HPS&ST NEWSLETTER

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The HPS&ST NEWSLETTER is emailed monthly to about 10,000 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 internatitioal 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 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 to the NEWSLETTER (publications, conferences, opinion pieces, &.) are welcome and should be sent direct to the editor: Michael R. Matthews, UNSW (m.matthews@unsw.edu.au).

The NEWSLETTER, along with RESOURCES, OBITUARIES, OPINION PIECES and more, are available at the website: https://www.hpsst.com/

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The Russian Invasion of Ukraine

Countless civil and academic organisations around the world expressed formal dismay at the Russian invasion of Ukraine. After 100+ days of the relentless destruction of national infrastructure, schools, hospitals, cultural institutes, domestic homes and unit blocks, the deaths of thousands and the displacement of millions--these calls are louder and more urgent.

Division of the History of Science and Technology (DHST)

The president, officers, and undersigned council members of the Division of the History of Science and Technology (DHST) of the International Union for the History and Philosophy of Science and Technology condemn the ongoing military actions against Ukraine directed by the government of the Russian Federation.

Our deepest concern and sympathy go to our Ukrainian colleagues and all the people bearing the grim consequences of this war, and also to colleagues elsewhere who are suffering in silence or risking their lives to speak up. We know that in addition to the unacceptable loss of human life, wars devastate libraries, schools, universities, and all kinds of cultural institutions that are the material remnants of a people's history and right to education.

European Society for the History of Science

We, the members of the Scientific Board of the ESHS, are greatly concerned about the escalating war in Ukraine. As an academic society committed to the values of reason and tolerance, we strongly believe that dialogue and diplomacy are the only legitimate means of resolving divergences among nations. Invading another country should never be an acceptable means of addressing concerns a country may have.

US History of Science Society

The History of Science Society staunchly endorses the statement of the European Society for the History of Science on the Ukraine Crisis. We share the position and views expressed in their statement, and we support our members and other colleagues whose lives and careers have been impacted by the event.

European Philosophy of Science Association

The Steering Committee of European Philosophy of Science Association stands, together with other academic societies and scholarly organisations, and the academic world at large, in support of the suffering people of Ukraine and their families and friends all over Europe and elsewhere. We also express our support to Russian colleagues who oppose the war, often at great personal risk.

EPSA is currently working towards extending its Fellowship program to include researchers at any level of seniority who have been affected by the war. Opportunities for financial and institutional support will be announced on our website as soon as we confirm participation from potential hosting institutions. The full EPSA statement is available in PDF format here.

For an updated list of relevant resources and events, please go to the excellent site maintained by the Eastern European Network for Philosophy of Science. A listing, and websites, for Ukrainian university philosophy of science departments is here.

The above sentiments will be shared by most readers of the HPS&ST NEWSLETTER.

Course Syllabi: "Teaching Philosophy of Science in the World"

The Philosophy of Science Association invites submissions of course syllabi that showcase effective and creative teaching of the philosophy of science that reaches beyond the Anglophone mainstream. We are seeking to build a library of new ideas and good practices from around the world that will help those who are trying to internationalise the subject and introduce it to new audiences. All submissions that meet

the eligibility criteria below will be made available on the syllabus repository that can be accessed freely via the PSA website.

Any members of the PSA may make a submission; non-members wishing to submit an entry are encouraged to apply for membership through the PSA's Sponsor-a-Scholar program, if they have financial need. Entries may be syllabi of courses specifying a schedule of sessions and reading lists, or descriptions of learning activities that do not fit the traditional notion of "course." Teaching plans at any level from secondary school to PhD programs are eligible. Entries must refer to courses or other activities that have already run at least once. They can be in any language (or mix of languages), but for an entry that is not in English, please submit an English translation alongside the original version. Submissions will be reviewed by the PSA International Relations Committee, consulting appropriate external experts as needed.

Innovations displayed by courses may include:

- Crafting of learning activities that adapt traditional issues in the philosophy of science to the sensibilities and conditions of the countries and communities in which the course is taught.
- Selection (or creation) of teaching materials (print or online) with the same purpose;
- Comparative study or synthesis of traditions of philosophy of science from different parts of the world, or from different languages, cultures, or religions.
- Application of insights from various non-Anglophone and non-analytic traditions of philosophy to the philosophy of science.
- Critical examination of the legacies of colonialism and other aspects of international and intercultural politics in the philosophy of science.
- Philosophical examination of interactions between European-origin science (and technology and medicine) and non-European traditions of knowledge.
- Productive combination of mainstream English-language sources with non-English sources.

All entries will be considered for an annual prize to be awarded at the biennial PSA conference or at a separate online event, where the prize-winner(s) will be invited to discuss the content of the winning entry. The prize will also carry a cash award of USD$500.

Entries may be submitted at any time to the Chair of the PSA International Relations Committee, Prof. Hasok Chang, University of Cambridge, by e-mail to: hc372@cam.ac.uk. The deadline for submission of syllabi to be considered for the 2022 prize is **15 July 2022**. Entries submitted after that date will be considered for the 2023 competition.

History of Science Approved as an Undergraduate Major in China

On 22 February 2022, the Chinese Ministry of Education announced a "Catalogue of Undergraduate Majors in Institutions of Higher Education," which listed the changes to undergraduate majors in universities throughout China. A total of 1961 majors were added to the list and 804 majors were dropped. "History of science" is one of the new majors to be offered under the discipline of "history" with a normative study period of 4 years.

The announcement also pointed to another significant change in the status of the history of science in China. Even though "history of science" has been recognized as an interdisciplinary field in the past, it has been officially categorized as an area of study in the "natural sciences." Under the old regulations, students who pursued undergraduate work in history of science were holders of a Bachelor of Science (BSc) degree. The establishment of "history of science" as an undergraduate major under the discipline of "history" now places the field in the arts and humanities rather than in the natural sciences. The changes contained in the announcement will allow the history of science in China to align more closely with how the field is conceived globally.

Starting from the next academic year, all public uni-

versities in China can offer their own history of science undergraduate major programs within a Bachelor of Arts (BA) degree and admit high-school students directly from the national college entrance exam (known as gaokao). Previously, only minor or certificate programs in history of science were offered for admitted undergraduate students majoring in science or engineering. Universities with a history of science major will offer a whole new package of undergraduate courses that may lead to a considerable increase of undergraduates pursuing the field, which may in turn lead to new teaching appointments.

Tsinghua University played a major role in bringing about the accreditation of history of science as an undergraduate major program in China. For more on the news and the catalogue, visit the Ministry of Education official homepage: here.

HPS&ST in Latin America

- Call for papers

The Brazilian Journal of History of Science is calling for papers for a special issue on HPS&ST (the deadline has been postponed to **July 3rd**): The History of Science for a Science Education of the Future, *História da Ciência para uma Educação em Ciências do futuro*; La Historia de la Ciencia para una Educación Científica del Futuro; (to access the Spanish and English versions, click in the language option at the right side of the webpage). **The journal accepts submissions in Portuguese, Spanish and English**. All members of the HPS&ST community are invited to send papers that discuss the potentialities and challenges of HPS&ST in the 21st century.

- Events

Echoes of Scientific Thought in Society - The late 19th century - early 20th century "race science" in Argentina and Brazil. This online meeting will bring together several scholars to discuss how the racial thought leads to impact in social constructs as diverse as education, literature and others, in Brazil and Argentina. It will also host paper presentation sessions (graduate students are especially encouraged to engage). Sept. 19-23, 2022. Information may be accessed here.

XX IOSTE Symposium (International Organization for Science and Technology Education) will be held in Federal University of Pernambuco and Mar Hotel Conventions, Recife, Brazil, from July 25th to 29th. The theme of the event will be "Esperançar in uncertain times: the role of science and technology education in/for a changing world", an allusion to Paulo Freire's concept of Esperança ("hope"). The event presents a special strand for submissions of HPS&ST field. Information is available at http://www.ioste2022.com/.

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 or secondly Michael Matthews.

Opinion Page: Fringe Theories Stack

Michael D. Gordin, History Department, Princeton University

Michael Dan Gordin is an American historian of science and Slavist.

Born in New Jersey, Gordin studied at Harvard University earning a bachelor's degree in 1996 and a doctorate in 2001. From 2003 he was at Princeton University, where he is now a professor.

He has done research on the early development of the natural sciences in Russia in the 18th century, biological warfare in the Soviet Union, the relationship of Russi n literature to the natural sciences, Lysenkoism, Immanuel Velikovsky and pseudosciences, the early history of the atomic bombs and the Cold War, Albert Einstein in Prague, history of global scientific languages, and the life of Dmitri Mendeleyev and the history of the periodic table.

Gordin, Michael D. (2020). *Einstein in Bohemia*. Princeton University Press.
Gordin, Michael D. (2021). *On the Fringe: Where Science Meets Pseudoscience*. Oxford University Press.

Almost nobody holds to just one strange idea. By 'strange' here, I mean unconventional, unorthodox, contrary to conventional wisdom. (To attenuate some of the hostile judgment implied in those descriptions, from now on I will use the term 'fringe'.) There is a whole gamut of examples to choose from, ranging from the idea that Lee Harvey Oswald did not act alone in the assassination of the US president John F Kennedy in 1963 – if, that is, he was not merely a patsy – to a conviction that extraterrestrials have been in cahoots with world governments and are monitoring dissidents' thoughts. That's quite a range, with varying degrees of social respectability attached. You may not believe either of those (perhaps your tastes do not run to the political) but, unless you are so unusual as to have completely middle-of-the-road views on just about everything, you probably subscribe to at least one fringe idea. Likely more than one.

For a good portion of the past 25 years, I have researched the history, philosophy and sociology of one particular type of fringe theory: alternative scientific theories, running from mesmerism and phrenology to ESP research and faster-than-light propulsion. Alternative scientific theories are a revealing subset of fringe ideas. Science is the repository of enormous cultural authority on questions of truth. Nonetheless, nature was unkind enough to withhold the solution key, so scientists disagree, often strongly, about the right answer – or about the right answer for now, given the limits of current understanding and scientific instruments. So science is also a breeding ground for adversarial clashes, with stubborn fringe movements sometimes crystallising around discarded doctrines. The history of astrology is an excellent example.

Scientists and the historians who study them have, mostly, shied away from paying too much attention to the fringes. They find them unsavoury, perhaps embarrassing, and distracting from studying 'real science'. I disagree. For one, fringe views about nature are part of the scientific milieu we live in, and you cannot claim to understand how science operates without taking a more catholic perspective. In addition, there are some pretty interesting puzzles that emerge the longer you study the fringes. This essay is about two of them.

We started with the first: that most devotees of a fringe theory are usually committed to more than one. They might start with just one, but fringes have a way of agglomerating. The second puzzle emerges when you scrutinise the first. The accumulation of fringe theories is often not random – it has a structure: fringe theories stack.

Stacking is a familiar concept from the history of technology. When speculators laid the first railroad tracks across the United States in the early 19th century, they selected paths based on probable demand, the supply of capital, labour availability, and the contours of the landscape. If you are short on labour but long on land, it is cheaper to go around the mountain than to dig a tunnel through it. When the next set of network builders strung telegraph cables, it made sense to run them along the railroad tracks: the equipment could be easily transported, and railroads were major users of telegraph signals to coordinate traffic. John Gast's classic painting American Progress (1872), of American appropriation of Native American lands through settlement, shows the connection clearly. Guess what path the major internet cables follow? There are clear reasons for stacking technological systems: shared expertise, economies of scale, distribution of consumers, etc. It is not, however, a widely appreciated phenomenon in intellectual history.

Sometimes, the stacking of fringe theories is pretty straightforward. Believing that Earth is flat and that the Apollo 11 Moon landing in 1969 was faked on a soundstage are conceptually distinct beliefs. Nothing about the latter impels you to believe the former. However, believing that Earth is flat essentially requires that you think that NASA's achievements are part of an elaborate conspiracy: there is no ability to travel to the Moon, nor are the photographs of a

globular Earth from space authentic. These fringe theories stack through logical interconnection. Fringe doctrines can also share a political sensibility. The mid- to late-19th-century enthusiasm for spiritualism – communication with ethereal spirits by groups of individuals seated around a séance table in a dimly lit room – tracked with socialism, women's suffrage and vegetarianism. All were heterodox theories concerned with liberating the oppressed.

Sometimes, the connections are not obvious, even counterintuitive. Understanding their stacking demands that we grapple with the first puzzle: why do fringe theories come in multiples?

What makes a theory 'fringe'? Ideas do not emerge with certificates that indicate their level of validity, so we use proxies. A typical device is observing an idea's orthodoxy – a term derived from the Greek for 'right' – which carries with it the understanding that social consensus is an approximation of correctness. You can easily see why this happens: a lot of people believe item x because x is genuinely persuasive, so that collective agreement would perhaps track epistemologically. It's not a great proxy: plenty of once orthodox ideas (natural slavery) are shown up to be grossly mistaken and, on occasion, heterodox ideas (germ theory) are accepted, becoming a new orthodoxy in turn. What society accepts as today's valid consensus has a chaotic and dynamic history.

It is helpful to resort to a simplified spatial model. Imagine a broad plane that comprises the collection of doctrines, ideas and beliefs in a given culture. In the centre, there is a circle with a blurry edge. That circle represents the orthodoxy – the set of beliefs that are taken as authoritative and settled. We aren't quite sure where this respectability ends, however, because the circumference is fuzzy. As we journey outward from the centre, we approach the fringes. There is great variety in the fringelands. Active scientific debates can reside here, such as the geoscientist Gerta Keller's contention that a massive, extended outbreak of Deccan volcanism, rather than a single, colossal asteroid strike, was responsible for the mass extinction of the dinosaurs. String theory also used to hang out here, before it was brought closer to the centre. Head a bit farther out, you'll encounter parapsychology; rather farther still, scientific creationism.

It can be pretty comforting to sit in the centre of the circle. All around you are orthodox beliefs, and espousing them brings affirmation. The fringe, on the other hand, is hazy, and it is hard to see from the vantage point of broad consensus what might separate the near, quasi-respectable edges from some of the more outlandish beliefs. Better to stick with the orthodox.

Nonetheless, one gets curious. The reason you are here at all is that you want to understand the world about you, to develop a worldview that is not only coherent but also accurate. That sometimes means asking awkward questions and getting even more awkward answers. You venture out to the fringes a little, because that is where new ideas necessarily come from. Perhaps a trusted acquaintance has pointed out some inconsistencies in the centre (our consensus is far from perfect) and you find some other points persuasive. Following this one strand out a little more might yield answers… You have made it to the fringe! You brace yourself for what happens next.

Typically, nothing. No thunderbolts, no scandalous outcry. You are still you, but a you who has questioned one aspect of the establishment and found a more satisfying, albeit heterodox, explanation. The absence of catastrophe increases your confidence, and other inconsistencies also nag at you. We can follow Bayesian decision theorists and dub what is happening 'revising your priors', or we can think of it as simply an increased tolerance for the side-eye you get when advancing your new views. Either way, your resistance to the fringes is reduced.

Perhaps your path might resemble that of Henry H Bauer, now emeritus professor of chemistry and science studies, and former dean of the School of Arts and Sciences, at Virginia Tech. Trained in electrochemistry – which is nothing if not a respectable branch of science – he was also fascinated by a diversity of marginalised topics and what made these notions different from those he deployed in his day job. In

1984, he published a useful, unobjectionable scholarly analysis of the debates over one demonised doctrine, the theories of Immanuel Velikovsky (about whom more in a moment). Then, however, he went beyond voyeuristic curiosity. Two years later, he wrote *The Enigma of Loch Ness: Making Sense of a Mystery*, containing rational and judicious presentations of the evidence for the existence of some kind of large aquatic creature in the waters of this Scottish lake, and why Bauer personally was convinced that Nessie existed. In 2007, he published a book questioning the link between the human immunodeficiency virus (HIV) and AIDS, a theory roundly excoriated by the public health community, epidemiologists, virologists and many who suffer from the disease. Nothing required the leap from cryptozoology to heterodoxy about causation in a global health crisis. But it does seem that, step by step, one thing led to another.

Sometimes, the clustering of new fringe theories happens by coincidence. In the early summer of 2021, two heterodox theories hit the mass media at the same time: the 'lab leak' theory for the origins of SARS-CoV-2, the virus behind the COVID-19 pandemic; and revelations that many US military pilots had seen unidentified aerial phenomena, given the new moniker UAP to distance them a bit from the unmistakably fringy UFO (unidentified flying object). To be clear: the consensus among virologists is that SARS-CoV-2 is zoonotic, having passed from an animal (probably a bat) to a human, and that UAPs are not alien visitors. But there is reasoned debate here, and many people entertained both ideas at once.

These theories, even when clustered, do not necessarily stack. They share little more than a limited belief in government coverups and mistakes; the communities of adherents do not overlap significantly. Stacking demands something more, as an extended example illustrates.

Immanuel Velikovsky was a Russian-Israeli psychoanalyst then living in New York City when his book *Worlds in Collision* (1950) was published. The book rocketed to the top of the bestseller lists. Velikovsky's claims were sensational. He argued that if you juxtaposed the myths and lore of ancient civilisations – principally those of the Near East, such as those found in the Hebrew Bible, Egyptian papyri or Babylonian clay tablets, but also from the Indian Vedas or Chinese legends – you would reveal a surprising consonance of phenomena: fire from the heavens, earthquakes and so on.

When Velikovsky adjusted the chronology (in the case of the Egyptians, rather drastically so), he saw these as the same disasters, which demanded a common cause. He claimed that these were natural disasters, caused by a comet that narrowly approached Earth, disrupting the planet and terrifying the human witnesses, and then eventually breaking away to become Venus, our nearest planetary neighbour. (A similar thing happened to Mars a few decades later.) The solar system was rearranged while humanity watched, and the trauma was, he argued, etched into world cultures.

Worlds in Collision was a pretty good read. What it was not, according to contemporary astronomers, was good astronomy (or geology, or ancient history). A few scientists threatened to boycott Velikovsky's publisher, Macmillan, which made most of its revenue from publishing scientific books, so the company relinquished this hot commodity to their competitor, Doubleday. The scandal served to boost sales, and Velikovsky was the talk of that season. The public sensation surrounding him died down for a decade and a half, but was revived in the mid-1960s when the counterculture appropriated *Worlds in Collision* and its several companion volumes as a way of combining myth with science. (Carl Sagan led the astronomers in expressing disapproval.) A cadre of adherents to Velikovsky's version of cosmic catastrophism cropped up, putting out specialised journals exploring aspects of his alternative chronology and orbital mechanics, and visiting the sage himself at his residence in Princeton, New Jersey. When Velikovsky died in 1979, the movement dissipated.

There's no doubt that cosmic catastrophism was a fringe theory. It never attained one iota of acceptance from the establishment, despite adherents' claims that Velikovsky had correctly predicted Space Age discov-

eries about Venus and Jupiter. And, as we have come to anticipate, they tended to believe at least one other fringe theory besides *Worlds in Collision*. Velikovsky kept a tight lid on the orthodoxy of his own movement, and he chastised or exiled those who tried to marry cosmic catastrophism to orgone theory (too anti-Freudian for the psychoanalyst) or scientific creationism (too Christian). Yet he mostly allowed some free-thinking among the non-threatening fringes.

Many Velikovskians were interested in other fringe ideas. For example, Albert W. Burgstahler, a professor of chemistry at the University of Kansas and an engaged Velikovskian, was a vocal opponent of fluoridating water. Another interest of Burgstahler's, which began in earnest just a year before his retirement in 1998 and long after the waning of Velikovskianism, was scepticism about the claim that William Shakespeare (1564-1616), of Stratford-upon-Avon, wrote the plays commonly attributed to him. This authorship debate does not seem an obvious fit to cosmic catastrophism. Yet it stacks: repeatedly one finds that Velikovskians (although not Velikovsky himself) subscribed to one or another theory of alternative authorship. Those theories are unquestionably unorthodox, and they are mutually inconsistent. Alternative authors for these plays were first proposed in the 19th century, and today the most frequently invoked are the politician, essayist and philosopher of science Sir Francis Bacon (1561-1626), the blue-blooded Edward de Vere, 17th Earl of Oxford (1550-1604) and William Stanley, 6th Earl of Derby (1561-1642), and Shakespeare's fellow playwright Christopher Marlowe (1564-93).

Shakespeare scepticism stacks with cosmic catastrophism. To see why, we need to join the colourful figure of Ignatius Donnelly in the 19th century. Born in 1831 to Irish Catholic immigrants in Pennsylvania, he entered the legal trade and decamped to the Minnesota Territory in 1856, settling in Dakota County. While there, he co-founded a failed utopian community (Nininger City), served as lieutenant governor of Minnesota (1860-63), was elected as a Republican to Congress (1863-69), subsequently served many terms in the state legislature, and authored a few books. The books are what concern us here. Publication of his Atlantis: *The Antediluvian World* (1882) was followed a year later by *Ragnarok: The Age of Fire and Gravel*. Together, these books argue that an extraterrestrial catastrophe had impacted the globe (he thought it was a comet collision) which destroyed Atlantis – Donnelly is to be credited with the revival of this trope in modern culture – and left traces in ancient myths.

That should sound familiar. So familiar, in fact, that early commentators suggested that Velikovsky had lifted the general outline from this Minnesotan precursor. For his part, Velikovsky once claimed never to have read Donnelly. He also never mentioned, and was perhaps unaware of, Donnelly's book *The Great Cryptogram* (1888), which argued that you could decode the texts of Shakespeare's plays and uncover their true author: Francis Bacon.

Why does cosmic catastrophism stack with Shakespeare scepticism? One hypothesis is that Velikovsky's acolytes were aware of the priority charge and read Donnelly, coming to an awareness of the debates surrounding the Stratfordian, which then spread through the existing social network. (Nonetheless, most Velikovskians with views on the matter seemed to prefer de Vere.) There is also perhaps a subtler link. The key method of Velikovskian cosmic catastrophism is reading ancient myths for buried clues to natural-historical events; the key method of debating Shakespeare's authorship is combing the plays and sonnets for telltale traces of the true poet. Both are fringe decoding operations. The contents of the theories differ wildly, but the methods bear an affinity.

The lion's share of scholarly discussion of fringe theories has addressed the question of 'demarcation': can you develop a philosophically robust criterion that enables you to cleanly separate those things that are credible scientific theories from 'pseudosciences' that merely look the part? The 'falsifiability criterion' of Karl Popper has assumed a prominent role here, and sucked a lot of the oxygen out of the room. When you set aside demarcation and consider fringe theories as entities in the landscape of intellectual history, different phenomena come into view.

Fringe theories aren't fringe, in the sense of being marginal to their culture, including ours. They are marginal only from the point of view of intellectual (or scientific) orthodoxy. Whether the scepticism is about mandatory vaccinations against COVID-19 (associated with the political Right) or the MMR vaccine's much-debunked link to autism (associated with the Left), or climate change denialism, or QAnon, or the gonzo futurism of one electric-car entrepreneur, there is an awful lot of 'fringe' occupying the centre of our conceptual – and increasingly political – space. For example, given the prevalent tendency for people to get their information from specific, often partisan or at least fellow-travelling social networks, publications, cable television (national or local public access) and radio shows, theories emerge in one of them and can quickly migrate across platforms, stacking fellows on the way. Fringe theories are worth paying attention to and trying to understand. This essay is one attempt to expand that conversation.

Fundamentally, we need to recognise that fringe theories aren't just theories. Like science, the fringes come with complex, interconnected social substructures. The theories serve as sources of identity and as social magnets. They provide meaning to how adherents think about the world, much as the mainstream scientific consensus does. The people interested in fringe theories may recognise that they are heterodox, but they also think that they are, in an important sense, correct or likely to become so. (You probably think the same about the unconventional ideas you happen to espouse.) These individuals, quite understandably, are interested in discussing their ideas with like-minded folks. The gathering of the like-minded, indeed, is how consensuses are built. That's how we built ours.

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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

- The Fourth International Conference of the German Society for Philosophy of Science (GWP.2022), which was originally scheduled for March 2022, will now take place from 15th-17th of August 2022, at Technische Universität Berlin. The line-up of talks and contributed papers/symposia remains unchanged (no new CfP will be necessary). For more information, see https://www.wissphil.de/gwp2022/

- To mark the 140th anniversary of Darwin's death in 1882, the Darwin Online project has transcribed c.100 items from the Darwin family's collection of letters and telegrams received from relatives, friends, contemporaries and institutions. The messages expressed grief and sorrow, offered condolences and tributes to the scientific figure they saw as having transformed our understanding of the living world. Many of these messages contain intimate and personal reminiscences by the writer- providing never before published details about Darwin and his contemporaries. http://darwin-online.org.uk/whatsnew.html

- The Antiquarian Horological Society (www.ahsoc.org) is delighted to announce the online publication of an open-access edition of its 2016 publication, The Life and Travels of James Upjohn, edited by John Leopold and Roger Smith.

With a full set of facsimile images of the original 1784 manuscript alongside a transcription, this important volume offers Upjohn's first-hand insight into the state of the British and Continental watch trade in the mid-eighteenth century.

Alongside the original text, Leopold and Smith's scholarly interpretation, together with maps showing Upjohn's journeys and a full index, complete the volume, which is available here: www.ahsoc.org/resources/public-resources/ (scroll to 'Books and manuscripts').

- Mark Young: 2022, 'From Epistemology to Policy: Reorienting Philosophy Courses for Science Students', *European Journal of Philosophy of Science* Vol. 12 Open Access: here.

- Till Grüne-Yanoff: 2022, 'Teaching Philosophy of Science to Scientists', *European Journal of Philosophy of Science* Vol. 12 Open Access: here.

- *European Journal for Philosophy of Science* Open Access Articles (139) here.

- *Science & Education* Open Access Articles (92) 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) to editor: m.matthews@unsw.edu.au

Recent HPS&ST Research Articles

Centaurus (Volume 64, Issue 21, 2022)
Spotlight Issue: How Epidemics End, edited by Erica Charters
https://www.brepolsonline.net/toc/cnt/2022/64/1

Perspectives on Science (Volume 30, Issue 3, 2022)
Special Issue on the Untold Stories of Renaissance Mathematics
Guest Editor: Paolo Rossini
https://direct.mit.edu/posc/issue

Bateman, K.M., Wilson, C.G., Williams, R.T. et al. (2022). Explicit Instruction of Scientific Uncertainty in an Undergraduate Geoscience Field-Based Course. *Sci & Educ*, 1-26. https://link.springer.com/article/10.1007/s11191-022-00345-z Online first

Chen, SY., Chen, CH. & Liu, SY. (2022). History of Science Reading Materials as Everyday Homework to Improve Middle School Students' Epistemological Beliefs about Science. *Int J of Sci and Math Educ*, 1-24. https://doi.org/10.1007/s10763-022-10285-3 online first

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Çilekrenkli, A., Kaya, E. (2022). Learning Science in Context: Integrating a Holistic Approach to Nature of Science in the Lower Secondary Classroom. *Sci & Educ*, 1-35. https://doi.org/10.1007/s11191-022-00336-0 online first

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Recent HPS&ST Related Books

Bengson, J, Cuneo, T., & Shafer-Landau, R. (2022). *Philosophical Methodology: From Data to Theory*. Oxford, UK: Oxford University Press.

> "*Philosophical Methodology* is a book addressed to the entire philosophical community. It develops a novel account of the structure and goals of inquiry, offers the first systematic discussion of philosophical data, and assesses extant philosophical methods. Introducing a new method for doing philosophy, it positions theorists to better understand their topics while also revealing how philosophy can continue to make progress in answering its foremost questions." (From the Publisher)

More information at: https://tinyurl.com/y8hnn84a

Boeck, G., & Rocke, A. J. (2022). *Lothar Meyer: Modern Theories and Pathways to Periodicity*. Basel: Birkhäuser. ISBN: 978-3-030-78341-9

> "This book provides an English translation of the early fundamental contributions of Lothar Meyer (1830-1895) regarding his independent discovery, coincident with that of Dmitrii Mendeleev, of the periodic system of the elements. Although an English translation of the 5th edition of Meyer´s book *Modern Theories of Chemistry and their Significance for Chemical Statics* was published in 1888, this will be the first time that these crucial early texts will be available in English. These writings reveal details regarding Meyer´s research pathway to the idea of periodicity and to an arrangement of the chemical elements in tables and graphs.
>
> "An introductory commentary and interpolated editorial footnotes to the texts clarify the (physico)-chemical background regarding the various shifts in thought during the crucial period from 1860 to the early 1870s. A short biography of Lothar Meyer completes the book.
>
> "The volume includes a complete translation of the first edition of *Modern Theories of Chemistry and their Significance for Chemical Statics* (1864), the ground-breaking paper "The Nature of the Chemical Elements as a Function of their Atomic Weights" in *Annalen der Chemie und Pharmacie*, suppl. vol. 7 (1870), 354-64, and portions of the revised second edition of *Modern Theories of Chemistry and their Significance for Chemical Statics* (1872)." (From the Publisher)

More information at: https://tinyurl.com/awpxsh8k

Burkhardt, B., Secord, J. & The Editors of the Darwin Correspondence Project (Eds.). (2022) *The Correspondence of Charles Darwin*. Cambridge: Cambridge University Press. ISBN: 978-1-009-23354-5

> "This volume is part of the definitive edition of letters written by and to Charles Darwin, the most celebrated naturalist of the nineteenth century. Notes and appendixes put these fascinating and wide-ranging letters in context, making the letters accessible to both scholars and general readers. Darwin depended on correspondence to collect data from all over the world, and to discuss his emerging ideas with scientific colleagues, many of whom he never met in person. The letters are published chronologically. In 1881, Darwin published his final book, *The Formation of Vegetable Mould through the Action of Worms*. He reflected on reactions to his previous book, *The Power of Movement in Plants*, and worked on two papers for the Linnean Society on the action of carbonate of ammonia on plants. In this year, Darwin's elder brother, Erasmus, died, and a second grandchild, also named Erasmus, was born. (From the Publisher)

More information at: https://tinyurl.com/55a3c8xu

Cartwright, N. (2022). *A Philosopher Looks at Science*. Cambridge: Cambridge University Press. ISBN: 978-1-009-20189-6

> "What is science and what can it do? Nancy Cartwright here takes issue with three common images of science: that it amounts to the combination of theory and experiment; that all science is basically reducible to physics; and that science and the natural world which it pictures are deterministic. The author's innovative and thought-

ful book draws on examples from the physical, life, and social sciences alike, and focuses on all the products of science – not just experiments or theories – and how they work together. She reveals just what it is that makes science ultimately reliable, and how this reliability is nevertheless still compatible with a view of nature as more responsive to human change than we might think. Her book is a call for greater intellectual humility by and within scientific institutions. It will have strong appeal to anyone who thinks about science and how it is practised in society." (From the Publisher)

More information at: https://tinyurl.com/3stmr6ww

Cunningham, A. (2022). *'I Follow Aristotle': How William Harvey Discovered the Circulation of the Blood*. Abingdon, UK: Routledge.
ISBN: 978-1-032-16223-2

"This book presents a new interpretation of how and why the discovery of the circulation of the blood in animals was made. It has long been known that the English physician William Harvey (1578–1657) was a follower of Aristotle, but his most strikingly 'modern' and original discovery – of the circulation of the blood – resulted from Harvey following Aristotle's ancient programme of investigation into animals. This is a new reading of the most important discovery ever made in anatomy by one man and produces not only a radical re-reading of Harvey as anatomist, but also of Aristotle and his investigations of animals." (From the Publisher)

More information at: https://tinyurl.com/a9wmu8md

DeSalle, R., & Tattersall, I. (2022). *Understanding Race*. Cambridge: Cambridge University Press.
ISBN: 978-1-009-05245-0

"The human species is very young, but in a short time it has acquired some striking, if biologically superficial, variations across the planet. As this book shows, however, none of those biological variations can be understood in terms of discrete races, which do not actually exist as definable entities. Starting with a consideration of evolution and the mechanisms of diversification in nature, this book moves to an examination of attitudes to human variation throughout history, showing that it was only with the advent of slavery that considerations of human variation became politicized. It then embarks on a consideration of how racial classifications have been applied to genomic studies, demonstrating how individualized genomics is a much more effective approach to clinical treatments. It also shows how racial stratification does nothing to help us understand the phenomenon of human variation, at either the genomic or physical levels." (From the Publisher)

"DeSalle and Tattersall provide a brilliant and comprehensive refutation of the folk concept of human races. Anyone who thinks that there are natural categories of people that correspond to zoological subspecies will have their worldview blown to bits!" - Jonathan Marks - Department of Anthropology, University of North Carolina at Charlotte

"*Understanding Race* explains to the reader in accessible terms all the misconceptions that continue to plague both lay people and professionals concerning race. First, the authors establish for the reader the fundamental mechanisms of evolution that are responsible for the variation within all species; then they explain how people thought about variation before there was a science to correctly explain it. The book guides the reader through how racial thinking changed as our understanding of evolution, as well as the technology to understand genetic variation, improved. The authors end by drawing attention to ongoing misconceptions concerning biological variation and social definitions of race in a variety of arenas, including medicine. If you don't read my books, you should read theirs; and in the best of all worlds you should read both." - Joseph L. Graves, Jr - Professor of Biological Sciences, North Carolina A&T State University

More information at: https://tinyurl.com/yzbeynke

Di Liscia, D. A., & Sylla, E. D. (2022). *Quantifying Aristotle: The Impact, Spread and Decline of the Calculatores Tradition*. Leiden: Brill.
ISBN: 978-9-004-51205-4

"Aristotelian philosophy is generally regarded as incompatible with the mathematical methods and principles that form the basis of modern science. This book offers

an entirely new perspective on this presumed incompatibility. It surveys the tradition of the Oxford Calculators from its beginnings in the fourteenth century until Leibniz and the philosophy of the seventeenth century and explores how the Calculators' techniques of quantification expanded the conceptual and methodological limits of Aristotelianism. In the process, it examines a large number of authors, some of them never studied in this context. Exploring the relationship between various late medieval disciplines, the book sheds new light on the problem of continuity vs. discontinuity between scholasticism and modern science. Beyond its historiographical purpose, this book also hopes to be a source of inspiration for present-day philosophers of science." (From the Publishers)

More information at: https://tinyurl.com/3xanmnr8

Ioannidis, S., & Psillos, S. (2022). *Mechanisms in Science: Method or Metaphysics?* Cambridge: Cambridge University Press. ISBN: 978-1-009-01966-8

"In recent years what has come to be called the 'New Mechanism' has emerged as a framework for thinking about the philosophical assumptions underlying many areas of science, especially in sciences such as biology, neuroscience, and psychology. This book offers a fresh look at the role of mechanisms, by situating novel analyses of central philosophical issues related to mechanisms within a rich historical perspective of the concept of mechanism as well as detailed case studies of biological mechanisms (such as apoptosis). It develops a new position, Methodological Mechanism, according to which mechanisms are to be viewed as causal pathways that are theoretically described and are underpinned by networks of difference-making relations. In contrast to metaphysically inflated accounts, this study characterises mechanism as a concept-in-use in science that is deflationary and metaphysically neutral, but still methodologically useful and central to scientific practice." (From the Publisher)

More information at: https://tinyurl.com/m6jfmkyy

Johnson, B. (2022). *Making Ammonia: Fritz Haber, Walther. Nernst, and the Nature of Scientific Discovery* [Open Access]. Springer: Cham. ISBN: 978-3-030-85532-1

"This Open Access book discusses the progress of science and the transfer of scientific knowledge to technological application. It also identifies the factors necessary to achieve this progress. Based on a case study of the physical chemist Fritz Haber's discovery of ammonia synthesis between 1903 and 1909, the book places Haber's work in historical and scientific (physicochemical) context. The scientific developments of the preceding century are framed in a way that emphasizes the confluence of knowledge needed for Haber's success. Against this background, Haber's work is presented in detail along with the indispensable contributions of his colleague, the physical chemist, Walter Nernst, and their assistants. The detailed accounts of scientific advancement remind us of the physical basis on which our scientific theories and ideas are built. Without this reminder we often forget how complex, and how beautiful achievements in science can be." (From the Publisher)

More information at: https://tinyurl.com/mrvcr2bv

McCain, K. (2022). *Understanding How Science Explains the World*. Cambridge: Cambridge University Press. ISBN: 978-1-108-99702-7

All people desire to know. We want to not only know what has happened, but also why it happened, how it happened, whether it will happen again, whether it can be made to happen or not happen, and so on. In short, what we want are explanations. Asking and answering explanatory questions lies at the very heart of scientific practice. The primary aim of this book is to help readers understand how science explains the world. This book explores the nature and contours of scientific explanation, how such explanations are evaluated, as well as how they lead to knowledge and understanding. As well as providing an introduction to scientific explanation, it also tackles misconceptions and misunderstandings, while remaining accessible to a general audience with little or no prior philosophical training." (From the Publisher)

More information at: https://tinyurl.com/2x2nvxcr

Miscevic, N. (2022). *Thought Experiments*. Springer:

Cham. ISBN: 978-3-030-81081-8

"This book offers a readable introduction to the main aspects of thought experimenting in philosophy and science (together with related imaginative activities in mathematics and linguistics).

"It presents the main options in understanding thought experiments, from empiricism to Platonism, and discusses their strengths and weaknesses. However, it also provides some original perspectives on the topic. Firstly, it provides a new definition and analysis of thought experimenting that brings it closer to laboratory experimenting. Secondly, it develops the author's earlier theory of "mental modelling", proposed some decades ago by him, and some other researchers in the field as the crucial procedure in thought experimenting. The mental modelling approach links work with thought experimenting to cognitive science and to research on mental simulation which is a hot topic in present-day research. Thirdly, it proposes a principled way to respond to criticism of thought experimenting by "experimental philosophers" as they have been dominating the present-day debates. The response suggests a possible ameliorative, self-help project for thought experimenting.

"Finally, the book provides a way to systematize the history of important thought experiments in science and philosophy and thus connects, in an original way, the systematic investigation of experimenting to the historical work of famous thought experiments. It is of interest to scholars interested in history of ideas and philosophy of science" (From the Publisher)

More information at: https://tinyurl.com/yc862s2m

Nassar, D. (2022). *Romantic Empiricism: Nature, Art, and Ecology from Herder to Humboldt*. Oxford, UK: Oxford University Press.
ISBN: 978-0-190-09543-7

"In *Romantic Empiricism*, Dalia Nassar distinguishes and explores an understudied philosophical tradition that emerged in Germany in the late eighteenth and early nineteenth centuries, traces its development, and argues for its continued significance. Moving from the late Kant's notion of reflecting judgment, to Herder's articulation of the idea of "animal worlds," Goethe's explication of the obligations of the scientist, and Alexander von Humboldt's aesthetic science, Nassar demonstrates how these thinkers developed a sophisticated empirical approach to the natural world, which focuses on the phenomenon while also recognizing the creative role of the knowing subject and the cognitive value of art and aesthetic experience. She explores how these four thinkers worked together-sometimes as rivals, but more often than not as teachers and collaborators-and illustrates how their search for a new methodology culminated in a new, ecological understanding of the world and the human place within it.

"Revisiting their thought, especially their distinctive approach to the study of nature, Nassar demonstrates, has the potential to redirect contemporary environmental debates and respond to urgent ecological questions in new and productive ways." (From the Publisher)

More information at: https://tinyurl.com/kth8dr7t

Rossetti, L. (2022). *Thales the Measurer*. Abingdon, UK: Routledge. ISBN: 978-0-367-68709-0

"*Thales the Measurer* offers a comprehensive and iconoclastic account of Thales of Miletus, considering the full extent of our evidence to build a new picture of his intellectual interests and activity.

"Thales is most commonly associated with the claim that 'everything is water', but closer examination of the evidence that we have suggests that he could not have said anything of the sort. His real interests, and his real innovations, lay in challenges of quantitative measurement, especially measurements related to the movement of the sun. In this he had no predecessors – and, for centuries to follow, no real successors either.

"This book is of interest for scholars in the history of philosophy, science, and life sciences. It is aimed especially at researchers in the field, but is also accessible to students and a more general readership." (From the Publisher)

More information at: https://tinyurl.com/279kycmj

Trimble, V., & Weintraub, D.A. (Eds.) (2022). *The Sky*

Is for Everyone: Women Astronomers in Their Own Words. Princeton, NJ: Princeton University Press. ISBN: 978-0-691-23736-7

"*The Sky Is for Everyone* is an internationally diverse collection of autobiographical essays by women who broke down barriers and changed the face of modern astronomy. Virginia Trimble and David Weintraub vividly describe how, before 1900, a woman who wanted to study the stars had to have a father, brother, or husband to provide entry, and how the considerable intellectual skills of women astronomers were still not enough to enable them to pry open doors of opportunity for much of the twentieth century. After decades of difficult struggles, women are closer to equality in astronomy than ever before. Trimble and Weintraub bring together the stories of the tough and determined women who flung the doors wide open. Taking readers from 1960 to today, this triumphant anthology serves as an inspiration to current and future generations of women scientists while giving voice to the history of a transformative era in astronomy.

"With contributions by Neta A. Bahcall, Beatriz Barbuy, Ann Merchant Boesgaard, Jocelyn Bell Burnell, Catherine Cesarsky, Poonam Chandra, Xuefei Chen, Cathie Clarke, Judith Gamora Cohen, France Anne Córdova, Anne Pyne Cowley, Bożena Czerny, Wendy L. Freedman, Yilen Gómez Maqueo Chew, Gabriela González, Saeko S. Hayashi, Martha P. Haynes, Roberta M. Humphreys, Vicky Kalogera, Gillian Knapp, Shazrene S. Mohamed, Carole Mundell, Priyamvada Natarajan, Dara J. Norman, Hiranya Peiris, Judith Lynn Pipher, Dina Prialnik, Anneila I. Sargent, Sara Seager, Gražina Tautvaišienė, Silvia Torres-Peimbert, Virginia Trimble, Meg Urry, Ewine F. van Dishoeck, Patricia Ann Whitelock, Sidney Wolff, and Rosemary F. G. Wyse." (From the Publisher)

More information at: https://tinyurl.com/2s3cpvau

Wilkins, J. S., Zachos, F. E., & Pavlinov, I. Y. (Eds.) (2022). *Species Problems and Beyond: Contemporary Issues in Philosophy and Practice*. Abingdon, UK: Routledge. ISBN: 978-1-032-22147-2

"*Species Problems and Beyond* offers a collection of up-to-date essays discussing from an interdisciplinary perspective the many ramifications of the 'Species Problem.' The authors represent experts in the philosophy of biology, in species-level evolutionary investigations, and in biodiversity studies and conservation. Some of the topics addressed concern the context sensitivity of the term 'species'; species as individuals, processes, natural kinds, or as 'operative concepts'; species delimitation in the age of Big (genomic) Data; and taxonomic inflation and its consequences for conservation strategies. The carefully edited volume will be an invaluable resource for philosophers of biology and evolutionary biologists alike." – Olivier Rieppel, Rowe Family Curator of Evolutionary Biology, Negaunee Integrative Research Center, Field Museum, USA

"Species, or 'the Species Problem', is a topic in science, in the philosophy of science, and in general philosophy. In fact, it encompasses many aspects of the same problem, and these are dealt with in this volume. Species are often thought of as fundamental units of biological matter to be used in ecology, conservation, classification, and biodiversity. The chapters in this book present opposing views on the current philosophical and conceptual issues of the Species Problem in biology.

"Divided into four sections, Concepts and Theories, Practice and Methods, Ranks and Trees and Names, and Metaphysics and Epistemologies, the book is authored by biologists, philosophers, and historians, many leaders in their fields. Topics include ontology of species, definitions of both species category and units, species rank, speciation issues, nomenclature, ecology, and species conservation.

"*Species Problems and Beyond* aims to clarify the contemporary issues of the Species Problem. It is ideal for use in upper-level seminars and courses in Evolutionary Biology, Philosophy of Science, Philosophy of Biology, Systematics and Taxonomy, and Phylogenetics/Cladistics, and for any scholar in these fields." (From the Publisher).

More information at: https://tinyurl.com/mtjnjsh6

Wuppuluri, S. & Grayling, A. C. (Eds.) (2022). *Metaphors and Analogies in Sciences and Humanities: Words and Worlds*. Springer: Cham. ISBN: 978-3-030-90688-7

"In this highly-interdisciplinary volume, we systematically study the role of metaphors and analogies in (mis) shaping our understanding of the world. *Metaphors and Analogies* occupy a prominent place in scientific discourses, as they do in literature, humanities and at the very level of our thinking itself. But when misused they can lead us astray, blinding our understanding inexorably. How can metaphors aid us in our understanding of the world? What role do they play in our scientific discourses and in humanities? How do they help us understand and skillfully deal with our complex socio-political scenarios? Where is the dividing line between their use and abuse? Join us as we explore some of these questions in this volume." (From the Publisher)

More information at: https://tinyurl.com/zpvycu9c

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June 19, 2022, Celebrating the Life, Science, Music, and Legacy of William Herschel (1738-1822), University of York.
Information: Rachel Cowgill

June 30-July 2, 2022, 4th International Conference on Science & Literature, Girona, Spain.
Details from Carlos Manuel Gamez Perez

July 2-4, 2022, Society for Philosophy of Science in Practice (SPSP) Ninth Biennial Conference Ghent University, Belgium.
See here for information.

July 3rd-7th, 2022, IHPST 16th International Conference, University of Calgary, Canada
Details here

July 13-15, 2022, Thomas Kuhn and the 21st Century Philosophy of Science, University of Kent.
Details here

July 18-22, 2022, 'Objects of Understanding: Historical Perspectives on Material Artefacts in Science Education', Europa-Universität Flensburg, Germany
Details: Roland Wittje, roland.wittje@gmail.com and here

August 17-19, 2022 East European Network for Philosophy of Science (EENPS) 2022 Conference, University of Tartu
Details here

August 29-Sept.3, 2011, ESERA Summer School, University of Utrecht, The Netherlands
Details here

September 7-10, 2022, 10th European History of Science Society Conference, Brussels.
'Science Policy and the Politics of Science'.
Information here

September 19-23, 2022, 41st Symposium of the Scientific Instrument Commission, Athens.
Details, George N. Vlahakis

July 24-29, 2023, 17th DLMPST Congress, University of Buenos Aires
Information: Pablo Lorenzano

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)

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

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