <https://doi.org/10.1007/s11191-022-00395-3> online first
- Pulkkinen, K., Undorf, S. & Bender, F.A.M. (2022). Values in climate modelling: testing the practical applicability of the Moral Imagination ideal. *Euro Jnl Phil Sci* 12, 68.
<https://doi.org/10.1007/s13194-022-00488-4>
- Rosalino, I., Kasseboehmer, A.C. (2022). Development and Validation of an Epistemological Profile Questionnaire in a Museum Environment: Analysis of Psychometric Properties and Their Application Using Scientific Apparatus. *Sci & Educ*, 1-23.
<https://doi.org/10.1007/s11191-022-00405-4>
online first
- Salimpour, S., Fitzgerald, M.T. (2022). Astronomy and Culture: A Social Semiotic Perspective on the Role of Culture in Astronomy Education. *Sci & Educ*, 1-22.
<https://doi.org/10.1007/s11191-022-00389-1>
online first
- Seyhan, I.A. (2022). The Early History of the Pulleys and Crane Systems. *Found Sci*, 1-17.
<https://doi.org/10.1007/s10699-022-09888-4>
online first
- Simões, A. (2022). In the Shadow of the 1919 Total Solar Eclipse: The Two British Expeditions and the Politics of Invisibility. *Ber. Wissenschaftsgesch.*
<https://doi.org/10.1002/bewi.202100040> online first
- Takriti, R., Tairab, H., Alhosani, N. et al. (2022). Toward Understanding Science as a Whole: Investigating Preservice Teachers' Perceptions About Nature of Science in the United Arab Emirates. *Sci & Educ*, 1-41.
<https://doi.org/10.1007/s11191-022-00404-5>
online first
- Tosun, C. (2022). Analysis of the Last 40 Years of Science Education Research via Bibliometric Methods. *Sci & Educ*, 1-30.
<https://doi.org/10.1007/s11191-022-00400-9>
online first
- Vincent, D.E., Topper, D.R. (2022). Einstein's Oxford cosmology blackboards: open portals to 1931. *EPJ*, 1-23.
<https://doi.org/10.1140/epjh/s13129-022-00046-9> online first
- Wiescher, M. (2022) A German physicist's travels in Great Britain Julius Plücker's visits from 1853 to 1866. *Annals of Science*.
<https://doi.org/10.1080/00033790.2022.2147216> online first

Wu, WH., Kao, HY., Yan, WC. et al. (2022). The Impact of Integrating Tribal Culture and Science Education Through Information and Communication Technology. *Sci & Educ*, 1-18. <https://doi.org/10.1007/s11191-022-00391-7> online first

Zuccarini, G., Malgieri, M. (2022). Modeling and Representing Conceptual Change in the Learning of Successive Theories: The Case of the Classical-Quantum Transition . *Sci & Educ*, 1-45. <https://doi.org/10.1007/s11191-022-00397-1> online first

Recent HPS&ST Related Books

Adriaens, P. R., & De Block, A. (2022). *Of Maybugs and Men: A History and Philosophy of the Sciences of Homosexuality*. Chicago, IL: The University of Chicago Press. ISBN: 9780226822440

“Questions about the naturalness or unnaturalness of homosexuality are as old as the hills, and the answers have often been used to condemn homosexuals, their behaviors, and their relationships. In the past two centuries, a number of sciences have involved themselves in this debate, introducing new vocabularies, theories, arguments, and data, many of which have gradually helped tip the balance toward tolerance and even acceptance. In this book, philosophers Pieter R. Adriaens and Andreas De Block explore the history and philosophy of the gay sciences, revealing how individual and societal values have colored how we think about homosexuality.

“The authors unpack the entanglement of facts and values in studies of male homosexuality across the natural and human sciences and consider the extent to which science has mitigated or reinforced homonegative mores. The focus of the book is on homosexuality’s assumed naturalness. Geneticists rephrased naturalness as innateness, claiming that homosexuality is innate—colloquially, that homosexuals are born gay. Zoologists thought it a natural affair, documenting its existence in myriad animal species, from maybugs to men. Evolutionists presented homosexuality as the product of natural selection and speculated about its adaptive value. Finally, psychiatrists, who initially pathologized homosexuality,

eventually appealed to its naturalness or innateness to normalize it.

“Discussing findings from an array of sciences—comparative zoology, psychiatry, anthropology, evolutionary biology, social psychology, developmental biology, and machine learning—this book is essential reading for anyone interested in what science has to say about homosexuality.” (From the Publisher)

More information [HERE](#)

Agren, J. A. (2022). *The Gene's-Eye View of Evolution*. Oxford, UK: Oxford University Press. ISBN: 9780192872593 [Paperback]

“To many evolutionary biologists, the central challenge of their discipline is to explain adaptation, the appearance of design in the living world. With the theory of evolution by natural selection, Charles Darwin elegantly showed how a purely mechanistic process can achieve this striking feature of nature. Since then, the way many biologists have thought about evolution and natural selection is as a theory about individual organisms. Over a century later, a subtle but radical shift in perspective emerged with the gene's-eye view of evolution in which natural selection was conceptualized as a struggle between genes for replication and transmission to the next generation. This viewpoint culminated with the publication of *The Selfish Gene* by Richard Dawkins (Oxford University Press, 1976) and is now commonly referred to as selfish gene thinking.

“The gene's-eye view has subsequently played a central role in evolutionary biology, although it continues to attract controversy. The central aim of this accessible book is to show how the gene's-eye view differs from the traditional organismal account of evolution, trace its historical origins, clarify typical misunderstandings and, by using examples from contemporary experimental work, show why so many evolutionary biologists still consider it an indispensable heuristic. The book concludes by discussing how selfish gene thinking fits into ongoing debates in evolutionary biology, and what they tell us

about the future of the gene's-eye view of evolution.

“*The Gene's-Eye View of Evolution* is suitable for graduate-level students taking courses in evolutionary biology, behavioural ecology, and evolutionary genetics, as well as professional researchers in these fields. It will also appeal to a broader, interdisciplinary audience from the social sciences and humanities including philosophers and historians of science.” (From the Publisher)

More information [HERE](#)

Barwich, A. S. (2022). *Smellosophy: What the Nose Tells the Mind*. Cambridge, MA: The Harvard University Press. ISBN: 9780674278721 [Paperback]

“Decades of cognition research have shown that external stimuli “spark” neural patterns in particular regions of the brain. This has fostered a view of the brain as a space that we can map: here the brain responds to faces, there it perceives a sensation in your left hand. But it turns out that the sense of smell—only recently attracting broader attention in neuroscience—doesn’t work this way. A. S. Barwich asks a deceptively simple question: What does the nose tell the brain, and how does the brain understand it?

“Barwich interviews experts in neuroscience, psychology, chemistry, and perfumery in an effort to understand the biological mechanics and myriad meanings of odors. She argues that it is time to stop recycling ideas based on the paradigm of vision for the olfactory system. Scents are often fickle and boundless in comparison with visual images, and they do not line up with well-defined neural regions. Although olfaction remains a puzzle, Barwich proposes that what we know suggests the brain acts not only like a map but also as a measuring device, one that senses and processes simple and complex odors.

“Accounting for the sense of smell upsets theories of perception philosophers have developed. In their place, *Smellosophy* articulates a new model for understanding how the brain represents sensory information.”

More information [HERE](#)

Bedford, D., & Workman, T. (2022). *Marx, Engels and the Philosophy of Science*. Abingdon, UK: Routledge. ISBN: 9781003318651

“This book expounds the dialectical conception of science largely implicit in the writings of Marx and Engels, offering a sympathetic reconstruction of a philosophy of science commensurate with Marx’s thought. Drawing on a reading of dialectics found in Plato and Hegel, it recasts Marx’s implicit ontology in terms of dialectical conceptions of the world, as these conceptions have responded to the growing sophistication of modern science. It thus deepens our understanding of materialist philosophy as it relates to science and draws out Marx’s logic of science in light of continuing discussions. As such, it will appeal to philosophers with interests in the nature and development of science and Marxist thought.”

More information [HERE](#)

Billington, D. P., & Billington Jr., D. P. (2022). *Power, Speed, and Form: Engineers and the Making of the Twentieth Century*. New Jersey, NJ: Princeton University Press. ISBN: 9780691242408

“*Power, Speed, and Form* is the first accessible account of the engineering behind eight breakthrough innovations that transformed American life from 1876 to 1939—the telephone, electric power, oil refining, the automobile, the airplane, radio, the long-span steel bridge, and building with reinforced concrete. Beginning with Thomas Edison’s system to generate and distribute electric power, the authors explain the Bell telephone, the oil refining processes of William Burton and Eugene Houdry, Henry Ford’s Model T car and the response by General Motors, the Wright brothers’ airplane, radio innovations from Marconi to Armstrong, Othmar Ammann’s George Washington Bridge, the reinforced concrete structures of John Eastwood and Anton Tedesko, and in the 1930s, the Chrysler Airflow car and the Douglas DC-3 airplane.

“These innovations used simple numerical ideas, which the Billingtons integrate with short narrative accounts of each breakthrough—a unique and effective way to introduce engineering and how engineers think. The book shows how the best engineering exemplifies efficiency, economy and, where possible, elegance. With *Power, Speed, and Form*, educators, first-year engineering students, liberal arts students, and general readers now have, for the first time in one volume, an accessible and readable history of engineering achievements that were vital to America’s development and that are still the foundations of modern life.” (From the Publisher)

More information [HERE](#)

Cartwright, N., Hardie, J., Montuschi, E., Soleiman, M. & Thresher, A.C (2022). *The Tangle of Science: Reliability Beyond Method, Rigour, and Objectivity*. Oxford, UK: Oxford University Press. ISBN: 9780198866343

“Science is remarkably reliable. It puts people on the moon, performs laser eye surgery, tells us about ancient civilizations and species, and predicts the future of our climate. What underwrites this reliability? This book argues that the standard answers—the scientific method, rigour, and objectivity—are insufficient for the job.

“Here we propose a new model of science which places its products front and centre. In *The Tangle of Science* we show how any reliable piece of science is underpinned by a vast, diverse, and thick network of other scientific products. In doing so we bring back into focus areas of science that have been long neglected, emphasizing how every product, from the screws that hold the space shuttle together, to ways of measuring the consumer price index, to Einstein's theory of general relativity, work together to support results we can trust.” (From the Publisher)

More information [HERE](#)

Cera, A. (2022). *A Philosophical Journey into the Anthropocene: Discovering Terra Incognita*. Maryland, MD: Rowman & Littlefield Publishers. ISBN: 978-1-7936-3081-0

“*A Philosophical Journey into the Anthropocene: Discovering Terra Incognita* presents the Anthropocene not only as a geological epoch, but rather as the potential métarécit of our age and the most faithful expression of the current zeitgeist. Insofar as the Anthropocene establishes that the human agency as technological omni-power represents a “global geophysical force” capable of altering the destiny of the Earth system, the coming of this new epoch shows that technology now embodies the subject of both history and nature. In this totalized form, technology achieves the status of an integral epochal phenomenon: the new environment for human life. Agostino Cera argues that the “technisches Zeitalter” (age of technology) outlined by twentieth-century philosophical thought is fully realized in the Anthropocene and that a more appropriate name for this planetary framework is, therefore, Technocene. The book develops along four basic directions: epistemological, ontological, anthropological, and ethical. It argues that the Anthropocene is something radically new, a terra incognita or an “epistemic hyperobject with a (geo-)historical barycenter,” giving rise to: an unprecedented form of reification of nature (“pet-ification of nature”); an unexpected version of anthropocentrism (“Aidosean Prometheanism”); and an unpredictable ethical paradox (“paradox of omni-responsibility”). (From the Publisher)

More information [HERE](#)

DeSilva, J. (Ed.) (2022). *A Most Interesting Problem: What Darwin’s Descent of Man Got Right and Wrong about Human Evolution*. New Jersey, NJ: Princeton University Press. ISBN: 9780691242064

“In 1871, Charles Darwin published *The Descent of Man*, a companion to *Origin of Species* in which he attempted to explain human evolution, a topic he called “the highest and most interesting problem for the naturalist.” *A Most Interesting Problem* brings together twelve world-class scholars and science communicators to investigate what Darwin got right—and what he got wrong—about the origin, history, and biological variation of humans.

“Edited by Jeremy DeSilva and with an introduction by acclaimed Darwin biographer Janet Browne, *A Most Interesting Problem* draws on the latest discoveries in fields such as genetics, paleontology, bioarchaeology, anthropology, and primatology. This compelling and accessible book tackles the very subjects Darwin explores in *Descent*, including the evidence for human evolution, our place in the family tree, the origins of civilization, human races, and sex differences.

“*A Most Interesting Problem* is a testament to how scientific ideas are tested and how evidence helps to structure our narratives about human origins, showing how some of Darwin’s ideas have withstood more than a century of scrutiny while others have not.

“*A Most Interesting Problem* features contributions by Janet Browne, Jeremy DeSilva, Holly Dunsworth, Agustín Fuentes, Ann Gibbons, Yohannes Haile-Selassie, Brian Hare, John Hawks, Suzana Herculano-Houzel, Kristina Killgrove, Alice Roberts, and Michael J. Ryan.” (From the Publisher)

More information [HERE](#)

Guenther, K (2022). *The Mirror and the Mind: A History of Self-Recognition in the Human Sciences*. New Jersey, NJ: Princeton University Press.

“Since the late eighteenth century, scientists have placed subjects—humans, infants, animals, and robots—in front of mirrors in order to look for signs of self-recognition. Mirrors served as the possible means for answering the question: What makes us human? In *The Mirror and the Mind*, Katja Guenther traces the history of the mirror self-recognition test, exploring how researchers from a range of disciplines—psychoanalysis, psychiatry, developmental and animal psychology, cybernetics, anthropology, and neuroscience—came to read the peculiar behaviors elicited by mirrors. Investigating the ways mirrors could lead to both identification and misidentification, Guenther looks at how such experiments ultimately failed to determine human specificity.

“The mirror test was thrust into the limelight when Charles Darwin challenged the idea that language sets humans apart. Thereafter the mirror, previously a recurrent if marginal scientific tool, became dominant in attempts to demarcate humans from other animals. But because researchers could not rely on language to determine what their nonspeaking subjects were experiencing, they had to come up with significant innovations, including notation strategies, testing protocols, and the linking of scientific theories across disciplines. From the robotic tortoises of Grey Walter and the mark test of Beulah Amsterdam and Gordon Gallup, to anorexia research and mirror neurons, the mirror test offers a window into the emergence of such fields as biology, psychology, psychiatry, animal studies, cognitive science, and neuroscience.

“*The Mirror and the Mind* offers an intriguing history of experiments in self-awareness and the advancements of the human sciences across more than a century.” (From the Publisher)

More information [HERE](#)

Haushofer, L. (2022). *Wonder Foods: The Science and Commerce of Nutrition*. Oakland, CA: University of California Press. ISBN: 9780520390393

“Between 1850 and 1950, experts and entrepreneurs in Britain and the United States forged new connections between the nutrition sciences and the commercial realm through their enthusiasm for new edible consumables. The resulting food products promised wondrous solutions for what seemed to be both individual and social ills. By examining creations such as Gail Borden's meat biscuit, Benger's Food, Kellogg's health foods, and Fleischmann's yeast, *Wonder Foods* shows how new products dazzled with visions of modernity, efficiency, and scientific progress even as they perpetuated exclusionary views about who deserved to eat, thrive, and live. Drawing on extensive archival research, historian Lisa Haushofer reveals that the story of modern food and nutrition was not about innocuous technological advances or superior scientific insights, but rather about the powerful logic of exploitation and economization that undergirded colonial and

industrial food projects. In the process, these wonder foods shaped both modern food regimes and how we think about food.” (From the Publisher)

More information [HERE](#)

Johnson, E. (2022). *Anxiety and the Equation: Understanding Boltzmann's Entropy*. Cambridge, MA: The MIT Press. ISBN: 9780262546614

“Ludwig Boltzmann's grave in Vienna's Central Cemetery bears a cryptic epitaph: $S = k \log W$. This equation was Boltzmann's great discovery, and it contributed significantly to our understanding of the second law of thermodynamics. In *Anxiety and the Equation*, Eric Johnson tells the story of a man and his equation: the anxiety-plagued nineteenth-century physicist who did his most important work as he struggled with mental illness.

“Johnson explains that “S” in Boltzmann's equation refers to entropy, and that entropy is the central quantity in the second law of thermodynamics. The second law is always on, running in the background of our lives, providing a way to differentiate between past and future. We know that the future will be a state of higher entropy than the past, and we have Boltzmann to thank for discovering the equation that underlies that fundamental trend. Johnson, accessibly and engagingly, reassembles Boltzmann's equation from its various components and presents episodes from Boltzmann's life—beginning at the end, with “Boltzmann Kills Himself” and “Boltzmann Is Buried (Not Once, But Twice).” Johnson explains the second law in simple terms, introduces key concepts through thought experiments, and explores Boltzmann's work. He argues that Boltzmann, diagnosed by his contemporaries as neurasthenic, suffered from an anxiety disorder. He was, says Johnson, a man of reason who suffered from irrational concerns about his work, worrying especially about opposition from the scientific establishment of the day.

“Johnson's clear and concise explanations will acquaint the nonspecialist reader with such seemingly esoteric concepts as microstates, macrostates, fluctuations, the distribution of

energy, log functions, and equilibrium. He describes Boltzmann's relationships with other scientists, including Max Planck and Henri Poincaré, and, finally, imagines “an alternative ending,” in which Boltzmann lived on and died of natural causes.” (From the Publisher)

More information [HERE](#)

Lawler, I., Khalifa, K., & Shech, E. (Eds.) (2022). *Scientific Understanding and Representation Modeling in the Physical Sciences*. Abingdon, UK: Routledge. ISBN 9781032054957

“This volume assembles cutting-edge scholarship on scientific understanding, scientific representation, and their delicate interplay. Featuring several articles in an engaging ‘critical conversation’ format, the volume integrates discussions about understanding and representation with perennial issues in the philosophy of science, including the nature of scientific knowledge, idealizations, scientific realism, scientific inference, and scientific progress.

“In the philosophy of science, questions of scientific understanding and scientific representation have only recently been put in dialogue with each other. The chapters advance these discussions from a variety of fresh perspectives. They range from case studies in physics, chemistry, and neuroscience to the representational challenges of machine learning models; from special forms of representation such as maps and topological models to the relation between understanding and explanation; and from the role of idealized representations to the role of representation and understanding in scientific progress.

“*Scientific Understanding and Representation* will appeal to scholars and advanced students working in philosophy of science, philosophy of physics, philosophy of mathematics, and epistemology.” (From the Publisher)

More information [HERE](#)

Mogilner, M. (2022). *A Race for the Future: Scientific Visions of Modern Russian Jewishness*. Cambridge, MA: Harvard University Press. ISBN: 9780674270725

“In the rapidly nationalizing Russian Empire of the late nineteenth century, Russian Jews grew increasingly concerned about their future. Jews spoke different languages and practiced different traditions. They had complex identities and no territorial homeland. Their inability to easily conform to new standards of nationality meant a future of inevitable assimilation or second-class minority citizenship. The solution proposed by Russian Jewish intellectuals was to ground Jewish nationhood in a structure deeper than culture or territory—biology.

“Marina Mogilner examines three leading Russian Jewish race scientists— Samuel Weissenberg, Alexander El’kind, and Lev Shternberg—and the movement they inspired. Through networks of race scientists and political activists, Jewish medical societies, and imperial organizations like the Society for the Protection of the Health of the Jewish Population, they aimed to produce “authentic” knowledge about the Jewish body, which would motivate an empowering sense of racially grounded identity and guide national biopolitics. Activists vigorously debated eugenic and medical practices, Jews’ status as Semites, Europeans, and moderns, and whether the Jews of the Caucasus and Central Asia were inferior. The national science, and the biopolitics it generated, became a form of anticolonial resistance, and survived into the early Soviet period, influencing population policies in the new state.

“Comprehensive and meticulously researched, *A Race for the Future* reminds us of the need to historically contextualize racial ideology and politics and makes clear that we cannot fully grasp the biopolitics of the twentieth century without accounting for the imperial breakdown in which those politics thrived.” (From the Publisher)

More information [HERE](#)

Mukharji, P. B. (2022). *Brown Skins, White Coats: Race Science in India, 1920–66*. Chicago, IL: The University of Chicago Press. ISBN: 9780226823010

“There has been a recent explosion in studies of race science in the twentieth and twenty-first

centuries, but most have focused either on Europe or on North America and Australia. In this stirring history, Projit Bihari Mukharji illustrates how India appropriated and repurposed race science to its own ends and argues that these appropriations need to be understood within the national and regional contexts of postcolonial nation-making—not merely as footnotes to a Western history of “normal science.”

“The book comprises seven factual chapters operating at distinct levels—conceptual, practical, and cosmological—and eight fictive interchapters, a series of epistolary exchanges between the Bengali author Hemendrakumar Ray (1888–1963) and the protagonist of his dystopian science fiction novel about race, race science, racial improvement, and dehumanization. In this way, Mukharji fills out the historical moment in which the factual narrative unfolded, vividly revealing its moral, affective, political, and intellectual fissures.” (From the Publishers)

More information [HERE](#)

Northcott, M.S. (2022). *God and Gaia: Science, Religion and Ethics on a Living Planet*. Abingdon, UK: Routledge. ISBN: 9780367627744

“*God and Gaia* explores the overlap between traditional religious cosmologies and the scientific Gaia theory of James Lovelock. It argues that a Gaian approach to the ecological crisis involves rebalancing human and more-than-human influences on Earth by reviving the ecological agency of local and indigenous human communities, and of nonhuman beings.

“Present-day human ecological influences on Earth have been growing at pace since the Scientific and Industrial Revolutions, when modern humans adopted a machine cosmology in which humans are the sole intelligent agency. The resultant imbalance between human and Earthly agencies is degrading the species diversity of ecosystems, causing local climate changes, and threatens to destabilise the Earth as a System. Across eight chapters this ambitious text engages with traditional cosmologies from the Indian Vedas and classical Greece to Medieval Christianity, with

case material from Southeast Asia, Southern Africa and Great Britain. It discusses concepts such as deep time and ancestral time, the ethics of genetic engineering of foods and viruses, and holistic ecological management.

“Northcott argues that an ontological turn that honours the differential agency of indigenous humans and other kind, and that draws on sacred traditions, will make it is possible to repair the destabilising impacts of contemporary human activities on the Earth System and its constituent ecosystems. This book will be of considerable interest to students and scholars of the environmental humanities, history, and cultural and religious studies.” (From the Publisher)

More information [HERE](#)

Otsuka, J. (2022). *Thinking About Statistics: The Philosophical Foundations*. Abingdon, UK: Routledge. ISBN: 9781032326108

“Simply stated, this book bridges the gap between statistics and philosophy. It does this by delineating the conceptual cores of various statistical methodologies (Bayesian/frequentist statistics, model selection, machine learning, causal inference, etc.) and drawing out their philosophical implications. Portraying statistical inference as an epistemic endeavor to justify hypotheses about a probabilistic model of a given empirical problem, the book explains the role of ontological, semantic, and epistemological assumptions that make such inductive inference possible. From this perspective, various statistical methodologies are characterized by their epistemological nature: Bayesian statistics by internalist epistemology, classical statistics by externalist epistemology, model selection by pragmatist epistemology, and deep learning by virtue epistemology.

“Another highlight of the book is its analysis of the ontological assumptions that underpin statistical reasoning, such as the uniformity of nature, natural kinds, real patterns, possible worlds, causal structures, etc. Moreover, recent developments in deep learning indicate that machines are carving out their own "ontology" (representations) from data, and better understanding this—a key objective of the

book—is crucial for improving these machines’ performance and intelligibility.” (From the Publisher)

More information [HERE](#)

Redman, S. J. (2022). *Bone Rooms: From Scientific Racism to Human Prehistory in Museums*. Cambridge, MA: Harvard University Press. ISBN: 9780674278677

In 1864 a U.S. Army doctor dug up the remains of a Dakota man who had been killed in Minnesota. Carefully recording his observations, he sent the skeleton to a museum in Washington, DC, that was collecting human remains for research. In the “bone rooms” of this museum and others like it, a scientific revolution was unfolding that would change our understanding of the human body, race, and prehistory.

“In *Bone Rooms* Samuel Redman unearths the story of how human remains became highly sought-after artifacts for both scientific research and public display. Seeking evidence to support new theories of human evolution and racial classification, collectors embarked on a global competition to recover the best specimens of skeletons, mummies, and fossils. The Smithsonian Institution built the largest collection of human remains in the United States, edging out stiff competition from natural history and medical museums springing up in cities and on university campuses across America. When the San Diego Museum of Man opened in 1915, it mounted the largest exhibition of human skeletons ever presented to the public.

“The study of human remains yielded discoveries that increasingly discredited racial theory; as a consequence, interest in human origins and evolution—ignited by ideas emerging in the budding field of anthropology—displaced race as the main motive for building bone rooms. Today, debates about the ethics of these collections continue, but the terms of engagement were largely set by the surge of collecting that was already waning by World War II.” (From the Publisher)

More information [HERE](#)

Richmond, S. (2022). *Restoring Our Humanity: Six Essays*. Newcastle, UK: Cambridge Scholars Publishing. ISBN: 978-1-5275-8796-0

“This book discusses possible paths towards restoring our humanity in today’s global techno-scientific culture. It begins by considering how talking face-to-face develops and improves critical discussion, before moving on to show that observing in both physics and art involves participating with what we are observing. The book then highlights how doing in general involves developing a third-person stance in order to improve our critical self-awareness, and how making in general is intertwined with the making and remaking of our multiple cultures. It also explores how critical discussion allows our thinking both to confront and to keep in touch with reality, and provides six tentative maxims on how to ‘be’ as a human.” (From the Publisher)

More information [HERE](#)

Stuhr, J. J. (2022). *No Professor's Lectures Can Save Us: William James's Pragmatism, Radical Empiricism, and Pluralism*. Oxford, UK: Oxford University Press. ISBN: 9780197664636 [Paperback]

“In *No Professor's Lectures Can Save Us*, John J. Stuhr utilizes the thought of American philosopher and psychologist William James to develop an original world view that addresses both enduring philosophical problems and contemporary cultural issues.

“Drawing on and illuminating the entirety of James's work, Stuhr explores James's psychology, his account of religious experience and his “will to believe” thesis, his pragmatism, his radical empiricism, his pluralism, and his writing on politics, democracy, and imperialism. Throughout, Stuhr engages the wide-ranging scholarship on James's philosophy and explores connections between James and the work of Bergson, Deleuze, Dewey, Peirce, Rorty, and Whitehead, as well as intellectual movements including contemporary democratic theory, positive psychology, and philosophical naturalism.

“After establishing the need to approach James's writings as intimately interwoven, Stuhr turns to each of James's major texts, including *The Will to Believe*, *Principles of Psychology*, *Varieties of Religious Experience*, *Pragmatism*, *The Meaning of Truth*, and *Essays in Radical Empiricism*. His focus throughout is practical, showing the concrete differences it makes in one's life should one take up a broadly Jamesian perspective across the “ever not quite” endeavors of our finite lives. “From this unsparing practical ordeal,” James noted, “no professor's lectures and no array of books can save us.” In this spirit, this book does not by itself, promise salvation. Instead, it is a master class not only in the philosophy of William James but in a new philosophy through James's thought.” (From the Publisher)

More information [HERE](#)

Shackelford, J. (2022). *An Introduction to the History of Chronobiology* [3 Volumes]. Pittsburgh, PA: University of Pittsburgh Press

In three volumes, historian Jole Shackelford delineates the history of the study of biological rhythms—now widely known as chronobiology—from antiquity into the twentieth century. Perhaps the most well-known biological rhythm is the circadian rhythm, tied to the cycles of day and night and often referred to as the “body clock.” But there are many other biological rhythms, and although scientists and the natural philosophers who preceded them have long known about them, only in the past thirty years have a handful of pioneering scientists begun to study such rhythms in plants and animals seriously. Tracing the intellectual and institutional development of biological rhythm studies, Shackelford offers a meaningful, evidence-based account of a field that today holds great promise for applications in agriculture, health care, and public health. Volume 1 follows early biological observations and research, chiefly on plants; volume 2 turns to animal and human rhythms and the disciplinary contexts for chronobiological investigation; and volume 3 focuses primarily on twentieth-century researchers who modeled biological clocks and sought them out, including three molecular biologists whose work in determining clock

mechanisms earned them a Nobel Prize in 2017. (From the Publisher)

More information on [Volume 1](#), [Volume 2](#), [Volume 3](#)

Strickland, L., & Lewis, H. R. (2022). *Leibniz on Binary: The Invention of Computer Arithmetic*. New York, NY: Penguin Random House

“The polymath Gottfried Wilhelm Leibniz (1646–1716) is known for his independent invention of the calculus in 1675. Another major—although less studied—mathematical contribution by Leibniz is his invention of binary arithmetic, the representational basis for today's digital computing. This book offers the first collection of Leibniz's most important writings on the binary system, all newly translated by the authors with many previously unpublished in any language. Taken together, these thirty-two texts tell the story of binary as Leibniz conceived it, from his first youthful writings on the subject to the mature development and publication of the binary system.

“As befits a scholarly edition, Strickland and Lewis have not only returned to Leibniz's original manuscripts in preparing their translations, but also provided full critical apparatus. In addition to extensive annotations, each text is accompanied by a detailed introductory “headnote” that explains the context and content. Additional mathematical commentaries offer readers deep dives into Leibniz's mathematical thinking. The texts are prefaced by a lengthy and detailed introductory essay, in which Strickland and Lewis trace Leibniz's development of binary, place it in its historical context, and chart its posthumous influence, most notably on shaping our own computer age.” (From the Publisher)

More information [HERE](#)

Authors of HPS&ST-related papers and books are invited to bring them to attention of the Newsletter's assistant editor Paulo Maurício (paulo.asterix@gmail.com) for inclusion in these sections.

Newsletter Assistant Editor (Europe) Required

A Newsletter Assistant Editor (Europe) is sought to better promote information about HPS&ST publications, conferences, activities and research programmes in Europe; to bring the newsletter to the attention of European HPS scholars and science educators; and to seek out European authors for the monthly Opinion Page.

The newsletter serves two communities. First, those historians, philosophers, educators, and teachers interested in the connection of history and philosophy of science to theoretical, curricular, and pedagogical issues that arise in science teaching. Second, philosophers and historians interested in making the teaching of their discipline more engaging, interesting, and effective.

Inquiries, with brief biographical statement, can be made direct to the [Editor](#).

Coming HPS&ST Related Conferences

January 14-17, 2023, American Association of Physics Teachers, Winter Meeting, Portland OR.

Details [HERE](#)

March 2-6, 2023, Philosophy of Education Society (USA), Annual Conference, Chicago

Details [HERE](#)

March 16-18, 2023, 9th Integrated History and Philosophy of Science Conference, University of South Carolina, Columbia SC.

Details [HERE](#)

April 18-21, 2023, NARST Annual Conference, Chicago

Details [HERE](#)

April 20-21, Conference *Gravitational Constant: From Local to Universal*, St Andrews, Scotland

Details [HERE](#)

May 5-7, 2023, ‘Science, Values and Society’, Postgraduate Philosophy Student Conference, Alberta, Canada

Details: [HERE](#)

June 8-9, 2023, 10th International Philosophy of Medicine Roundtable, Bologna, Italy

Details [HERE](#)

June 9-11, 2023, Eighth Annual Conference on the History of Recent Social Science, Uppsala, Sweden

Details [HERE](#)

June 27-30, 2023, ASERA Annual Conference, Cains, Australia

Details [HERE](#)

July 24-29, 2023, 17th DLMPST Congress, University of Buenos Aires

Information: Pablo Lorenzano, [HERE](#)

August 9-11, 2023, IHPST-LA regional conference, Porto Alegre, Brazil

Details [HERE](#)

August 14-18, 2023, International Committee for History of Technology, 50th Conference, Tallinn, Estonia

Details [HERE](#)

August 29-Sept.3, 2023, ESERA biennial conference, Cappadocia, Turkey

Details [HERE](#)

HPS&ST Related Organisations and Websites

[IUHPST](#) – International Union of History, Philosophy, Science, and Technology

[DLMPST](#) – Division of Logic, Mathematics, Philosophy, Science, and Technology

[DHST](#) – Division of History, Science, and Technology

[IHPST](#) – International History, Philosophy, and Science Teaching Group

[NARST](#) - National Association for Research in Science Teaching

[ESERA](#) - European Science Education Research Association

[ASERA](#) - Australasian Science Education Research Association

[ICASE](#) - International Council of Associations for Science Education

[UNESCO](#) – Education

[HSS](#) – History of Science Society

[ESHS](#) – European Society for the History of Science

[AHA](#) – American History Association

[ACS HIST](#) – American Chemical Society Division of the History of Chemistry

[GWMT](#) - Gesellschaft für Geschichte der Wissenschaften, der Medizin und der Technik

[ISHEASTME](#) – International Society for the History of East Asian History of Science Technology and Medicine

[EASE](#) - East-Asian Association for Science Education

[BSHS](#) – British Society for History of Science

[EPSA](#) - European Philosophy of Science Association

[AAHPSSS](#) - The Australasian Association for the History, Philosophy, and Social Studies of Science

[HOPOS](#) – International Society for the History of Philosophy of Science

[PSA](#) – Philosophy of Science Association

[BAHPS](#) - Baltic Association for the History and Philosophy of Science

[BSPS](#) – The British Society for the Philosophy of Science

[SPSP](#) - The Society for Philosophy of Science in Practice

[ISHPSB](#) - The International Society for the History, Philosophy, and Social Studies of Biology

[PES](#) – The Philosophy of Education Society (USA)

The above list is updated and kept on the HPS&ST website at: [HERE](#)

HPS&ST related organizations wishing their web page to be added to the list should contact assistant editor Paulo Maurício (paulo.asterix@gmail.com)

HPS&ST NEWSLETTER STAFF

Editor

Assistant Editor

Assistant Editor (Publications & Website

Regional Assistant Editor (North America)

Regional Assistant Editor (Latin America)

Regional Assistant Editor (Asia)

Michael Matthews

Nathan Oseroff-Spicer

Paulo Maurício

Sophia Jeong

Nathan Lima

Huang Xiao