HPS&ST Newsletter
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CONTENTS:

Introduction

The HPS&ST Newsletter is sent monthly to about 11,000 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** .

Vale Stephen Gaukroger (1952-2023)

Vale Evelyn Fox Keller (1936-2023)

Solving the 'Problem' of the 18th Century in the History of Science

A collection of articles has been published on the place of the eighteenth century in the history of science. These articles take the form of a special issue, edited by Adrian Wilson (University of Leeds) and published in the *Journal of Early Modern Studies*.

It is now four decades since Geoffrey Cantor observed that the eighteenth century is a "problem" for historians of science. For Cantor, the period had long been a "grey area on the historical chart", with no plausible "master narrative" and no Newton or Faraday to supply any landmarks; it was largely overlooked in general histories of science; and historians had tended to "set up simplistic, monolithic interpretations" of it. The purpose of this special issue is to draw renewed attention to that cluster of problems and to offer some solutions.

The introductory essay, by Michael Bycroft, identifies six master narratives that continue to shape the study of eighteenth-century science. The next three articles, by Domenico Bertoloni Meli, Brendan Dooley, and Emma Spary, reconsider the link between science and Enlightenment. They focus respectively on Thomas Hankins' 1985 textbook *Science and Enlightenment*, on natural history in early eighteenth-century Padua, and on the "re-enchantment" of nature in recipe books.

Anita Guerrini offers a new perspective on what is perhaps the main recent growth area of eighteenth-century historiography, namely collecting. Richard Sorrenson identifies "improvement" as a major theme of the period, one that is especially relevant to instruments and that has often been overlooked by historians of science. Finally, Adrian Wilson treats the eighteenth-century development of natural knowledge as a whole, depicting this as the realisation of Bacon's vision of a "Great Instauration."

See HERE for details, including abstracts of individual articles:

What is the Future of Knowledge with Gen AI? Journal Special Issue

Forthcoming special edition of *Science & Education* titled: 'The Future of Knowledge: Conversations about Artificial Intelligence and Epistemic Insight'. HERE

For information about submissions, and offers of reviewing for the issue, contact co-editor:

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See also related projects:

The Epistemic Insight Initiative
www.epistemicinsight.com
The Future of Knowledge
www.futureofknowledge.com

Opinion Page
Thomas Kuhn: Incommensurability and the Resources of Reason

KEITH M. PARSONS, PHILOSOPHY, UNIVERSITY OF HOUSTON-CLEAR LAKE, TEXAS

Keith M. Parsons is an Emeritus Professor of Philosophy and Humanities at the University of Houston-Clear Lake, Texas. He graduated with a PhD in philosophy from Queen's University, Canada (1986) and a PhD in in History and Philosophy of Science, University of Pittsburgh (1996).

His books include: *God and the Burden of Proof*, Prometheus Books (1989); *Drawing Out Leviathan: Dinosaurs and the Science Wars*, Indiana University Press (2001); *Bombing the Marshall Islands: A Cold War Tragedy* (coauthored with Robert A. Zaballa), Cambridge University Press (2017); *Why It's OK to Trust Science*, Routledge (2023).

1. 

Thomas Kuhn's *The Structure of Scientific Revolutions* was first published in 1962. However, it appeared in an obscure reference work and drew the attention only of a limited number of scholars. It was only the publication of the second edition as a stand-alone work in 1970 that made it widely available. The reception was overwhelming, and *Structure* became one of the most influential books of the twentieth century, impacting the behavioral, social, and political sciences, as well as science policy, science education, and legal studies (Marchum 2015: 201-231). Some have documented its deleterious impact on science education theory and pedagogy (Matthews, 2022, 2023).

The pervasive influence of *Structure* has been both fortunate and unfortunate. In many ways it was unfortunate for Kuhn himself. He lived for another 34 years after the first appearance of *Structure*, and published copiously during that time, including a distinguished history of quantum mechanics. In his later writings he clarified, qualified, and, perhaps, stepped back from some of the more provocative elements of *Structure*. W.H. Newton-Smith characterizes Kuhn's philosophical development after *Structure* by saying that Kuhn went from revolutionary to social democrat (Newton-Smith, 1981). Certainly, Kuhn reacted against what he regarded as misinterpretations of his work both by critics and would-be friends.

Kuhn's Relativist Challenge

The impact of *Structure* was fortunate in that, though its main themes had been anticipated by a number of previous thinkers, it vigorously highlighted ideas that challenged—and continue to challenge—our understanding of the nature of science and of rationality in general. In the sometimes-acrimonious debates over the rationality of science during the "science wars" of the 1980's and '90's, the academic science critics, frequently referred back to Kuhn to justify their claims about the failure of traditional concepts of scientific objectivity and progress.

Kuhn's work was taken as supporting postmodernism, the strong program in the sociology of knowledge, social constructivist interpretations of science, and radical feminist science critiques. As recently as 2018, Steven Pinker reported that *Structure* was, after a popular biology textbook, the second-most assigned book on science in American universities (Pinker 2018: 395). So, the book remains a living presence.

What were the elements of *Structure* that were appropriated (or misappropriated) by the academic science critics of the "science wars?" *Structure* was read as a defense of conceptual relativism, the idea that truth or justification is relative to standpoint, worldview, or conceptual scheme. Kuhn's analysis of scientific change in terms of "paradigm shifts"—wholesale replacements of theory, observation, and epistemic standards—implied that "true" could be predicated only within paradigms and not across them.

Further, the radical discontinuity between theories, extending even to the observational evidence that could be adduced to support them, appeared to imply that theory change was irrational, and that the scientific shift to a new theory was like a "gestalt switch," a religious "conversion," or "mob psychology," as one critic put it (Lakatos, 1970: 178).

Was Kuhn a relativist or irrationalist? Ian Hacking, in his Introduction to the fiftieth anniversary edition of *Structure* calls such charges "absurd" (Hacking 2012: xxxi). However, I think that we have to be more charitable to those who read Kuhn in that way. In fact, it is fair to say that if *Structure* is not a defense of relativism and irrationalism, it is a very good impersonation. Kuhn says that when radical theory breaks occur,

it is as though the world changes, as if the scientific community had been transported to a different planet (Kuhn 2012: 111). And such language is not merely metaphorical; to take it as such is to fail to take Kuhn seriously.

For instance, the realities of Galileo and Aristotle were so divergent that even their visual experience was different. While Galileo saw pendulums, Aristotle saw only constrained fall (Kuhn 2012: 121). Kuhn emphasizes that it was not simply that they saw the same things and understood them differently or that Galileo saw something *as* a pendulum while Aristotle saw it *as* constrained fall. No, Galileo *saw* a pendulum and Aristotle did not. Likewise, Franklin *saw* a condenser where others had seen a Leyden jar, and after Herschel's discovery of Uranus, astronomers *saw* one new planet and one less star. Further, the views of Galileo and Aristotle were simply at cross-purposes and their proponents talked past each other (Kuhn 2012: 132).

In such a situation, when paradigms clash, experiment cannot settle the issue and proponents will cite circular arguments and employ propaganda techniques (Kuhn 2012: 94).

Incommensurability

Of the various claims that seemed to imply the irrationality of theory choice, the one that probably received the most discussion was the idea of incommensurability.
"Incommensurability" is a concept borrowed from mathematics. For instance, no matter what units you use to measure the side of a square, the measure of the diagonal of that square cannot be expressed by any whole number of those units. The side and the diagonal of a square thus lack a common measure; they are incommensurable. What exactly Kuhn meant by the term is problematic. His remarks in *Structure* are rather sketchy and, as Muhammad Ali Khalidi notes, he offered various characterizations of the concept at various times (Khalidi 2000:172-173).

Newton-Smith identifies three different senses in which Kuhn held that theories could be incommensurable (Newton-Smith 1981: 148-151): incommensurability of values, incommensurability of standards, or incommensurability due to radical meaning variance. Scientists justify their theories by appealing to such values as simplicity, accuracy, or fruitfulness, but may irreconcilably disagree about which of these values is to take precedence in comparing rival theories.

Also, scientists might disagree about the very standards of good science. For Aristotle, science had to explain the causes of things, and, for instance, he explained the fact that rocks fall down by positing an innate motive force that propels objects downward. Newton, on the other hand, famously declared *"hypotheses non fingo"* (I frame no hypotheses) about *why* gravitational force exists and thought that physics should provide the mathematical description of *how* it worked.

Newton-Smith says that Kuhn's most controversial proposal was that opposing theories might have terms that are homonyms but are given entirely different meanings in the contexts of those theories. For instance, to cite the standard example, Newton and Einstein both employed the term "mass," but, supposedly, each meant something incomparably different by that term. Thus, proponents of Newtonian and Einsteinian theory could appear to be disagreeing but are really just talking past one another because they have such disparate understanding of the common terms they employ. So, scientists can be like politicians who both profess devotion to "freedom" but have wholly different conceptions of the meaning of that term.

In his Postscript written in 1969 for the second edition of *Structure*, Kuhn complains that philosophers—and *only* philosophers, he says—misunderstood his remarks on incommensurability as implying that scientists cannot rationally communicate in their debates over theory choice (Kuhn 2012: 197-198). He says he never denied that scientists can offer good reasons for preferring one theory over another. However, it is hard to read Kuhn's few and rather vague remarks on incommensurability in *Structure* without taking him as claiming a considerable degree of inevitable miscommunication, misunderstanding, or incomprehension between proponents of opposing paradigms.

Translatability

So, did Kuhn ever settle on a definite and clear conception of incommensurability? Khalidi identifies what he regards as Kuhn's "mature" understanding of the term. He says that Kuhn eventually focused entirely on the linguistic sense of incommensurability and came to equate the term with untranslatability (Khalidi 2000: 173). That is, there is no language into which the sentences of a theory may be translated so that its meaning is entirely preserved.

Therefore, opposing theories cannot be translated into a shared language that preserves entirely the meaning of each theory. Point-by-point comparison of the theories is therefore impossible, because where theories appear to clash head-on, they inevitably equivocate. Newton is talking about mass$_N$ and Einstein is talking about mass$_E$.

Khalidi says that Kuhn identifies two distinct problems that account for such untranslatability (Khalidi 2000: 173-175). The first sort of problem I call the "holism" issue and the second the "disparity" difficulty.

First, for Kuhn, the terms of theories must be understood holistically, that is, in relation to the other terms of the theory and how they are employed within that theory (Kuhn 2012: 148). If then, the terms of a theory are detached from their original context and translated into the language of a different theory, their original meaning is distorted. The meanings of a theory's terms must be understood *as a whole* and cannot be understood by piecemeal translation into a different language.

The second sort of problem is that a term in one language may have no precise equivalent in another language so that no exact translation is possible. The meaning of the term can be rendered by clumsy paraphrases, but this breaks up what for one speaker was a unitary concept into a number of concepts. For instance, the French word *doux* has no precise equivalent in English and the translator must use a number of different words to capture its nuances (Kuhn 2000: 48-49). The problem with this is that for a native French speaker *doux* has a consistent meaning across its various applications, whereas for an English speaker it must receive different translations in different places. So, translation distorts by fragmenting a unitary concept in French to a cluster of concepts in English.

Something very much like these problems of translation is encountered in pedagogical contexts. Any instructor who has attempted to communicate the thought of a vastly different age and culture to an audience of undergraduates faces problems very similar to those besetting the translator. Therefore, examination of how these difficulties are addressed in a classroom might shed some light on the mitigation or circumvention of the proposed problems of incommensurability.

A pedagogical lesson from teaching Aristotle

In teaching introductory ethics classes, I have often had the task of explicating Aristotle's *Nicomachean Ethics* to students with no previous experience of philosophy. One essential task is to familiarize them with the Aristotelian term *eudaimonia.* One problem is that *eudaimonia* needs to be understood holistically in its connection to other terms such as *arete* and *ergon* and in relation to the teleological cast of Aristotle's thinking as a whole.

Further, no one English word captures the richness of *eudaimonia.* It is generally translated as "happiness," which, for various reasons, is unfortunate. "Thriving," "flourishing," and "well-being" are better, but still not quite right. How to communicate Aristotle's meaning?

The process has three stages. The first job is to disabuse students of their ordinary associations with the translated terms. For us, "happiness" is subjective and idiosyncratic. It is different things for different people. Happiness also connotes a temporary feeling of elation or satisfaction. It can be brought on by turn of good fortune, a rewarding experience, the completion of a difficult task, or any number of other circumstances. Likewise, any number of circumstances can spoil our happiness. Maybe someone's boorish behavior ruins our big day. Happiness, then, for us is mostly a matter of our mood at a given time, or in particular circumstances. I saw an advertisement for a car dealership that said, "We sell happiness." Yes, a new car can be exciting—until the first payment is due.

For Aristotle, on the other hand, *eudaimonia* is not a transient mood or feeling or any subjective quality. It is an objectively desirable state, characterizing a whole life, and comprising a way of living in which our rational and moral faculties are fully actualized. *Eudaimonia* is not sensitive to the vagaries of circumstance, and, unlike honors, is not dependent upon others to grant or deny. Aristotle admits that one in dire poverty, sickness, or other deep distress cannot thrive. Yet if life's gravest misfortunes can be avoided, the person who has achieved *eudaimonia* will face life's vicissitudes with equanimity and poise. The life of the mind, intellectual contemplation, plays a preeminent role in the achievement of *eudaimonia.* Those who have achieved such a life are blessed indeed.

The second task is to explicate *eudaimonia* with reference to the associated ideas with which it seamlessly joins in the thought of Aristotle. What sort of life is the most satisfactory and fulfilling for human beings? What is the characteristic human good? To answer that question, Aristotle—always the biologist—has to ask what kind of organism a human being is. The good of any organism is determined by its *ergon,* its particular function, that is, what its nature has adapted it to do and do well. In the movie *Jaws,* the marine biologist played by Richard Dreyfuss explains that the great white shark is supremely adapted to do three things—swim, eat, and make little sharks. A shark is thriving when it is doing well what it is designed to do—swim, eat, and make little sharks.

What is the human *ergon,* the characteristic function that nature has adapted humans to perform and perform well? For Aristotle, a human is obviously a social animal. In his *Politics* he says that the human being is a "political animal," that is, nature has equipped human beings to thrive in a *polis,* the Greek city-state, but we may generalize and say "polity" instead of *"polis."* Further, the human being is preeminently the *rational* animal, capable of rational thought and gifted with a unique capacity for learning. So, the *ergon* of a human being is to live the life of a rational social animal.

Genuine thriving involves not just performing a function but performing it superlatively. *Arete,* normally translated as "virtue," is the state of excellence whereby any organism or thing optimally performs its distinctive function. The Greeks could therefore speak of the *arete* of a non-human animal or even an inanimate object. The hardness and sharpness of an axe is its *arete,* the speed, endurance, and courage of a war horse is its *arete.* Since humans are both rational and social creatures, humans must possess both intellectual and moral *arete* if they are to best fulfill their functions as thinkers and as participants in political and social life.

Now that students have been instructed as to the inadequacy of our ordinary notions of happiness for understanding Aristotle and guided through the intricacies of the connections between *eudaimonia, ergon, arete,* and Aristotelian teleology in general, the final task is to put everything back together so that *eudaimonia* can be seen as a unified and coherent concept.

Students finally can see that for Aristotle *eudaimonia* is possessed by those who enjoy mental and physical health and a modicum of material prosperity while exercising their intellectual and moral faculties in accordance with the highest standards of excellence. Such a person will excel at fulfilling the human *ergon,* thinking clearly, learning eagerly, judging and acting rationally, and interacting successfully, or as successfully as circumstances permit, with fellow human beings.

Once such an understanding is grasped, can we rationally compare Aristotle with thinkers of a very different hue, such as Kant? We cannot minimize the differences between the two. Aristotle and Kant would no doubt see the other's project as pervasively and irremediably flawed. Indeed, as Jonathan Lear notes, Kant would not even regard Aristotle as offering a system of morality, and Aristotle would similarly fail to see Kant's theory as an ethical outlook (Lear 1988: 154-155).

Clearly, Aristotle and Kant would be at cross purposes as much as any of Kuhn's conflicting paradigms. Yet there is no reason to think that that we cannot adequately understand each, *on his own terms,* and then make rational comparisons, even point-by-point comparisons between them. Scholars do it all the time.

For instance, here are two passages from Lear:

> Kant severed the tie between morality and the pursuit of happiness because, he argued, morality cannot be binding on an agent in virtue of desires he just happens to have. The agent might have lacked those desires and, Kant argued, it is intolerable that an agent should be bound to morality by so slender a thread. (Lear 1988: 153-154).
>
> Happiness [for Aristotle] is not based on the satisfaction of desires which a person just *happens* to possess. According to Aristotle, man has a nature: there is something definite and worthwhile that it is to be a human being (Lear 1988: 155; emphasis in original).

Recognizing such a fundamental difference is not a barrier to rational communication and comparison; rather, it enables it. It is the recognition of the full depth of disparity between theoretical concepts that *prevents* equivocation and question begging and permits fair and unbiased critique. Kant would be forced to realize that Aristotle *did* have a very different understanding of "happiness" and he would have to address Aristotle's concept *on its own terms.* Doing so would clarify further differences between the two and point to other means of rational encounter. So, the recognition of fundamental conceptual differences does not indicate an epistemic cul-de-sac, but a stimulus and opportunity for deeper understanding.

Incommensurability and comparability

The upshot, as I see it, is that the issues raised by Kuhn's "mature" understanding of incommensurability, once recognized, can guide us to deeper and more complete understanding of opposing theories. We learn not to carelessly identify the concepts of one theory with those of another—even if they are named by the same term—but to interpret those concepts in their own contexts. Further, we learn that what for us might be a cluster of concepts could be a single concept for someone else, and we have the burden of attempting to understand it as that person does. Such caveats are not terribly profound and are, in fact, fairly commonplace considerations for translators and historians of ideas.

Actually, by the time Kuhn presented his paper "Commensurability, Comparability, Communicability," at the 1982 meeting of the Philosophy of Science Association, he probably would have agreed with most of what is said above about understanding a foreign language (or theory) (Kuhn 2000: 33-57). The sort of translation he is addressing seems to be "radical translation," the creation of translation manuals in which the terms of one language are replaced item-for-item by the translator with co-referring terms of another language.

Thus, to employ W.V.O. Quine's classic scenario, if the native speaker of another language uses the term "gavagai" on all and only those occasions on which we use the term "rabbit," we would translate "gavagai" as "rabbit" in our manual. For radical translators such as Quine, all that counts is that the two terms have the same extensions, that is, that they are employed in the exact same circumstances. Meanings are irrelevant. Indeed, for the native speaker "gavagai" might mean "undetached rabbit parts" and not "rabbit."

For Kuhn, translations that merely substitute co-referring expressions and ignore meanings inevitably distort. The point of the "holism" issue mentioned earlier is that piecemeal and automatic replacement of terms with others of the same extension will obscure the fact that the characteristic terms of a theory must be grasped *as a whole,* i.e., as inter-defined with other terms, or they simply will not be understood. Indeed, in learning an unfamiliar theory, like learning a foreign language, we truly know it when we don't have to translate but can speak like a native (Kuhn 2000: 40).

Kuhn makes what I consider to be an obvious and necessary distinction between interpretation and translation (Kuhn 2000: 37-40). Interpretation is understanding how different languages or theories "structure the world" (Kuhn 2000: 40). In explicating a past theory, a historian of ideas is not merely a language *user* but a language *teacher,* one who shows how terms were understood holistically in their original context (Kuhn 2000: 42-45). For the interpreter, identifying the common extensions of terms is not enough; intensions (meanings) must also be identified and explicated. We need to know what Newton *meant* by "mass" and "force" (and you cannot understand the one without the other) and not just whether he employed those terms in the circumstances where a current physicist would.

I fully agree with Kuhn that understanding has to involve both interpretation and translation, and that the former cannot be reduced to the latter. Indeed, interpretation must often work *against* translation. As I note above, Aristotle cannot be understood without challenging the usual translations of "*eudaimonia."*

If then, incommensurability is equated with untranslatability, then radical translation cannot adequately translate the content of theories. However, the failures of the radical translator are grist for the historian's interpretive mill, and what the historian can know, the scientist can know.

What about point-by-point comparisons between theories? What does "point-by-point" mean? If the question is whether each concept of a theory can be matched one-to-one with its corresponding concept in an opposing theory, then, obviously, the answer is "no." I take it as true, indeed trivially true, that different theories will employ quite different conceptual toolkits in their different models of the world.

To take a glaring example: Darwinian evolutionary theory has no parallel to the divine speech-acts—"Let there be..."—of the creationist. Yet, empirical claims of theories, even ones as different as evolution and creation, may be directly compared. Young-earth creationism entails that the earth is six to ten thousand years old. For over two centuries, there has been overwhelming evidence that this is not so, and we now know that biblical chronology is off by six orders of magnitude.

Conclusion

In conclusion, I think that much of the initial excitement generated by the term "incommensurability" was largely, perhaps mostly, due to the vague but provocative way that it was presented in *Structure.* In fact, I think that much of the book's impact was not so much due to its ideas—many of which, as noted earlier—were unoriginal, but to its style of presentation. Some have said that the book is written in aphorisms. To his credit, Kuhn later attempted to clarify, qualify, and specify his meaning. However, the result of such efforts was to reduce incommensurability from a seemingly formidable challenge to scientific rationality to a much more modest and tractable problem, arising only in certain limited contexts. In the end, incommensurability, to the extent that it exists at all, only succeeds in underscoring the actual richness of reason's resources.

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Matthews, M.R. "Thomas Kuhn and Science Education: A Troubled Connection." *HPS&ST Newsletter,* 1-18, aproped2022.pdf (hpsst.com), 2022.

Matthews, M.R. 'Thomas Kuhn and Science Education. Learning from the Past: The Importance of History and Philosophy of Science' *Science & Education* online first, 2023.

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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**.

HPS&ST in Latin America

● *Ciência & Educação* acaba de lançar novos artigos do volume 29, 2023.

Para acessar os artigos, por favor, clique sobre o link ou digite em seu navegador:

https://www.scielo.br/j/ciedu/i/2023.v29/

Tenha uma ótima leitura!
Cordialmente,
Equipe de *Ciência & Educação* (Bauru)

If you have 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.

The Professional Committee on Physics Education and Popularization (PCPEP) conference, Shanghai Sept. 15-18, 2023

The Professional Committee on Physics Education and Popularization (PCPEP) conference was held by the Chinese Youth Science and Technology Educators Association in Shanghai City from September 15th to 18th, 2023. Many professors and experts in physics education from different universities and institutions attended the conference, including Professor Bingyuan Hu, who is the Chairman of the National Association for Higher Physics Education, an honorary Director of the PCPEP, and a professor in East China Normal University. Professor Boqin Liao is the Director of the PCPEP and the Director of the Science Education Research Institution at Southwest University. Professor Shanyan Song, who is from the College of Education of Hunan Normal University, is the Deputy Director of the PCPEP. Professor Xiao Huang, who is from the College of Education at Zhejiang Normal University, is the Secretary of the PCPEP. Moreover, the Director of Academic Affairs at East China Normal University and the Dean of the School of Physics and Electronic Science at East China Normal University.

The conference topics explored the development of physics education, including curriculum, textbooks, instruction, evaluation, etc. More than 200 teachers and educators from different provinces in China attended the conference, including elementary schools, middle schools, high schools, and universities.

At the beginning of the conference, Professor Boqin Liao explained the main ideas of curriculum standards and major elements of experiments that should be considered in the revision process of Compulsory Education Physics Curriculum Standards and High School Physics Course Standards. Professor Xiao Huang elaborated on how social scientific issues improve public scientific literacy from the aspects of origins, mechanisms, and treatments of coronavirus. Professor Haibo Yu from Northeast Normal University discussed the path and methods from learning physics knowledge to developing physics ideas. Professor Liqing Chen from East China Normal University introduced the

development of talented students' education in physics.

At the conference, other professors or educators shared their research, including Anhui Normal University, Central China Normal University, Zhejiang Normal University, Hubei University, Nanjing Normal University, Guangxi Normal University, Fuyang Normal University, Jimei University, Hanshan Normal University, and Shanghai Hongkou Senior High School. Meanwhile, there was a section for graduate students to share their research. All attendants visited the Shanghai Science Popularization Center.

HPS&ST in Asia

2023 International Chemistry Olympiad: Vietnam won 3 gold medals, 1 silver medal, and ranked the third among the entire delegations
HERE

Vietnam achieved excellent results in the 2023 International Physics Olympiad
HERE

The Japanese Cabinet approves the *Basic Plan for the Promotion of Education (2023-2027)*
HERE

South Korea: "TOUCH" teachers change the way they teach in the classroom and lead digitally-driven innovation
HERE

Malaysia World Renewable Energy Congress (WREC) XXII 2023
HERE

Multi-department cooperation, science and education together improve the scientific literacy for primary and secondary school teachers
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 (Zehjiang Normal University) **HERE** or Michael Matthews **HERE**.

Varia

- HPS&ST books, downloadable files **HERE**
- *Science & Education* Open Access articles (124) **HERE**
- 'Cultural Studies in Science Education: A philosophical Appraisal' (Michael R. Matthews) *Cultures of Science* journal (Vol.6 No.2, June 2023). Available **HERE**
- The Paradoxes of Religion and Science in the USA, Jared Diamond, Carol Bakhos & Alex Joyce-Johnson. Available **HERE**
- Journal thematic issues on science education for global sustainability:
  Science & Education (HERE),
  Science Education (HERE),
  Journal of Research in Science Teaching (HERE),
  Studies in Science Education (HERE).
- Jeffry L. Ramsey book on *Sustainability and the Philosophy of Science* HERE
- Jerry Coyne on the widening debate about Mātauranga Māori (Māori Science) in New Zealand schools and universities **HERE**.

  Previous HPSST Newsletter contributions to the NZ debate can be read HERE and HERE.

Recent HPS&ST Research Articles

Agustian, H.Y. (2023). The Critical Role of Understanding Epistemic Practices in Science Teaching Using Wicked Problems. *Sci & Educ*, 1-26. https://doi.org/10.1007/s11191-023-00471-2

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Recent HPS&ST Related Books

Bertucci, Paola (2023). *In the Land of Marvels: Science, Fabricated Realities, and Industrial Espionage in the Age of the Grand Tour.* Baltimore, MD: Johns Hopkins University Press. ISBN: 9781421447100.

"In 1749, the celebrated French physicist Jean-Antoine Nollet set out on a journey through Italy to solve an international controversy over the medical uses of electricity. At the end of his nine-month tour, he published a highly influential account of his philosophical battle with his Italian counterparts, discrediting them as misguided devotees of the marvelous. Paola Bertucci's *In the Land of Marvels* brilliantly reveals the mysteries of Nollet's journey, uncovering a subterranean world of secretive and ambitious intelligence gathering masked as scientific inquiry.

"The advent of electricity was a pivotal phenomenon not only in the history of physical experimentation, but also in the cultivation of popular scientific interest. Nollet's journey was supposedly inspired by the need to investigate, and subsequently report on, claims of the use of electrified "medicated tubes" by their Italian inventor Gianfrancesco Pivati. Motivated by economic interests in the silk industry, Nollet's journey was in fact an undercover mission commissioned by the French state to discover the secrets of Italian silk manufacture and possibly supplant its international success. The event that sparked the medical controversy—the unusual cure of a bishop—was a complete fabrication.

"Bertucci insightfully contrasts published accounts of the event with private documents and discusses how eighteenth-century scientists published fictional events and results to bolster their careers, ultimately leading to long-lasting misrepresentations of scientific practice and enduring stereotypes. *In the Land of Marvels* reveals the constellation of historical actors, from reputed physicists to travel writers and electrical amateurs, who manipulated information to gain authority and prestige." (From the Publisher)

More information HERE

Horton, S. & Mitchell, V. (2023). *Pattern and Chaos in Art, Science and Everyday Life*. Chicago, IL: The University of Chicago Press. ISBN: ISBN: 9781789387803

"This book explores critical and visual practices through the lens of interactions and intersections between pattern and chaos. The interrelationship between pattern and chaos challenges disciplinary boundaries, critical frameworks, and modes of understanding, perception, and communication. Drawing on fields such as visual culture, sociology, physics, neurobiology, linguistics, and critical theory, contributors to this volume explore the results of experiments with pattern and chaos–related forms, processes, materials, sounds, and language. The result is a bracing, wide-ranging examination of a central dynamic in the making and understanding of art." (From the Publisher)

More information HERE

Kennedy, A. Graham (2023). *Science and Public Policy: A Philosophical Introduction*. Abingdon, UK: Routledge. ISBN: 9781032317403

"*Science and Public Policy: A Philosophical Introduction* argues that in order to effectively apply science in any relevant or meaningful way, we must first understand what science is, how it works, and what its limitations are. The first half of the book thus discusses the domain of science, the concept of scientific evidence, and the interpretation of scientific data. The second half then moves through a detailed discussion of science communication in the public sphere, the concept, use and limitations of scientific expertise, and finally, the ways in which we can effectively apply science to public policies in the context of a democratic society.

"Along the way, the book uses detailed scientific examples to explore the relationship between science and uncertainty with the aim of showing that, in the end, public debates over science are rarely over the science itself, but instead over what public policies will follow from the science." (From the Publisher)

More information HERE

Kronfeldner, Maria (2023). *What's Left of Human Nature? A Post-Essentialist, Pluralist, and Interactive Account of a Contested Concept*. Cambridge, MA: The MIT Press. ISBN: 9780262549684

"Human nature has always been a foundational issue for philosophy. What does it mean to have a human nature? Is the concept the relic of a bygone age? What is the use of such a concept? What are the epistemic and ontological commitments people make when they use the concept? In *What's Left of Human Nature?* Maria Kronfeldner offers a philosophical account of human nature that defends the concept against contemporary criticism. In particular, she takes on challenges related to social misuse of the concept that dehumanizes those regarded as lacking human nature (the dehumanization challenge); the

conflict between Darwinian thinking and essentialist concepts of human nature (the Darwinian challenge); and the consensus that evolution, heredity, and ontogenetic development result from nurture and nature.

"After answering each of these challenges, Kronfeldner presents a revisionist account of human nature that minimizes dehumanization and does not fall back on outdated biological ideas. Her account is post-essentialist because it eliminates the concept of an essence of being human; pluralist in that it argues that there are different things in the world that correspond to three different post-essentialist concepts of human nature; and interactive because it understands nature and nurture as interacting at the developmental, epigenetic, and evolutionary levels. On the basis of this, she introduces a dialectical concept of an ever-changing and "looping" human nature. Finally, noting the essentially contested character of the concept and the ambiguity and redundancy of the terminology, she wonders if we should simply eliminate the term "human nature" altogether." (From the Publisher)
More information HERE

Ladyman, James (2023). *Understanding Philosophy of Science* (2nd Ed.). Abingdon, UK: Routledge. ISBN: 9781138301047

"In this exceptionally clear and engaging introduction to the philosophy of science, James Ladyman explores the philosophical questions that arise when we reflect on the nature of the scientific method and the knowledge it produces. He discusses whether fundamental philosophical questions about knowledge and reality might be answered by science, and considers in detail the debate between realists and antirealists about the extent of scientific knowledge.

"The style remains unassuming, bringing to life the essential questions in the philosophy of science. Ideal for any student of philosophy or science, the book requires no previous knowledge of either discipline. It contains suggestions for further reading and cross-references with an extensive bibliography, making this the ideal textbook for students coming to the subject for the first time.

"The second edition includes the following key features:

- new chapter 'Confirmation and Evidence' which will include Nicod's criterion and Hempel's symmetry thesis and Bayesianism
- new content added to the 'Revolutions and Rationality' chapter, including Post-Kuhnian views of the scientific method
- more content on social factors in science and recent views of science." (From the Publisher)

More information HERE

Munoz, Lisa M. P. (2023). *Women in Science Now: Stories and Strategies for Achieving Equity*. New York, NY: Columbia University Press. ISBN: 9780231206143

"Women working in the sciences face obstacles at virtually every step along their career paths. From subtle slights to blatant biases, deep systemic problems block women from advancing or push them out of science and technology entirely.

"*Women in Science Now* examines solutions to this persistent gender gap, offering new perspectives on how to make science more equitable and inclusive for all. This book shares stories and insights of women from a range of backgrounds working in various disciplines, illustrating the journeys that brought them to the sciences, the challenges they faced along the way, and the important contributions they have made to their fields.

Lisa M. P. Munoz combines these narratives with a wealth of data to illuminate the size and scope of the challenges women scientists face, while highlighting research-based solutions to help overcome these obstacles. She presents groundbreaking studies in social psychology and organizational behavior that are informing novel approaches for combating historic and ongoing inequities.

"Through a combined focus on personal experiences and social-science research, this timely book provides both a path toward

greater gender equity and an inspiring vision of science and scientists." (From the Publisher)

More information HERE

Radick, Gregory (2023). *Disputed Inheritance: The Battle over Mendel and the Future of Biology.* Chicago, IL: The University of Chicago Press. ISBN: 9780226822723

"In 1900, almost no one had heard of Gregor Mendel. Ten years later, he was famous as the father of a new science of heredity—genetics. Even today, Mendelian ideas serve as a standard point of entry for learning about genes. The message students receive is plain: the twenty-first century owes an enlightened understanding of how biological inheritance really works to the persistence of an intellectual inheritance that traces back to Mendel's garden.

"*Disputed Inheritance* turns that message on its head. As Gregory Radick shows, Mendelian ideas became foundational not because they match reality—little in nature behaves like Mendel's peas—but because, in England in the early years of the twentieth century, a ferocious debate ended as it did. On one side was the Cambridge biologist William Bateson, who, in Mendel's name, wanted biology and society reorganized around the recognition that heredity is destiny. On the other side was the Oxford biologist W. F. R. Weldon, who, admiring Mendel's discoveries in a limited way, thought Bateson's "Mendelism" represented a backward step, since it pushed growing knowledge of the modifying role of environments, internal and external, to the margins. Weldon's untimely death in 1906, before he could finish a book setting out his alternative vision, is, Radick suggests, what sealed the Mendelian victory.

"Bringing together extensive archival research with searching analyses of the nature of science and history, *Disputed Inheritance* challenges the way we think about genetics and its possibilities, past, present, and future." (From the Publisher)

More information HERE

Rexroth, Frank (2023). *Knowledge True and Useful: A Cultural History of Early Scholasticism* (Trans, John Burden). Philadelphia, PA: University of Pennsylvania Press. ISBN: 9781512824704

"A radical shift took place in medieval Europe that still shapes contemporary intellectual life: freeing themselves from the fixed beliefs of the past, scholars began to determine and pursue their own avenues of academic inquiry. In *Knowledge True and Useful*, Frank Rexroth shows how, beginning in the 1070s, a new kind of knowledge arose in Latin Europe that for the first time could be deemed "scientific."

"In the twelfth century, when Peter Abelard proclaimed the primacy of reason in all areas of inquiry (and started an affair with his pupil Heloise), it was a scandal. But he was not the only one who wanted to devote his life to this new enterprise of "scholastic" knowledge. Rexroth explores how the first students and teachers of this movement came together in new groups and schools, examining their intellectual debates and disputes as well as the lifelong connections they forged with one another through the scholastic communities to which they belonged.

"Rexroth shows how the resulting transformations produced a new understanding of truth and the utility of learning, as well as a new perspective on the intellectual tradition and the division of knowledge into academic disciplines—marking a turning point in European intellectual culture that culminated in the birth of the university and, with it, traditions and forms of academic inquiry that continue to organize the pursuit of knowledge today." (From the Publisher)

More information HERE

Tabery, James (2023). *Beyond Versus: The Struggle to Understand the Interaction of Nature and Nurture.* Cambridge, MA: The MIT Press. ISBN: 9780262549608.

"If everyone now agrees that human traits arise not from nature or nurture but from the interaction of nature and nurture, why does the "nature versus nurture" debate persist? In

Beyond Versus, James Tabery argues that the persistence stems from a century-long struggle to understand the interaction of nature and nurture—a struggle to define what the interaction of nature and nurture is, how it should be investigated, and what counts as evidence for it.

"Tabery examines past episodes in the nature versus nurture debates, offers a contemporary philosophical perspective on them, and considers the future of research on the interaction of nature and nurture. From the eugenics controversy of the 1930s and the race and IQ controversy of the 1970s to the twenty-first-century debate over the causes of depression, Tabery argues, the polarization in these discussions can be attributed to what he calls an "explanatory divide"—a disagreement over how explanation works in science, which in turn has created two very different concepts of interaction. Drawing on recent developments in the philosophy of science, Tabery offers a way to bridge this explanatory divide and these different concepts integratively. Looking to the future, Tabery evaluates the ethical issues that surround genetic testing for genes implicated in interactions of nature and nurture, pointing to what the future does (and does not) hold for a science that continues to make headlines and raise controversy." (From the Publisher)

More information HERE

Trimble, V. &Weintraub, D. A. (Eds.) *The Sky Is for Everyone: Women Astronomers in Their Own Words*. Princeton, NJ: Princeton University Press. ISBN: 9780691253916

"*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." (From the publisher)

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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.

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

Feng shui and the scientific testing of chi claims (Michael R. Matthews)

This *Cultures of Science* paper documents the long history of feng shui belief and practice in Chinese culture; and its spread worldwide during the past century. The paper shows that commitment to the peculiar *qi* or chi entity (on realist interpretations), or relational concept (on empiricist interpretations)—is central to feng shui. More generally, it is central to the history of Chinese writing on Traditional Medicine (TCM), astrology, divination, philosophy, politics, literature, landscaping, building design, natural philosophy, and science. Chi (*qi*) underlies much alternative, or complimentary, medical practice notably acupuncture, and the many *qigong* exercise regimes.

Chi now has an everyday presence in Western culture extending into town planning and construction principles; in many jurisdictions chi claims are grounds for litigation; feng shui courses, and degrees, are fixtures in many Chinese and Western university landscaping, architecture,

and construction programmes as well as medical and nursing programmes.

Chi has some affinity with Bergson's Élan vital, and with many other deep-seated life-force ideas found in numerous cultures. For instance, Mauri in New Zealand's Mātauranga Māori system.

The longevity, depth, and impact of chi belief has, understandably, made it the subject of sociological, historical, psychological and philosophical study. Philosophers of science can bring particular talents to the understanding and evaluation of chi belief systems.

Despite their centrality and omnipresence, chi claims have rarely been scientifically appraised. This is, in part, because they are stated so vaguely and mysteriously that scientific testing is a challenge.

But there has been one rare, and well-credentialled, multi-university-based research programme affirming the reality of chi. The paper argues that this particular programme does not bear examination. It details why the cost of seriously endorsing a chi-based explanation of any putative effect is a rejection of the entire ontological, epistemological and methodological edifice of modern science. Chi explanations are incompatible with both a methodological, and an ontological, naturalist understanding of science.

The *Cultures of Science p*aper is available **HERE**.

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November 9-12, 2023 History of Science Society (HSS), annual meeting, Portland OR.
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March 7-11, 2024, Philosophy of Education Society (PES) Annual Conference, Salt Lake City, UT
Details **HERE**

March 17-20, 2024, NARST Annual Conference, Denver CO
Details **HERE**

June 13-15, 2024, XXXI Baltic Conference on the History and Philosophy of Science, Tartu
Details Anu Rae (anu.rae@ut.ee)

August 1-8, 2024, 25th World Congress of Philosophy, Rome
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
FHPP APS - Forum on History and Philosophy of Physics of the American Physical Society
HAD AAS - Historical Astronomy Division of the American Astronomical Society.
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**

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