

## 反思科学史：过去、现状以及可能的未来

### Reflections on the History of Science: The Past, The Present, and Possible Futures

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**摘要:** 科学史的未来如何? 这并非我们历史学者常问的一个问题, 因为我们并非先知或预言家, 且我们研究的是过去而非未来。不过, 通过审视科学史的过去和现状, 也许可以一窥科学史未来的走向。本文首先回顾了西方科学史学科自上世纪80年代开始的由“内在主义”到“语境主义”的过渡, 然后结合笔者自2004至2014主编《爱西斯》期刊以及编辑《科学史指南》的经历讨论了语境主义近15年来的发展。接着, 笔者探讨了在语境主义继续发挥主导作用的条件下科学史的未来走向问题。在此, 笔者强调了学者们对“全球科学史”的兴趣——这种兴趣很有可能催生新的语境主义研究方向, 从而促进中国科学史学者与其西方同行的合作。

**关键词:** 未来 科学史 内在主义 语境主义 《爱西斯》

**Abstract:** What is the future of the history of science? This is an unusual question for historians to ask. We do not think of ourselves as seers or prophets. We study the past, not the future. But perhaps, by looking at the past history of the history of science, and its present, we can detect a trajectory that we can track into the future. In this paper I reflect back on how the discipline of the history of science in the west moved from “internalism” to “contextualism,” beginning in the 1980’s. Drawing on my experiences editing the journal *Isis* from 2004 to 2014, and editing a massive introduction to the history of science, I discuss how contextualism has developed over the past fifteen years. Then I examine possible futures for the history of science if contextualism continues to dominate the field. Here I emphasize the growing interest in what has been labeled “global history of science,” and how that has the potential to push the contextualist approach in new directions that will help to bring together historians of science in China with their colleagues in the west.

**Key Words:** Future; History of science; Internalism; Contextualism; *Isis*

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What is the future of the history of science? I decided to take on the daunting task of editing a  
was confronted by this question in 2012 when I collection of essays designed to introduce readers

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\*最近主编出版的文集有:《全球斯宾塞主义》、《科学史指南》和《科学博物馆的演变》。目前正在撰写丁铎尔传记, 并担任“丁铎尔通信项目”编辑。该项目致力于收集、整理和编辑丁铎尔的全部来往书信, 是一项国际合作项目。(Among his most recent publications are the edited and co-edited collections *Global Spencerism*, *A Companion to the History of Science*, and *Science Museums in Transition*. He is currently working on a biography of John Tyndall and is one of the editors of the John Tyndall Correspondence Project, an international collaborative effort to obtain, digitalize, transcribe, and publish all surviving letters to and from Tyndall.)

\*This paper is based on a presentation at the Chinese History of Science Society on September 20th, 2018, at the University of the Chinese Academy of Sciences.

to the history of science. This was the beginning of what eventually became *A Companion to the History of Science*, published by Wiley Blackwell in 2016. I realized that if this introduction to the field was to be useful it had to be relevant for several decades after it was published. But history of science has been a very dynamic field since the 1980's as scholars incorporated work from other disciplines and explored new approaches to old topics. How was I to anticipate future developments in a rapidly changing field of scholarship? The question, what is the future of the history of science, then, made me very uneasy. Historians study the past, not the future. We do not think of ourselves as seers or prophets.

Today I will share with you how I answered this troubling question. It forced me to examine more closely where the history of science had been in the past. It pushed me to look back over the development of the field from the time that I was a newly minted Ph.D. in 1979, to my arrival at York University in 1987 as an assistant professor, to my appointment as editor of *Isis* in 2004, and to the work that I did editing *A Companion to the History of Science*. My hope was that by looking at the history of the history of science, and its present, I could detect a trajectory that could be tracked into the future. This account of the past, present, and future of the history of science may be helpful for you as you think about the future of the discipline in China. But it cannot provide a rigid blueprint for moving forward. One of the major lessons that historians of science have learned since the 1980's is that context is all. This means that the trajectory of the history of science in China has been different from the development of the history of science in Canada, the United States, Great Britain, and other countries in the west. So you should evaluate what I have to say about history of science in the west in light of what has happened to the field here in China in previous decades.

### I. The Past

Before 1980 the history of science in the west

stressed a big picture focused on the theoretical progress made by great scientific heroes like Galileo, Newton, and Darwin. Leading scholars included Sarton, who founded *Isis* in 1913 and edited the journal right up until 1952, and figures such as Koyré, Cohen, and Westfall, many of whom focused on the scientific revolution of the early modern period. Starting in the 1980's the field was transformed by the gradual adoption of a new historiographical approach. It was shaped by scholars offering rich, thickly descriptive, local studies. Rather than emphasizing the discovery of new scientific theories, historians of science became interested in how science was practiced in the laboratory as well as in other sites. A whole new cast of characters was added to the story, most of them outside the intellectual elite, including women, invisible assistants, popularizers, and members of the working class. Historians of science integrated modes of scholarship from other fields into their work. They looked to cultural studies, communication studies, women's studies, visual studies, and the scholarship on science and literature, to name just a few. The historians of science associated with this change in thinking are Simon Schaffer, Steven Shapin, Peter Galison, James Secord, Lorraine Daston, and many others.

Professor Lynn Nyhart discusses the complicated story of how the history of science has changed since the 1980's in detail in her chapter on "Historiography of the History of Science" in *A Companion to the History of Science*. Here she compares the older scholarship, which traced the growth and branching of a tree of scientific ideas rooted in the base of Western culture, to the newer image of the history of science as a densely tangled bank of people and material things teeming with social, cultural, economic, and religious life, that covers the globe. "The historian's task," she argues, "now is to tease out how certain forms of knowledge and practice within this mass of activity came to be understood as 'science;' what has sustained science, social, culturally, and materially; and who has benefitted and who has suffered in its formation."<sup>1</sup> Nyhart locates the origins of the new historiography in the social constructionist

turn of the late 1970's and early 1980's, which led historians to think of scientific knowledge as being constructed by human beings rather than being discovered in nature. This later led historians of science, Nyhart asserts, to focus on the making of scientific knowledge in different contexts, which involved an increasing sensitivity to scientific practice and material culture; and to focus on the moving of scientific knowledge, which required attention to matters of communication and circulation.

By the time I started to edit *Isis* in 2004 the new historiographical approach, which I will refer to as “contextualism,” had become dominant. The older historiography, which was known as “internalism,” was no longer as influential. We have moved on from the “science wars” of the 1990's, in which contextualism was vehemently criticized by scientists as well as the internalists within the history of science. In *Isis* I published the best articles from both historiographical traditions. But, in the new Focus sections that I created as a way to increase interest in the journal, I recruited those who were in the forefront of the new scholarship. The Focus sections contained three or four short think pieces on a particular topic of wide interest to the readers of *Isis*. Some of the Focus sections dealt with important anniversaries, such as the hundredth anniversary of Einstein's 1905 papers on special relativity or the two hundred anniversary of the birth of Darwin. But the papers attempted to resituate Einstein and Darwin within the contextualist historiography. Other Focus sections explored the fruitful interactions between history of science and cognate fields, such as the study of science and literature or the history of medicine. Still others drew attention to the new work on areas of research outside of Europe and the United States, such as the Focus section on “New Directions in the History of Modern Science in China,” organized by Grace Shen, which included pieces by Benjamin Elman, Fa-Ti Fan, Zuoyue Wang, and Danian Hu. What tied the Focus sections together was a collaborative attempt to explore the exciting ways in which the contextualist approach was being developed and pushed further.

During the period that I edited *Isis* it seemed to me as though the contextualist approach continued to inform the bulk of the scholarship in the field.

## II. The Present

So much for the past. Now on to the present. Here I will draw on my experiences editing *A Companion to the History of Science*. I wanted this edited volume to reflect the current state of the scholarship in history of science. That meant trying to pin down what was driving the contextualist approach in its present incarnation, to try to look underneath the surface for the main structures at work. I wanted those structures to supply the way I set up the volume. I had to figure this out before I started to assign the forty chapters in the volume. I realized that I had to abandon the traditional chronological structure that is adopted by so many introductions to the history of science, and, instead, rely on a more thematic approach. Each of the chapters had to be synthetic, midscale studies rather than micro studies. I decided that the book would be divided into four parts, with each part reflecting one of the broad analytical categories that are now central to the field. The thematic structure allowed contributors to cut across traditional chronological and geographic boundaries in exciting ways.

Part I, on “Roles,” explores the various roles of the “scientist” from ancient times to the present. The chapters emphasize how the idea of the “scientist” had changed dramatically over time. After all, the term “scientist” was not coined until 1834 by the English polymath William Whewell, and he did not have in mind the specialized, professional scientist that we are familiar with today. The role of the scientist that has been adopted in the past varied over time and across cultural settings. The chapters deal with the learned man and woman in antiquity and the middle ages; go-betweens; the alchemist; the natural philosopher; the natural historian; invisible technicians, instrument makers, and artisans; scientific illustrators; the human experimental subject; amateurs; the man of science;

and the professional scientist.

The chapters in Part II, titled “Places and Spaces,” examine the situatedness of knowledge. All scientists, whatever role they assume, must perform that role in a specific place. But who manages these spaces? What are its boundaries? Who is allowed access? To answer these questions we must acknowledge that scientific knowledge bears the imprint of its location, as the geographer of science David Livingstone puts it.<sup>2</sup> In Part II there are chapters on the medieval university, the observatory, the court, academies and societies, museums and botanical gardens, domestic space, commercial space, the field, the laboratory, and the modern school and university. In reading these chapters it is striking to see how the sites of knowledge have varied from the ancient period to the present. Durable sites, such as the university and the observatory, have changed dramatically over time. But there is nothing analogous to some of the older sites, such as the European court of the sixteenth and seventeenth century, while new sites, such as the scientific society, did not exist prior to the early modern period. Some of these spaces, such as the laboratory and the museum, have long been recognized by historians as privileged places of power. But the importance of others, such as domestic and commercial spaces, has only recently been recognized.

Part three moves from where knowledge has been generated to how that knowledge travels between sites. As they circulate, scientific ideas and images undergo translation and transformation, since people encounter representations differently in different circumstances. Knowledge has been transferred between sites through a variety of media, including print, visual, and oral media. There are chapters on manuscripts, the printing press, correspondence networks, translations, journals and periodicals, textbooks, lectures, and film, radio and television. The chapters deal both with how scientists communicated to each other, and how they communicated to the public. There are many other modes of communication that we could have covered but didn't due to lack of space, such as field notebooks and museum catalogues.

Finally, in part four, titled “Tools of Science,” we moved from communication to the understanding of scientific knowledge as practise. Chapters cover important scientific instruments and material objects as a way to illuminate the changing practices of science. Scientific objects are the things studied by scientists, whereas instruments are the tools by which those objects are studied. There are chapters on timing devices, weights and measures, calculating devices and computers, specimens and collections, recording devices, microscopes, telescopes, spectrometers, diagrams, and three-dimensional models.

By focusing on these four analytical categories, the roles, places, communicative practices, and materials of science in the past, the contributors to the volume and I hoped to capture what is driving the field at present. We also hoped to explain why current scholarship in the history of science is so vibrant and exciting.

### III. The Future

So far I have dealt with the past and the present. Now I will move on to the future. I have already expressed my reservations about making predictions about what lies in store for history of science as we move closer to the third decade of the twenty-first century. But I will put those reservations aside and try to base the discussion on what we can learn from the past and the present. The very first observation I would make is that there is no sign that contextualism is dying. I have not detected a new generation of young scholars in the field engaged in a critical analysis of the grounds of contextualism. Rather, historians of science continue to explore what can be done with the contextualist approach. I suspect that this will be the case for the foreseeable future. This means that historians of science have not yet exhausted this historiographical approach. It is still yielding rich insights into the development of science throughout the ages. After all, the contextualist approach is relatively young. The internalist approach reigned for at least eighty years, perhaps more. The

contextualist approach is barely forty years old. There is life in it yet!

My second observation is that there are certain areas of research that seem to be attracting a lot of interest and that have the potential to have a real impact on the entire discipline. Of course I look at this through the eyes of a scholar who works on 19th century British science. But I've seen evidence of this in other fields as well. One area that is starting to command attention is bringing together the digital humanities with the history of science. See, for example, the work of Michael Pettit et al in a recent article in *Isis* that uses data mining to analyze scientific networks in the history of psychology from the 1920s to the 1940s.<sup>3</sup> Historians of science have just begun to scratch the surface here.

But I want to focus on the potential of another relatively new development: the study of the global history of science. I say "relatively new" because when I was editing *Isis* we had a Focus section on "Global Histories of Science" back in 2010. Organized by Sujit Sivasundaram, it included pieces by Marwa Elshakry, Helen Tilley, Shruti Kapila, and Neil Safier on Africa, India, the Middle East, and the Americas. Sivasundaram asserted that new global histories of science will be "characterized by critical reflection on the limits of generalization, as well as a creative adoption of new sources, methods, and chronologies, in an attempt to decenter the European history of science. Such a project holds the promise of opening up new conversations between historians, anthropologists, philosophers, and sociologists of science."<sup>4</sup> In his 2012 article on "The Global Turn in the History of Science," Fa-ti Fan echoed some of Sujit's points. Stressing how new the area of study was, he discussed the recent rise of interest in the global history of science, asserting, "the intellectual terrain is still barely recognizable."<sup>5</sup>

I agree with Sujit and Fa-ti that the global history of science holds great promise and that it has the potential to become a major component of the discipline. I first became involved in research in this area when I co-edited *The Circulation of*

*Knowledge Between Britain, India and China* (2013), which included chapters on China by Fa-Ti Fan as well as Haiyan Yang.<sup>6</sup> My interest in global history of science was heightened when Ke Zunke, who is knowledgeable about both British and Chinese history of science, came to work with me for a year at York University. I am now poised to begin a new project on the global history of science and religion. But like other scholars, my ability to do research on the global history of science is limited by my incomplete language skills.

I see a few solutions to the problem. First, we need more translation projects so that the best work in the history of science is made more widely available. I understand that many of history of science books by western scholars have been translated into Chinese. The works of Koyre, Butterfield, Burt and Sarton are among those that have been translated. But their books are the classics from the period before contextualism became dominant. Most of you are probably aware of the Max Planck Institute "Reader Project" organized by Professors Dagmar Schäfer and Angela Creager. The project involves publishing Chinese translations of twelve of the most influential articles and book chapters since 1990. But how many of the best works by Chinese scholars have been translated into English? The Reader Project plans to have a companion volume that translates into English a selection of articles in Chinese chosen by Asian scholars, but that will just scratch the surface. Second, I would encourage more collaborative projects undertaken by western scholars in collaboration with Chinese scholars, as well as scholars from other nationalities where English is not the first language. This is where there can be a genuine exchange of scholarly views and approaches that would enrich historical research.

The field continues to evolve. Undoubtedly, enterprising historians of science will formulate new analytical categories in the future and new areas of scholarship will be developed. We must encourage experiments in historical innovation if the field is to retain its vitality, and its relevance.

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