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Editorial

(New) Histories of Science, in and beyond Modern Europe: Introduction

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Over the past few decades, history of science has changed enormously and developed into a very dynamic and diversified field of historical research. Today, it includes subjects from not only the history of the natural sciences, medicine and mathematics, but also of the social sciences, the humanities as well as the study of the relationship between science and technology. Since the 1950s, also inspired by emerging approaches in the philosophy and sociology of science, new questions of scientific practice, gender or knowledge transfer have stimulated the field and contributed to the historization of scientific knowledge and institutions. In addition to a focus on nation-states, history of science also embraces inter- or transnational or global perspectives, taking postcolonial and decolonial aspects into consideration as well (e.g., Ludwig et al. 2022; Harding 2011; Seth 2017). The methods and theoretical approaches, too, have emerged from a great variety of institutional settings and disciplinary contexts across the globe. Inter- and multidisciplinary practices have become the norm rather than the exception in the history of science, and the field has seen intensified reflections of the relationship between science and other forms of knowledge (Östling et al. 2020; Sarasin 2011). Given these diversifying developments, it seems no longer adequate to call this discipline "history of science". Rather, it might be labelled as "histories of science", understanding "science" as *Wissenschaften* in the German sense, including the natural sciences, mathematics, medicine, the humanities, the social sciences as well as the study of technology.

With this Special Issue, we aim to emphasize this diversity of today's histories of science as a vibrant field of research. Introductory monographs and volumes typically focus on the history of the natural sciences (Hagner 2001; Kragh 1989; Serres 2002; Sommer et al. 2017). The history of technology often appears as a separated field of research (see König 2009). The series "Cambridge History of Science" does have a volume on the history of the social sciences (Porter and Ross 2008), but none on the history of the humanities. The latter still seems to be very separated from the general history of science, as if C. P. Snow's dictum of the "two cultures" (scientists and literary intellectuals) was set in stone.

In this Special Issue, *(New) Histories of Science, in and beyond Modern Europe*, we do not attempt to provide an all-encompassing overview of all research areas, methodological and theoretical approaches, and narratives that constitute the histories of the various sciences. Instead, we present contributions on a broad spectrum of current research topics and (new) approaches, highlighting their ramifications and illustrating their ties to neighboring disciplines and (interdisciplinary) areas of research, e.g., philosophy of science, science and technology studies, gender studies, or intellectual history. Moreover, the contributions exemplify how histories of science can be written in ways that not only move across but also challenge temporal and spatial categories and categorizations, including hegemonic understandings of "modernity", Eurocentric views of the development of science and the humanities, or certain notions of center-periphery. They deal with histories of specific disciplines, specific research objects and phenomena, and with specific practices, while they also explore the historicity of certain ideals of scientificity (in the sense of the German

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Wissenschaftlichkeit). Furthermore, some papers are dedicated to selected methods and perspectives of current approaches in the histories of science. Among them is a focus on practices, including the everyday actions involved in engaging in science, but also on the specific spaces and places of knowledge production, as well as on the media of knowledge transfer and communication.

Emphasizing diversity and dynamics might give the impression of a certain arbitrariness. Therefore, we want to shortly introduce the articles and provide some background on what aspects they represent. The articles by *Rens Bod* and *Philippe Fontaine* present two relatively new research fields in the histories of science in its broad conception: the history of the humanities and the history of the social sciences. Bod is one of the leading scholars voting for a comprehensive new field called "history of the humanities", which should reach beyond the traditional and often Eurocentric histories of single humanities' disciplines often written by experienced scholars who were socialized in the respective discipline. But what are the epistemic elements holding the humanities together? This is one of the main questions discussed in this new field, and Bod suggests to apply "patterns", which would allow speaking of the humanities as such (Bod 2013, 2022). In the history of the social sciences, the methodological and theoretical discussions are of a different nature. The differences between specific social sciences (such as economics, sociology, psychology, human geography, etc.) require intense reflection on what defines them as social sciences and what methods are suitable for their historical analysis (see Backhouse and Fontaine 2010). Fontaine reflects the historiographical traditions in this field of research, emphasizing specific disciplinary histories on the one, and more general intellectual history on the other hand. According to Fontaine, scholars have increasingly combined these traditions and implemented the transnational turn in the past twenty years, and consequently, such historiographical polarizations have come to an end.

Fontaine's and Bod's articles both highlight the need for approaches transcending Eurocentric narratives. So does *Sonja Brentjes'* contribution, where a different issue is center stage, namely the question of how to arrive at a good historiographical balance between content and context in order to understand the achievements and the shortcomings of scientific communities in past Islamicate societies. Contrasting investigations of content with investigations of context leads to conflict, exclusion and closure, she argues. Instead, Brentjes pleads for extensive cooperation to mutually benefit from the very diverse backgrounds of the scholars in this area. This, however, would require "to recognize the contradictions, mistakes or relative simplicity in an authorial or artisanal product without, however, denying such a product and its maker the right to serious historical analysis" (pp. 280–81).

The tension between context and content approaches is also a hot topic in the history and historiography of mathematics. Traditionally, the history of mathematics presents itself as relatively autonomous field in the history of science and technology, often practiced by mathematicians themselves. In their article, *Jenny Boucard* and *Thomas Morel* provide an overview of this field of research and discuss new research topics that are more on the context side of historiography: mathematical education, the inclusion of actors previously neglected such as school teachers, or the influence of bureaucracies in the cultural development of mathematics. The younger trend in historiography of mathematics exploring education is related to aspects of articulation, mediation and circulation of scientific knowledge, which is also a major focus in the history of knowledge (see Bod 2022; Secord 2004).

Two articles of this Special Issue explicitly historicize communication practices in scholarship. *Kristian H. Nielsen* discusses histories of science communication and identifies two main contradictory narratives: widening gaps between science and the public on the one hand, building bridges through dialogue, engagement, and participation on the other. What unites them, according to Nielsen, is the fact that science communication is not a distorted form of science but the sum of social conversations around science. *Josep Simon* explores another area that touches the topic of "science communication:" scientific

publishing. He demonstrates the vitality this research field showed in the past decades and how it furthers interdisciplinary cooperation with fields such as book history, the history of education and communication studies.

Communication and information gathering practices are changing rapidly in the computer age. In their article, *Anna Siebold* and *Matteo Valleriani* provide an overview of the latest developments in digital history. For the history of science, one of the main advantages of using digitized sources is the possibility to identify networks of scientists and scholars and to describe their complex behavior in such a network during a certain period of time. With the digital age and the seemingly endless possibilities of the internet in general and social media in particular, new groups of actors are questioning the leading roles of scientists and scholars in society. They present themselves as experts, even though they follow a style of thought that previously was labelled as "pseudoscientific". The relationships between science and "pseudoscience", between the known and the unknown, success and error, and consideration and ignorance, are examined by *Lukas Rathjen* and *Jonas Stähelin* in their analysis of the dialectical constitution of scientific knowledge. The authors demonstrate how the exploration of this dialectical constitution allows for a novel comprehensive way of unpacking how images and ideals of science are constituted epistemically as well as socially through processes of inclusion and exclusion.

Inclusive and exclusive processes of (re)negotiating what science can and should be are often tied to specific sites of science and scholarship. Such sites are the main focus of the papers by *Donald L. Opitz* and *Jan Surman*. According to Opitz, the ubiquity and distinctiveness of domestic sites for scientific research attracted a great amount of research in the past years. The relationship between amateur and professional science and gender aspects in science have been prominent topics. Focusing on the role of domestic spaces in knowledge production, scholars have been able to trace how scientific developments in their various historical contexts have been embedded in gender-, class-, and race-based social structures and power relations. Surman, in contrast, considers scholarship in transnational empires as a tool to transcend national narratives in the history of science. He argues that the imperial history of science plays an important role in revising the post-/decolonial history of sites having been under imperial rule, taking Central and Eastern Europe as example.

Jeremy Vetter, too, emphasizes the role of embeddedness in his discussion of the *field*. The *field* as such, as well as in its interplay with the laboratory, has been one of the most important material, virtual and discursive places of engaging in modern science in many disciplines, ranging from biology to cultural anthropology. As Vetter shows, the work of field scientists and the process of becoming a scientist in the field was shaped by power relations on various spatial scales and also influenced by colonialism.

The development of science, particularly the natural and the field sciences, has often moved hand in hand with technological developments. Therefore, technology is a crucial aspect of today's histories of sciences. However, inspired by the History of Technology and Science and Technology Studies, the focus has shifted from "technology as innovation" towards "technology-in-use". *Heike Weber's* contribution represents one aspect of this approach. It reflects on one of the newest topics in this field: repair, maintenance and the process of becoming obsolete. In this way, Weber situates technology in a temporal frame of its own. She emphasizes the importance of such technological temporalities not only for the history of science, but also for our thinking about ongoing debates of technological solutions in the "Anthropocene".

As editors, we hope that the contributions to this Special Issue may provoke discussions about the disciplinary matrix of the history of science and on its theoretical and methodological foundations. Can historians of the humanities use the same approaches as historians of the natural sciences? What is the role of the histories of social sciences and humanities next to the histories of the natural sciences and mathematics? And what kind of institutional structure would be required for exploring the histories of science in such a comprehensive way? At the same time, we hope that this issue provides an introduction

and an entry point to the manifold research questions, objects and practices of historians of the sciences, the humanities, the social sciences, and technology.

Finally, the various contributions illuminate the ramifications and richness of the relationship of histories of science to other fields of historical research. They show how histories of science have not only been inspired by many other fields of history, but how they deal with topics and research questions that might also inspire gender history, colonial history, media history, and environmental history. Moreover, they deal with research questions also relevant to many non-historical fields, such as the sociology of knowledge, or communication studies. In other words, the manifold histories of science offer approaches and tools to connect various interests both within history, and between history and its neighboring fields.

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