

RESEARCH REPORT 2013—2014



MAX-PLANCK-GESellschaft

MAX-PLANCK-INSTITUT FÜR WISSENSCHAFTSGESCHICHTE

Max Planck Institute for the History of Science



Cover: The photo of the Institute's entrance hall was taken by Montserrat de Pablo with the Experimental Historical Camera Obscura (CO) of the MPIWG. This Camera served and serves investigations into the performance of optical CO's of the 17th and 18th centuries when this instrument played an important role in the development of optics. These CO's were also of significance for painting in the early modern period and later on no less for photography up to the present day. Montserrat de Pablo, who teaches photography at the Universidad de Castilla-La Mancha, Cuenca, Spain, stayed at the MPIWG as a visiting scholar and artist-in-residence in Department I in 2014 and 2015.

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Most of the portrait photographs were taken by Skúli Sigurdsson

RESEARCH REPORT 2013—2014

MAX-PLANCK-INSTITUT FÜR WISSENSCHAFTSGESCHICHTE

Max Planck Institute for the History of Science

Introduction

In 2014 the Max Planck Institute for the History of Science (MPIWG), Berlin, turned twenty. Since 2013, the MPIWG has witnessed a changing of the guard in key positions: a new Department directed by Dagmar Schäfer has begun its work; Ohad Parnes has succeeded Jochen Schneider as Research Coordinator; and Esther Chen will soon take over as Head Librarian from Urs Schoepflin. As we gratefully say farewell to old colleagues and warmly welcome new ones, we pause to take stock of the MPIWG's development, retrospectively and, especially, prospectively.

The MPIWG was established in 1994 to conduct research on fundamental questions in the history of knowledge from Neolithic times to the present. Of central interest is the emergence of basic categories of scientific thinking and practice as well as their transformation over time: examples include experiment, data, rationality, normalcy, space, proof, and science itself. MPIWG projects investigate traditional themes of philosophical epistemology historically, drawing on concrete cases, embracing practices as well as concepts, and embedding episodes of innovation in cultural, social, and economic contexts. The common perspective of the MPIWG's diverse research activities is therefore often called "historical epistemology." The premise of historical epistemology is that not only bodies of knowledge (e. g., disciplines such as physics, as well as systems of rational planning such as large-scale architectural and water projects) but also ways of knowing (e. g., experiment, collecting, classification, and observation) and criteria for what counts as knowledge (e. g., certainty, predictive accuracy, explanatory scope, and practical applicability) all have histories and that these histories are intertwined.

When the MPIWG began its work twenty years ago, its research focused almost exclusively on the history of the natural sciences in the Western tradition, broadly interpreted. This focus has long been the heartland of the history of science as a discipline, and a great deal of the MPIWG's research continues to cultivate this fertile field. However, the same comparative perspective, both cross-cultural and cross-historical, that inspired historical epistemology has widened the ambit of our inquiry dramatically. This panoramic view has forced us to rethink the boundary between knowledge and science. Comparative approaches have revealed just how provincial the current understanding (especially the anglophone or francophone understanding) of "science" is: a product of the latter half of the nineteenth century in a few (not all) European countries, this definition of science narrowed its meaning to the university-based natural sciences. Even though historians of the premodern period and non-European cultures knew better, the modern definition still dominates the subject matter of the history of science to a surprising extent: for example, even though the German word *Wissenschaft* has resisted the narrowing trend of its cognates in English and French, the bulk of *Wissenschaftsgeschichte* was nonetheless devoted to the history of the modern natural sciences—a situation that is changing dramatically

→ p. 26ff, 22f

due to recent research initiatives like the Excellence Cluster Topoi, with which the MPIWG has cooperated closely.

This research landscape is now being reconfigured, thanks to several trends that are enlarging the history of science into a history of knowledge, including a re-examination of the interactions between practical and theoretical knowledge in both familiar (e. g., mechanics in early modern Europe) and not-so-familiar (e. g., water management in imperial China) contexts; new histories of forms of learning usually excluded from modern definitions of science (e. g., philology across a range of premodern and modern cultures); comparative studies of the classification and hierarchies of knowledge and associated forms of reasoning (e.g., thinking with cases in sixteenth-century Italian medicine, Qing dynasty forensics, and twentieth-century social science); and the concerted tracking of certain objects (e. g., jade, astrolabes, indigo) and practices (e. g., distillation, note-taking, double-entry bookkeeping) wherever they may lead, across the boundaries that separate disciplines, learned from lay practitioners, and cultural traditions. All of these trends are well represented in the research documented in the pages of this report.

The history of knowledge has flourished especially but not exclusively in the history of premodern and non-Western science. Its practitioners have queried the anachronistic assumptions that restrict the gaze of historians to institutions, actors, and genres that seem most continuous with modern, Western ones (e.g., professors at medieval universities who write treatises but not apothecaries who trade recipes) or the ethnocentric assumptions that posit a European origin of modern science that slowly diffused to other parts of the world (e. g., through Jesuit missions to China). Historians of knowledge have paid particular attention to place (e. g., the princely court, the household, the merchant's warehouse, the scholar's library) and material culture (e. g., *materia medica* traded over oceans and continents), as well as to the points at which local, lay knowledge intersected with cosmopolitan, elite science (e. g., in observer networks of earthquakes or the weather). Historians of women and gender as well as social historians have shown how much natural knowledge was and is generated outside the framework of professional science, itself a relatively recent institution.

The history of knowledge also encompasses learned discourses about what knowledge is, what its main divisions are, how it should (and should not) be cultivated, and who should pursue it and why. Especially important in the last decade have been histories of non-Western intellectual traditions, which have challenged long-standing assumptions in the history of science about classifications and hierarchies of knowledge as well as about knowers. For example, the dominant role of philology in remarkably long-lived Chinese, Sanskrit, and Arabic, as well as Greek and Latin, intellectual traditions has illuminated scholarly practices and standards of rigor that informed other forms of systematic inquiry, such as astronomy. Analogously, the combination of the roles of scholar and government official institutionalized by the

Chinese examination system queries taken-for-granted assumptions about the boundary between theoretical and practical knowledge that inform much past history of science. Projecting modern classifications of knowledge even onto late nineteenth-century Europe, much less onto other periods and cultures, can significantly distort our understanding of the history of standards for the most certain and highly esteemed forms of knowledge, as well as the shared practices (and often personnel) that bound them together. More generally, attention to the history of texts, both their contents and their material form, and to their associated practices, such as reading, note-taking, commenting, compiling, and interpreting, is transforming the history of science across periods and places, whether it be the impact of woodblock printing in the Song dynasty, the archiving of astronomical observations on baked clay tablets in ancient Mesopotamia, or cheap paper in Victorian Britain.

The history of knowledge is already cross-fertilizing the history of science in stimulating ways, as a glance at even mainstream journals in the field reveals. Yet there has been no sustained reflection on the implications of the enlarged vision for the history of science—most obviously, for periodization, geography, professionalization, and other core topics, but also for a unified history of ways of knowing. One obvious advantage of enlarging the history of science would be to deprovincialize the history of science: what was not just *a* Eurocentric narrative but rather *the* Eurocentric narrative—how science and technology made modern European and derivative cultures historically unique—falls apart when confronted with the interconnected knowledge traditions that have crisscrossed much of the globe since ancient times. But as yet we have no new narrative to put in its place. We lack a unified history of ways of knowing, or even a unified way of talking about them. The MPIWG sees this reconfiguration as the major challenge to the history of science, one that will eventually transform both our subject matter and theoretical frameworks.

By the standards of the eighty-odd institutes of the Max Planck Society, the MPIWG is small, with only three Departments, directed by Jürgen Renn, Lorraine Daston, and Dagmar Schäfer. Emeritus director Hans-Jörg Rheinberger continues to contribute to the Institute's research on the modern life sciences: he is currently working on a book manuscript provisionally titled *System and Synthesis: A Historical Assessment of the Life Sciences in the Twentieth Century*. Thanks to a swarm of smaller Independent Research Groups (eight at this writing), led by Sabine Arnaud, Jochen Büttner, Vincenzo De Risi, Sven Dupré, Elaine Leong, Veronika Lipphardt, Florian Schmaltz, and Viktoria Tkaczyk, we have been able to expand the purview of the Institute's research well beyond the already broad programs of the three Departments. The welcome addition of Professor Glenn W. Most of the Scuola Normale Superiore, Pisa, Italy, and the University of Chicago, USA, as External Scientific Member of the MPIWG has supplemented the history of science with projects on the history of learning. Over 150 Predoctoral and Postdoctoral Fellows plus 200-odd Visiting Scholars have contributed their energy and expertise to our projects and taught us volumes about their own. The MPIWG's 2013–2014 Research Report provides some idea of the

thematic variety and chronological and geographical scope of the research projects pursued under this roof, from the history of ancient technology to the history of data, from the history of colors in early modern Europe to the history of planning across regions and epochs. It would be easy to conclude that our ambition is to cover the history of science in its entirety, in all places and all epochs.

Easy, but misleading: we cannot achieve such all-encompassing coverage; nor do we strive to. Although by the standards of a small discipline such as the history of science, the MPIWG is a big institution, it is dwarfed by the vastness of its subject matter. And this is as it should be: no one institution should be able to monopolize research initiatives; diversity of topics and approaches is essential to the vitality of the discipline, as is the distribution of scholars and scholarship among many different places and intellectual traditions worldwide. We are in absolutely no danger of exhausting our subject matter—quite the contrary.

Cooperation is essential to meeting the challenge of rethinking the history of science, and the MPIWG has sought partners far and wide. These collaborations are documented in connection with the relevant research projects described in this report. In many ways, however, our most intense collaborations are those with colleagues near at hand, with whom we have the pleasure and privilege of more frequent and informal discussions. The Berlin Center for the History of Knowledge has hosted seven postdoctoral fellows, who organized three workshops in 2014; starting in January 2015, a monthly colloquium on the boundary between science and knowledge will be launched under its auspices, pairing scholars from Freie Universität Berlin, Technische Universität Berlin, Humboldt-Universität zu Berlin, and the MPIWG in presentations. Most important of all are the collaborations that cut across the organizational structures of the MPIWG itself, including a joint grant application by scholars from three different research units, cosponsored reading groups and workshops, shared Postdoctoral Fellows and Visiting Scholars, new digital mapping tools applied to diverse projects, and countless conversations in the library, the corridors, and the tea kitchens. A new theme-centered format for the Institute's colloquium has brought prominent scholars from a range of specialties to the MPIWG and brought scholars from all corners of the Institute together both at the colloquium itself and associated reading groups. Despite the fact that the MPIWG is overflowing its quarters, with more scholars than space, it has never been so thickly crosshatched with contacts among all of its eleven research units.

None of this would be possible without the dedication of our indefatigable staff, whose competent, cheerful efforts support our work every day. We gladly take this opportunity to thank them, each and every one.

→ p. 223ff

→ p. 252ff

Table of Contents

11 Structure and Organization of the Institute

- 11 Scientific Advisory Board
- 12 Department I
- 13 Department II
- 14 Department III
- 15 Max Planck Research Groups
- 16 Emeritus Scientific Member
- 16 External Scientific Member
- 17 Administration, Coordination, and Services

Department I DIRECTOR *Jürgen Renn*

19 Structural Changes in Systems of Knowledge

- 22 Systematic Longitudinal Studies
- 26 The Structure of Practical Knowledge
- 31 Transforming and Melding Ancient Knowledge
- 38 Networks and Institutions of Knowledge
- 43 Toward an Epistemic History of the Anthropocene
- 47 Transforming and Melding Classical Physics
- 55 Scientific Networks and Academic Institutions

Department II DIRECTOR *Lorraine Daston*

61 Ideals and Practices of Rationality

- 63 The Sciences of the Archive
- 76 Between the Natural and the Human Sciences
- 89 Gender Studies of Science
- 93 Science in Circulation
- 101 Reading and Writing Nature in Early Modern Europe
- 108 The Making of Acoustics in Sixteenth- to Nineteenth-Century Europe
- 112 Pre- and Postdocs

Department III DIRECTOR *Dagmar Schäfer*

115 Artefacts, Action, and Knowledge

118 Histories of Planning

131 Tools and Methods

137 Postdoctoral Fellows

External Scientific Member *Glenn W. Most*

144 The Learned Practices of Canonical Texts

Max Planck Research Group RESEARCH GROUP LEADER *Sven Dupré*

147 Art and Knowledge in Premodern Europe

148 Alchemy and the Arts

151 Early Modern Materials and Art Technologies

157 Written Transmission in the Arts

160 Spaces of Exchange of Objects and Knowledge

163 Artisanal Practices and Knowledge of Light, Color, and Perspective

168 Colloquia, Conferences, and Workshops

Max Planck Research Group RESEARCH GROUP LEADER *Veronika Lipphardt*

171 Twentieth-Century Histories of Knowledge about Human Variation

172 Individual Projects

177 Guest Program

186 Workshops

189 Colloquium Series

190 Group Members

Max Planck Research Group RESEARCH GROUP LEADER *Sabine Arnaud*

195 The Construction of Norms in 17th- to 19th-Century Europe and the United States

196 Encounters between Medicine, Literature, Philosophy, and their Circulation in Public Debates

- 199** Medicalization at the Intersection of the History of Psychology and the History of Education
- 201** Legal History, History of Criminology, and History of Psychiatry
- 202** History of Material Culture, History of Technology, History of Psychiatric Institutions
- 203** History of Linguistics, Philosophy of Language, and Forms of Life
- 205** Conferences, Workshops, and Seminars

[Max Planck Research Group](#) RESEARCH GROUP LEADER *Vincenzo De Risi*

209 Modern Geometry and the Concept of Space

212 Individual Projects

[Max Planck Research Group](#) RESEARCH GROUP LEADER *Viktoria Tkaczyk*

219 Epistemes of Modern Acoustics

220 Group Members

[Joint Activities](#)

223 Research Services

223 Cooperation and Outreach

236 Preprints

238 Library

245 Digital Humanities

252 The Institute's Colloquia

257 Overviews

257 Workshops and Conferences

262 Collaborations, Academic Achievements and External Activities

271 Publications

325 Index

332 Errata & Supplements

Structure and Organization of the Institute

Scientific Advisory Board

Prof. Dr. Markus Asper

Institut für Klassische Philologie, Humboldt–Universität zu Berlin, Germany

Prof. Dr. Fabio Bevilacqua

Dipartimento di Fisica “A. Volta,” Università degli Studi di Pavia, Italy

Prof. Dr. Francesca Bray

School of Social and Political Science, University of Edinburgh, United Kingdom

Prof. Dr. Angela N. H. Creager

Department of History, Princeton University, USA

Prof. Dr. Moritz Epple

Historisches Seminar, Wissenschaftsgeschichte, Goethe Universität, Frankfurt am Main,

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Prof. Dr. Mareile Flitsch

Völkerkundemuseum der Universität Zürich, Switzerland

Prof. Dr. John Forrester

Department of History and Philosophy of Science, University of Cambridge,

United Kingdom

Prof. Dr. Beatrice Gruendler

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Freie Universität Berlin, Germany

Prof. Dr. Shigehisa Kuriyama

Department of East Asian Languages, Harvard University, Cambridge MA, USA

Prof. Dr. Christoph Meinel

Lehrstuhl für Wissenschaftsgeschichte, Universität Regensburg, Germany

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Prof. Dr. Martin Mulsow

Forschungszentrum Gotha der Universität Erfurt, Germany

Prof. Dr. Peter C. Perdue

Department of History, Yale University, New Haven CT, USA

Prof. Dr. David Warren Sabean

Department of History, University of California, Los Angeles CA, USA

Prof. Dr. Ana Simões

Secção Autónoma de História e Filosofia das Ciências, Universidade de Lisboa, Portugal

Prof. Dr. Pamela H. Smith

Department of History, Columbia University, New York, USA

Prof. Dr. M. Norton Wise (Chair)

Department of History, University of California, Los Angeles, USA

Prof. Dr. Karin Zachmann

School of Education, Technische Universität München, Germany



Department I

Structural Changes in Systems of Knowledge

DIRECTOR *Jürgen Renn*

Since its inception in April 1994, Department I has investigated the history of science as part of a larger history of knowledge, emphasizing the role of practical knowledge and of deep-time continuities, even when focusing on the turning points of modern science. Since 1998 cross-cultural comparisons—in particular between Western and Chinese science—have been one of the hallmarks of the Department’s work. Since 2004 the globalization of knowledge in history has been advanced as a central research topic.

RESEARCH SCHOLARS

Jaromír Balcar
Alexander Blum
Sonja Brentjes
Jochen Büttner
Giuseppe Castagnetti (until January 2015)
Giulia Giannini
Dieter Hoffmann (until February 2014)
Ursula Klein
Christoph Lehner
Pietro Daniel Omodeo
Christoph Rosol
Matthias Schemmel
Florian Schmaltz (until December 2014)
Juliane Stiller
Klaus Thoden
Matteo Valleriani
Helge Wendt

Department II

Ideals and Practices of Rationality



DIRECTOR *Lorraine Daston*

The research projects of Department II (established 1995) chart the history of epistemic categories and practices that have become so fundamental to modern science and culture that they seem self-evident. Examples described in this report include “data” (“Sciences of the Archive”), “gender” (“Gender Studies of Science”), and modern classifications of knowledge (“Between the Natural and the Human Sciences”). Because the hidden histories of these taken-for-granted objects only become visible when contexts vary, most projects have a comparative dimension, spanning many centuries, several cultures, or both (“Science in Circulation”).

RESEARCH SCHOLARS

Elena Aronova

Etienne Benson (until August 2013)

Lino Camprubi

Donatella Germanese

Philipp Lehmann

Elaine Leong (Minerva Research Group Leader)

Christine von Oertzen

David Sepkoski

Viktoria Tkaczyk (Dilthey Fellow until March 2015)

Annette Vogt



Department III

Artefacts, Action, and Knowledge

DIRECTOR *Dagmar Schäfer*

Artefacts, action, and knowledge are at the heart of Department III's research agenda. Established in August 2013, Department III studies the historical dynamics of concept formation, situations, and experiences of action through which actors have explored, handled, and explained their physical, social, and individual worlds. Three premises inform this work. First, historically, actors often conceived of forms and expressions of knowledge bound to action in terms of procedures (such as planning, ordering, and designing). Second, different material orders (of life, environment, work, use, or production) contributed substantially to the witnessing of knowledge production. Third, scientific and technological understanding took place in a diversity of forms and formats.

RESEARCH SCHOLARS

Emily K. Brock
CHEN Shih-Pei (Digital Curator)
Nina Lerman (until July 2015)
Martina Siebert

Max Planck Research Groups

Art and Knowledge in Premodern Europe

RESEARCH GROUP LEADER *Sven Dupré* (2011–2016)
ended August 2015



Twentieth-Century Histories of Knowledge about Human Variation

RESEARCH GROUP LEADER *Veronika Lipphardt* (2009–2016)
ended June 2015



The Construction of Norms in 17th- to 19th- Century Europe and the United States

RESEARCH GROUP LEADER *Sabine Arnaud* (2010–2016)
extended until October 2016



Modern Geometry and the Concept of Space

RESEARCH GROUP LEADER *Vincenzo De Risi* (2010–2015)
extended until September 2016



Epistemes of Modern Acoustics

RESEARCH GROUP LEADER *Viktoria Tkaczyk* (2015–2020)





Emeritus Scientific Member

Experimental Systems and Spaces of Knowledge

Hans-Jörg Rheinberger

The research projects in Hans-Jörg Rheinberger's department (formerly Department III) were completed in 2011. Since then Hans-Jörg Rheinberger has continued his scholarly work as emeritus scientific member of the MPIWG.



External Scientific Member

The Learned Practices of Canonical Texts

Glenn W. Most

Research activity during the years 2013–2014 was dedicated to a research project involving the cross-cultural comparison of philological procedures in a variety of canonical textual traditions (Greek, Latin, Hebrew, Coptic, Mesopotamian, Ottoman, Sanskrit, Chinese).

Administration, Coordination, and Services

Research Coordination

Jochen Schneider (until January 2015), *Ohad Parnes* (since February 2015)



Cooperation and Outreach

Hansjakob Ziemer



Library

HEAD *Urs Schoepflin* (until March 2015), *Esther Chen* (since April 2015)



Digital Humanities

HEAD *Dirk Wintergrün*



Administration

HEAD *Claudia Paaß*





Members of Department I:

Left to right: 1. Paul Trezciok, 2. Kristina Schönfeldt, 3. Florian Schmaltz, 4. Kristina Langrock, 5. Vera Götz, 6. Astrid Gläsel, 7. Luisa Bonolis, 8. Angela Axworthy, 9. Giulia Giannini, 10. Sascha Freyberg, 11. Sonja Brentjes, 12. Sebastian Kruse, 13. Dirk Wintergrün, 14. Rodolfo Garau, 15. Petra Schröter, 16. Jürgen Renn, 17. Margaret Haines, 18. Ursula Klein, 19. Marie-Luise Mortag, 20. Caroline Frank, 21. Anna Jerratsch, 22. Gül Sürmelhindi, 23. Ulrike Thoms, 24. Gunthild Storeck, 25. Alexander Blum, 26. Joyce van Leeuwen, 27. Hajime Inaba, 28. Lindy Divarci, 29. Christoph Rosol, 30. Georg Pflanz, 31. Alexander Immer, 32. Matthias Schemmel, 33. Birgit Kolboske, 34. Martin Jähnert, 35. Jochen Büttner, 36. Christoph Lehner, 37. Dieter Hoffmann, 38. Antoni Malet, 39. Jaromír Balcar, 40. Beatrice Hilke, 41. Helge Wendt.

Department I

Structural Changes in Systems of Knowledge

DIRECTOR *Jürgen Renn*

Introduction

Since its inception in April 1994, Department I has investigated the history of science as part of a larger history of knowledge, emphasizing the role of practical knowledge and of deep-time continuities, even when focusing on the turning points of modern science. Since 1998, cross-cultural comparisons, in particular between Western and Chinese science, have been one of the hallmarks of the Department's work. Since 2004 the globalization of knowledge in history has been advanced as a central research topic.

Meanwhile these themes are also central foci of research collaborations within and beyond the Institute, most prominently with the Excellence Cluster Topoi and the Berliner Antike-Kolleg, the Collaborative Research Centers "Transformations of Antiquity" and "Episteme in Motion," the Chinese Academy of Sciences, the Minerva Humanities Center at Tel Aviv University, and the Max Planck Institutes that have jointly launched the Max Planck Society (MPG) research and fellowship program "Convivencia: Iberian to Global Dynamics, 500–1750"—namely, the Kunsthistorisches Institut in Florenz and the Max Planck Institutes for European Legal History and for Social Anthropology. The Department has also benefited from additional funding by the Deutsche Forschungsgemeinschaft, the Humboldt Foundation, the German Academic Exchange Service, the German-Israeli Foundation, the Mellon Foundation, and the German Digital Library. In 2014 it was instrumental in cofounding the Centro Internazionale di Studi Telesiani (Nuccio Ordine, Jürgen Renn).

Research in the Department is organized along two major axes: the long-term transmission and transformation of knowledge, and processes of knowledge transfer and globalization. The time-span covered by research projects extends from the origins of human thinking to the challenges of the Anthropocene. The geographical range extends from the decipherment of cuneiform tablets from the Ebla archives in northern Syria (Imad Samir) to the city of Fray Bentos, in Río Negro, Uruguay, where a nineteenth-century industrial chemical laboratory is being reconstructed on the basis of the transmission of scientific knowledge from Europe (Lucía Lewowicz). A new focus of research is the relationship between three interlinked areas: sharing and accumulation processes of scientific and practical knowledge; the economic and social dynamics

of industrialization processes; and various research projects contributing to a historical epistemology of scientific institutions.

The historical investigations are accompanied by efforts to develop further the theoretical framework common to all major projects of the Department, aiming at a historical theory of the evolution of knowledge, which comprises different forms of knowing and learning as well as their contexts. Here, as in other activities, pivotal achievements have been made by young scholars who are pursuing their dissertations under the auspices of Department I. These dissertations were discussed at the Department's regular doctoral colloquium. Thus, concepts and methods of historical epistemology have been explored in various activities dedicated to histories of epistemology, psychology, and the history of science itself. One dissertation project deals with the epistemology of Edgar Wind (Sascha Freyberg). The iconological method he developed can be closely connected to principles of a historical epistemology. In his main philosophical work *Das Experiment und die Metaphysik*, he analyzed the research logics of modern physics to show possible consequences for the concept of nature in general. Another, completed dissertation is dedicated to a historical reconstruction of the development and transformation of German experimental psychology. It traces the evolution of the conceptual as well as the experimental framework of psychology between 1879 and the 1930s, focusing on the work of Kurt Lewin (Anna Perlina). The role played by Kantian and post-Kantian epistemological arguments in the reception of modern physical theories during the 1920s in different European communities has been examined in another dissertation project, carried out at the Universidad Nacional Autónoma de México (Nicolás Gaudenzi). A master's thesis was dedicated to Ernst Cassirer's *Determinismus und Indeterminismus in der modernen Physik* (Pim van der Heijden).

Theoretical questions of historical epistemology and the history of knowledge have also been explored in the context of various workshops and conferences, among them a conference dedicated to the work of Thomas S. Kuhn (2012), a colloquium commemorating Peter Damerow and his work (2013), both held at the Institute, and a conference, co-organized by the Institute, on science as cultural hegemony, which assessed the usefulness of concepts derived from Antonio Gramsci for addressing the political dimensions of the history of science, held in Barcelona in 2014 (Massimiliano Badino, Kostas Gavroglu, Agustí Nieto-Galan, Pietro Daniel Omodeo, Matteo Raldi, Emma Salient Del Colombo). The results of these workshops and conferences are being prepared for publication. A new theoretical framework for dealing with general evolutionary processes, integrating concepts from regulatory network and niche construction theories, has emerged from discussions within the Department and is now being applied to examples from both biological and cultural evolution (Manfred Laubichler, Jürgen Renn). The elaboration of this theoretical framework will be a central focus of future work at the Department, with the aim of outlining a new narrative for global knowledge evolution.

The research projects of the Department are complemented by the development of new tools supporting research on historical sources, interdisciplinary collaboration,

and new forms of dissemination. A broadly diversified publication policy is being pursued, ranging from academic publishers to innovative open-access ventures. The Edition Open Access, a pioneering open-access book series created in collaboration with other Max Planck Institutes, has now been extended to include the new Edition Open Sources, which is jointly supported with the University of Oklahoma Libraries and the Department of the History of Science, Technology and Medicine at the University of Oklahoma. → p. 243

Department I has also been engaged in what we have called “historical epistemology in action,” that is, various dissemination and outreach activities attracting the interest of a larger public in various forms of critical reflection on science and its contexts, among them exhibitions and theater projects, lectures series, “popular” books, projects with schools, interviews and articles in various media, and cooperation with journalists in residence, in particular with Thomas de Padova on the occasion of Galileo’s 450th anniversary in 2014. Also in 2014, several researchers presented the work of the Department to students of Berlin’s Immanuel-Kant-Gymnasium at the school’s annual “Langer Nachmittag der Wissenschaften” (Alexander Blum, Horst Kant, Dieter Hoffmann). During the refurbishing of the Max Planck Society’s Harnack Haus, members of the Department offered their expertise in presenting the Society’s history to the general public. A prominent guest scholar of the Department, the Italian writer and literary scholar Nuccio Ordine completed the extended Italian version of his book *L'utilità dell'inutile* during his stay, reflecting on the dangers of an increasing economization of culture and research. It has meanwhile been translated into seventeen languages and become an international best-seller.

The political dimension of science will also be the focus of an international conference jointly prepared with the Fritz Haber Institute of the Max Planck Society to commemorate the one hundredth anniversary of the first German chemical warfare attack in Belgium at Ypres in April 1915 (Martin Wolf, Jürgen Renn, Bretislav Friedrich, Dieter Hoffmann, Florian Schmaltz). Chemical warfare will be addressed from different disciplinary perspectives, such as the history of science and technology, international law, and ethics. The conference will also discuss problems of nonproliferation and arms control, and include issues such as the ecological long-term consequences of contaminated military sites and the role of dual-use prospects in the application of research results in civil and military contexts.



Members of Department I attend a working retreat in Bad Belzig (2014). From left to right: Christoph Lehner, Alexander Blum, Matthias Schemmel, Lindy Divarci, Jürgen Renn, Florian Schmaltz.

Systematic Longitudinal Studies

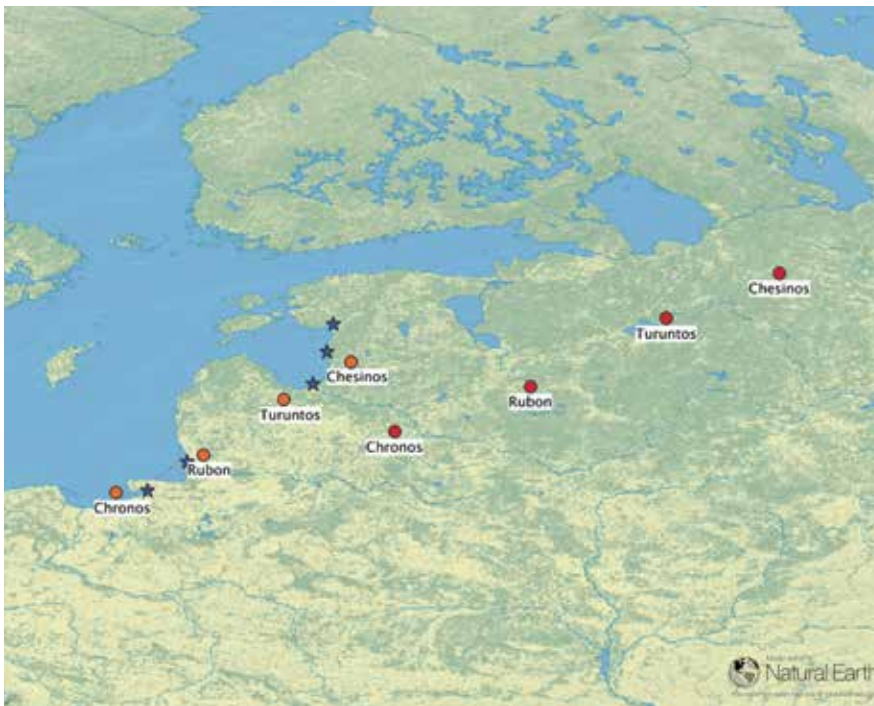
For many decades, the history of science has focused on detailed contextual studies of specific episodes, conceived as belonging to a history of culture. In contrast, the Department has pursued systematic studies of the long-term development of knowledge, attempting to avoid the traps of the traditional history of ideas, which is often characterized by neglecting societal and material contexts. Two major studies aiming at such systematic longitudinal studies have been completed in the period covered by this report: one on the historical epistemology of space, the other on the epistemic history of architecture.

Historical Epistemology of Space: From Ancient Times to the Present

The project on the long-term development of spatial concepts, carried out in the context of the Department's cooperation with the Topoi project cluster, has resulted in the publication of the working-group volume *Spatial Thinking and External Representation*.

The book begins with a general survey of the topic, specifying structures of spatial knowledge under different historical and cultural conditions and characterizing their epistemic status. In the remaining six chapters, different stages of the development of spatial thinking are presented through exemplary studies, which constituted the core of the research project. These studies address (a) spatial concepts in nonliterate societies, comparing spatial languages and practices of the Eipo of Papua New Guinea and the Dene Chipewyan of Canada, two independent, recent nonliterate societies; (b) the impact of notational systems, studying the development from the practical knowledge of Mesopotamian surveyors at the beginning of the third millennium BCE to Babylonian geometry in the middle of the second millennium BCE; (c) theoretical reflections on elementary actions and instrumental practices, using the example of the Mohist Canon, a theoretical text from Warring States China discussing spatial concepts; (d) different types of theoretical reflection, comparing the different approaches of the two major classical "authorities" on cosmology, Aristotle and Ptolemy, in arguing for the centrality of the earth; (e) theoretical reflection in the context of early modern science, discussing attempts to distinguish the concepts of space and matter by means of the notion of impenetrability; and (f) experience and representation in disciplinarily structured science, delineating the fundamental changes in the concepts of space and time brought about by the advanced formalism of twentieth-century physics, which enabled the integration of a growing corpus of experiential knowledge (Matthias Schemmel, Wulf Schiefenhövel, Martin Thiering, William G. Boltz, Irina Tupikova, Pietro Daniel Omodeo, Peter Damerow, Jürgen Renn, Alexander Blum).

Much of the work on this longitudinal study has already been reported on. Two recent research activities have focused on the earliest and latest phases in the mathematization of a global concept of space: ancient spherical geography and astronomy; and general relativity and cosmology. A new interpretation of Ptolemy's geographical coordinates has been proposed. The approach started from the much-discussed assumption that Ptolemy worked with a value for the circumference of the earth that was too small, so that his coordinates have to be transformed using spherical trigonometry to judge the quality of his geographical data. For this approach, localities within one region must always be related to at least one reference point. It turned out that such transformations drastically improve the positions of the locations given in Ptolemy's catalog, at least for a great part of the Oikoumene (Irina Tupikova). The approach thus helps to reveal inconsistencies in former attempts at systems of identification and helps in putting forward new hypotheses and assessing their plausibility. In particular, this approach has been applied to the region of the Tarim Basin, where a whole water system described in Ptolemy, whose identification posed notorious problems, can in fact be identified as a duplicate of another such system (Irina Tupikova, Matthias Schemmel, Klaus Geus). The role played by Ptolemaic geography in the early modern period, in particular for Martellus's maps and Behaim's globe, was also investigated (Günther Görz)



Ptolemaic versus recalculated positions in comparison with the mouths of the rivers Pregolya, Neman, Daugava, Salaca, and Pärnu (blue stars, from left to right). Ptolemaic positions of the mouths of rivers flowing into the Sarmatian Ocean are marked with red circles; the position of the Greenwich meridian is defined by adjusting the Ptolemaic longitude of Rome to its modern longitude. Recalculated to the "Eratosthenian" size of the Earth, positions are marked with orange circles; the reference point of recalculation lies at the Roman camp at Vlie. Map: Quantum GIS 2.6. Open Source Geospatial Foundation Project.

A similar re-evaluation of the relation between experience and mathematical structures has helped to throw new light on the emergence of the relativistic concept of space. The starting point of this study was the observation that new mathematical structures demanding the accumulation of a large corpus of experiential knowledge to emerge in history, in hindsight often needed only a very small portion of that knowledge to imply the given structure. One example is the huge amount of empirical

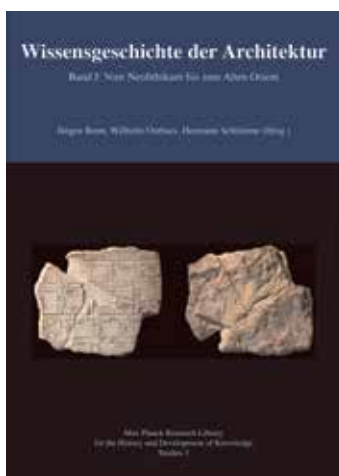
knowledge on electromagnetism that was accumulated in the nineteenth century and eventually brought about special relativity, and yet in hindsight the principle of the constancy of the speed of light is all that is needed from electromagnetism in order to derive Minkowski spacetime. The tension between the bodies of historically necessary and systematically sufficient experiential knowledge in the establishment of new knowledge has been explored as a powerful analytical tool in the study of necessity and contingency in the long-term development of fundamental structures of physical knowledge. In the case of general relativity, this approach enabled an independent analysis of the empirical conditions for the description of the causal structure of spacetime (conformal light-cone structure) and those for the description of its inertial structure (projective geometry) (Alexander Blum, Jürgen Renn, Matthias Schemmel).

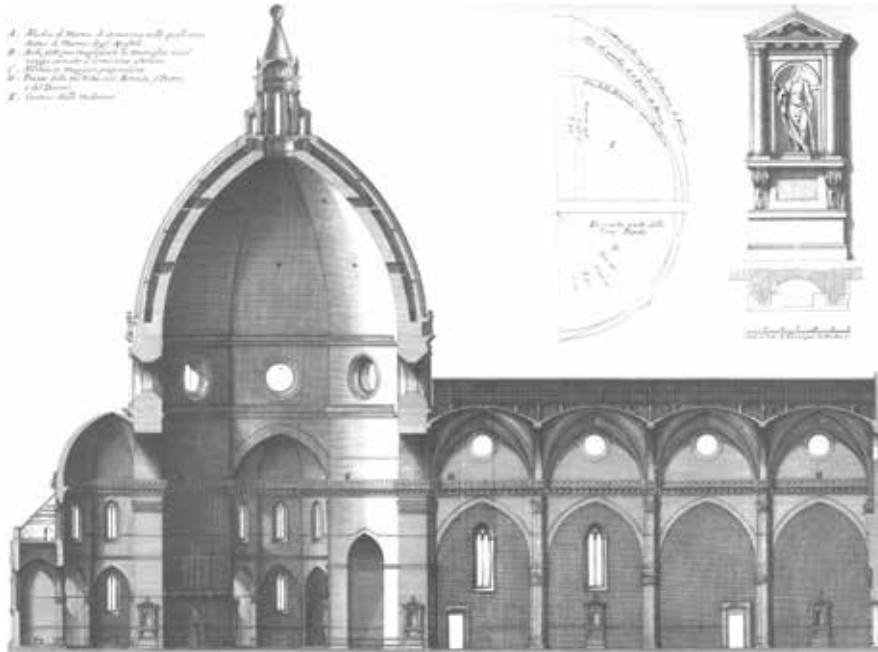
Epistemic History of Architecture: From Ancient Times to the Early Modern Period

The second systematic longitudinal study that has been completed concerns the epistemic history of architecture. It was based on an intensive collaboration with the Bibliotheca Hertziana in Rome. The project covered an extensive range of epochs and geographic regions: from the beginnings of building in the Neolithic age to the advanced societies in Mesopotamia and Egypt, the classical ancient world in Greece and Rome, the medieval religious buildings in northern Europe, and the Italian architecture of the early modern age. The three volumes document the results of an analysis of the knowledge relevant in the process of developing building methods, alongside their material, financial, and human resources, and also examine the representative and symbolic meanings of the constructions themselves. Until the modern age, building was based mostly on practical knowledge gained from experience; thus, it was necessary to consider many different historical sources, such as treatises, artwork, administrative documents, preserved tools, and of course the buildings themselves.

The three-volume publication on the epistemic history of architecture, available at <http://www.edition-open-access.de/studies/3/index.html>.

The research was undertaken by archaeologists, Orientalists, Egyptologists, and historians of construction, science, and art, and took into consideration fundamental





Longitudinal section of the Cathedral of Santa Maria del Fiore in Florence. Engraving by Bernardo Sgrilli, based on the original drawing by Giovan Battista Nelli. From *Descrizione e Studi dell'Insigne Fabbrica di S. Maria del Fiore di Bernardo Sansone Sgrilli, Firenze, Per Bernardo Paperini, 1734* (anastatic edition by the Opera di Santa Maria del Fiore, 1996), Fig. IV.

aspects of the epistemic history of architecture, such as planning, material, construction knowledge, and knowledge about logistics. The research was complemented by a recently completed doctoral work on the emergence of the early modern architectural profession, based on the works of Sieneese architect Francesco di Giorgio (Elizabeth Merrill), as well as by a study of the interaction between scientific developments and architectural design in the nineteenth century, dealing with the construction and use of the Athens Astronomical Observatory (Maria Rentetzi).

In collaboration with the Kunst Historisches Institut in Florence (MPI), the Department contributed to the first comprehensive exhibition on Florence.

The work on an epistemic history of architecture has suggested two major historiographical insights that are being followed up by further research in the Department: the crucial role of institutions as a framework for organizing transfer and transformation processes of knowledge, and the multidimensionality of innovation processes of practical knowledge, including both cognitive and institutional aspects. The important role that administration played in supporting innovation by providing a kind of institutional scaffold for audacious projects is strikingly illustrated by the role of the Opera del Duomo in the ingenious construction of the Florence Cathedral cupola by Filippo Brunelleschi.



The Years of the Cupola is a digital edition of the surviving administrative documentation in the historic archive of the Opera di Santa Maria del Fiore for the period 1417–1436 (see http://duomo.mpiwg-berlin.mpg.de/home_eng.HTML), a joint project with the Opera del Duomo. The completed digital edition has now been complemented by an archive of the entire set of over 10,500 photographs of the archival manuscripts used by the editorial staff for the preparation of the vast textual corpus of over 21,000 documents. The archive includes, for example, UV photos overlaying the images of flood-damaged sources. A studies section is now online which offers an online journal for scholarly studies concerning this collection (Jochen Büttner, Margaret Haines).

The Structure of Practical Knowledge: From Ancient Times to the Early Modern Period

Several research activities of the Department have yielded broader insights into the structures of practical knowledge, its relation to other forms of knowledge, and, in particular, its role in the evolution of scientific knowledge. Because the history of knowledge is such an extremely broad field, research has focused on those aspects relevant to the understanding of the emergence and transformation of science. Research has concentrated on two specific periods: classical antiquity and the early modern period.

Ancient Technology at the Nexus of Innovation and Knowledge

The Department has been part of the Excellence Cluster Topoi since its launch in 2007. Currently, cooperation is pursued in the context of three research groups: (a) a group building a digital “Atlas of Innovations” in the ancient world, in cooperation with the German Archaeological Institute (DAI), (b) a group investigating the relation between the diffusion of water technology and the development of hydromechanics in antiquity, and (c) a group studying the long-term development of weighing from its earliest beginnings in the early third millennium up to the early Middle Ages and the middle Byzantine period.

The Web-based “Atlas of Innovations” allows archaeological data to be represented in flexible forms supporting heuristic investigations into the diffusion of clusters of artifacts as markers of innovation processes (Svend Hansen, Florian Klimscha, Jürgen Renn, Jochen Büttner). To this end, PLATiN (**Pl**ace **A**nd **T**ime **N**avigator), a tool for representing, analyzing, and filtering spatio-temporal data, has been developed (Sebastian Kruse, Jochen Büttner). PLATiN is made available as an open source tool (<https://github.com/skruse/PLATIN>) and is also used by various other research projects.

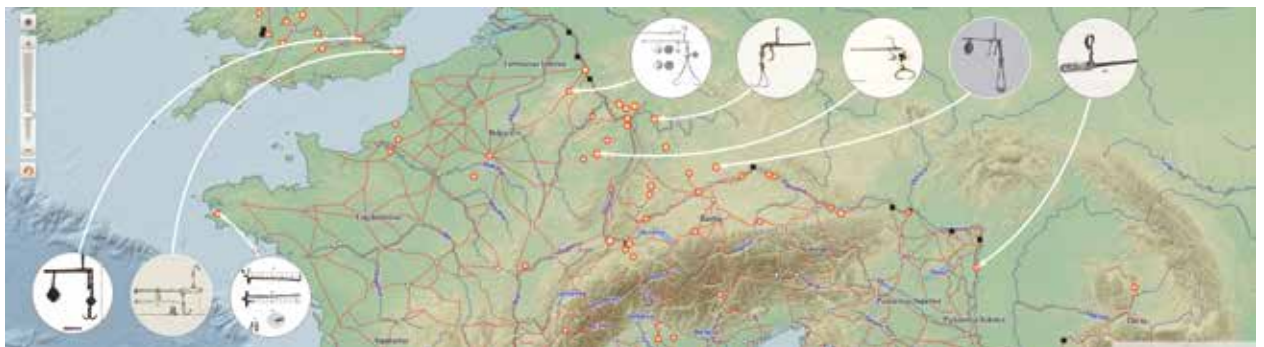
The project “Mapping of Water Technology” investigates the emergence of hydromechanics in the context of water management systems from antiquity to the Middle Ages. Technology, technological innovations, and technological knowledge diffusion processes represent a constant and continuous impulse toward theoretical development (Matteo Valleriani, Emine Gül Sumelihindi). The objective of this recently launched research project is the systematic mapping of the spread of water technology in the ancient and medieval worlds. An initial survey of the diffusion of water technology has already been carried out (Matteo Valleriani).

The research group studying weighing technology was established in November 2012 (Jochen Büttner, Dirk Rohmann, Jenny Schlehofer, Anette Schomberg, Ilyas Özşen). The group models the innovation process of weighing technology on the basis of

→ p. 251

existing material evidence and interprets it by reconstructing the historical circumstances under which it arose. In 2013, specialists on various Bronze Age cultures were brought together in a workshop (<http://www.topoi.org/event/22085>) that resulted in the first comprehensive picture of the emergence, spread, and impact of scales, weights, and weighing in early cultures. The evolution of the balance from the earliest evidence in the third millennium to its classic form in the New Kingdom has been traced on the basis of preserved archaeological evidence as well as imagery and texts from Egypt (Jochen Büttner, David Warburton). A comparative study that included Mesopotamia established that the origin of weighing probably lies in Egypt.

The group investigates, in particular, ancient balances with arms of variable length, the most familiar of which is the Roman balance, also commonly referred to as the steelyard. A catalog of more than seven hundred ancient balances has been prepared (Anette Schomberg). Special attention was paid to the reconstruction of the practical knowledge resulting from experience with the design, production, and usage of balances. Thus, for instance, the metallurgic composition of the alloys used in casting steelyards was probed in cooperation with the Landesmuseum Bonn to understand how general knowledge concerning metal processing and workmanship specifically manifested itself in the case of steelyard production. In order to gain information on the usage context of steelyards, the surviving literary, epigraphical, and papyrological sources were surveyed (Dirk Rohmann). The textual sources suggest how the normative social processes of establishing, maintaining, and controlling weight standards were changed by the introduction of the steelyard as a new weighing technology.



The spread of the steelyard over the vast geographical area covered by the Roman Empire and its persistence over time can be characterized as a complex innovation process in which different subtypes of steelyards emerged and replaced each other. It could be shown that balances of the same type, besides being morphologically similar, obey certain general principles, that is, they show repeating complicated patterns in the relations between the relevant design parameters. These regularities are the result of recurrent similar actions in their production. These results highlight an essential but unappreciated aspect of ancient technology: the production of technical artifacts according to complex rules that determined their essential properties, thus equipping these objects to fulfill their expected functions.

Findspots of different types of Roman steelyards mapped onto the Barrington atlas of the Roman world.



In collaboration with the Museo Galileo in Florence, the Department was involved in the creation of a major exhibition on Archimedes and his historical impact, shown at the Musei Capitolini in Rome. The exhibition was accompanied by a scientific catalog with contributions by seven members of the Department.

Early modern woodblocks are artifacts carrying knowledge and were continuously reused in the production of different scientific works. Woodblocks as codification of practical and learned knowledge are investigated by Bruce Moran in the working group "The Structures of Practical Knowledge." Woodblock "Fregaria," Houghton Library, Houghton TypR-87 (1-3). Printed in "Fregaria" from Mattioli, P. A., 1563. New Kreuterbuch. Prague: G. Melantrich, 437v.



Some of these rules have been reconstructed on the basis of an in-depth study of the individual objects (Jochen Büttner, Anette Schomberg). To this end, autopsy campaigns in various German and European museums have been conducted in which the balances have been recorded by means of 3-D scanning. The digital models thus produced serve as the basis for a reconstruction of the construction rules and will be made available as research data together with the catalog in preparation.

A new model for the evolution of complex systems based on an integration of regulatory network and niche construction theories has been applied to explain the innovation dynamics of the evolution of the steelyard and its impact on theoretical knowledge, and in particular on Aristotelian mechanics (Jürgen Renn, Jochen Büttner, Manfred Laubichler, Peter McLaughlin). Research on Aristotelian mechanics has been further enriched by an in-depth study (Ido Yavetz) devoted to the analysis of the consistencies between Aristotle's dynamics of balances, as expressed in his *Mechanical Questions*, and his theory of material bodies in motion, as expressed mainly in the *Physics and On the Heavens*.

Practical Knowledge in the Early Modern Period

The role of practical knowledge in the emergence of early modern science has been studied by the Department extensively in the past, particularly in the area of mechanics. It was therefore one of the aims of research pursued in the period covered by this report to validate some of the conclusions for fields other than mechanics in an attempt to build a historiographical framework for understanding the role of practical knowledge in early modern science more generally. The main endeavor in this direction was the collaborative research performed in the context of the working group "The Structures of Practical Knowledge (1500-1700)," which involved more than twenty international researchers who met regularly over a period of two years. In addition, two major books have been published which are dedicated to influential engineer-scientists of the sixteenth century, Niccolò Tartaglia and Guidobaldo del Monte. Finally, work on digital resources for the study of early modern science has made major progress.

The working group is organized around two key questions: How did processes of codification of practical knowledge shape the emergence of scientific knowledge, and how did such processes depend on specific social con-

texts? The group has amassed a collection of sixteen case studies whose themes range from metallurgy to cosmology. They investigate both the social and institutional context and the internal configuration of practical knowledge. In particular, because the early modern period was an era of technological boom, the continuously increasing number of technological enterprises required ever more elaborated practical knowledge and skills. As a consequence, traditional social structures and actors involved in knowledge production turned out to be no longer capable of dealing with the ensuing challenges. Against this background, one main goal of the working group is to reconstruct the new knowledge economy emerging from these challenges.

In one specific case—ballistics—it has been possible to detail how the restructuring of practical knowledge and technological innovations has shaped new scientific theo-



The relation between astronomical, astrological, and medical knowledge is investigated by Richard L. Kremer in the working group “The Structures of Practical Knowledge.” Zodiac Man and bloodletting scenes from Johannes Wonnecker, *Almanac* for 1499 (Basel, 1498).

ries. This study was concluded in 2013 with the publication of a new edition of Niccolò Tartaglia’s *Nova scientia*, a work that led to the foundation of the modern science of ballistics (Matteo Valleriani). Tartaglia’s intention was to create a purely mathematical science based on axioms, which was fundamental to the entire subject of mechanics, starting with a limited number of principles and arriving at a series of propositions through a rigid procedure of deduction. Nevertheless, as Tartaglia himself states, his primary motive was fundamentally practical and connected to the activities of the sixteenth-century bombardier. The study was able to show how the emergence of theoretical ballistics was a consequence of (a) the technological innovations that took place in the context of the practice of iron casting at the turn from the fifteenth to the sixteenth century, (b) the standardization of models of heavy artillery due to the institutional intervention of states and political entities in general, and (c) the beginning of an externalization process of the knowledge of the artillerymen due to the need to spread such knowledge.

The role of practical knowledge in the early modern transformations of geometry has, moreover, been studied by way of Thomas Harriot’s work on motion. It could be shown, in particular, how Harriot’s concern with problems of artillery led him to

→ p. 209

consider mathematical curves formerly not treated in geometry, to apply algebraic methods to geometry, and to consider infinitely small quantities (Matthias Schemmel). The results were presented at the conference “Geometry and Mechanics,” which was organized by the Max Planck research group “Modern Geometry and the Concept of Space.” A parallel case is the burgeoning use in early modern times of geometry as an instrument for solving structural problems in theoretical music. It had repercussions on the concept of number, in particular relating to questions of the continuum, as has been demonstrated using the work of Erasmus of Höritz (Oscar Abdounur).

→ cover of this report

Another important engineer-scientist was Guidobaldo del Monte. After much research dedicated to his work, in particular to his work on mechanics, he has now become the object of a more comprehensive study that includes his many activities in fields ranging from sundials to perspective. The results were published in 2013 (Antonio Becchi, Domenico Bertoloni Meli, Enrico Gamba, Pietro Daniel Omodeo, Jürgen Renn). The camera obscura, widely used in early modern science and art, has been researched as part of the prehistory of photography by Montserrat de Pablo, using an experimental device available at the Institute.

→ p. 241f, 247

These research endeavors have been supported by developments in the digital humanities. The online edition of Thomas Harriot’s manuscripts, in which the content of the individual folios is classified and mapped thematically and presented together with transcripts, translations, and commentaries, has been extended. The image material is now complete: in addition to the circa 8,000 folio pages from the British Library, the roughly 2,300-page manuscript material in the possession of Lord Egremont, Petworth House, Sussex, has been digitized, processed, and entered. The classification, transcription, and commentary have been augmented considerably, and now comprise all folios on algebra, arithmetic, combinations, and geometry, as well as a large amount of the folios on mechanics and optics (Jacqueline Stedall, Matthias Schemmel, Robert Goulding, Klaus Thoden, Dirk Wintergrün, Urs Schoepflin, Jochen Büttner, Simone Rieger).

We mourn the untimely death of Jackie Stedall (1950–2014), historian of mathematics at Oxford University and close collaborator on the Thomas Harriot Online Project, a congenial scholar, and a dear friend. Photo with kind permission of her daughter, Ellie Stedall.

Work on the role and structure of practical knowledge was also supported by a database of machine drawings. Building on earlier work, the database now comprises around 1,850 drawings from 41 different authors/documents. These drawings have been systematically analyzed with regard to technical components and pictorial language in a social context. They are available as part of the Archimedes digital research library, and include rare manuscripts from the fifteenth and sixteenth centuries (Wolfgang Lefèvre, Marcus Popplow).



Transforming and Melding Ancient Knowledge: From Classical Antiquity to the Enlightenment

In addition to systematically studying the long-term development of knowledge and the interaction between practical and other forms of knowledge, processes of reshuffling and reorganizing knowledge have been investigated. These processes have been studied along two dimensions, a diachronic longitudinal one and a geographic or culturally transversal one. Two theoretical frameworks have thus been relevant to these investigations. For diachronic transformation processes, reference has been made to the framework of the Cooperative Research Center 644 “Transformations of Antiquity” at the Humboldt-Universität zu Berlin, which comprises detailed analytical tools and terminology for describing such transformation processes. For transversal transformation processes, reference has been made to the theoretical framework of the project “Globalization of Knowledge in History,” completed during the period covered by this report. In the following, we consider these processes from two complementary perspectives, one emphasizing the long shadow of antiquity, the other underlining attempts at constructing a distance from it, or even declaring its finale.

The Long Shadow of Antiquity

Globalization processes of knowledge already took place in antiquity. Exchange processes connecting different parts of the Western Eurasian world of the first millennium BCE have been studied in various contributions to a volume produced in the framework of the globalization project, entitled *Melammu: The Ancient World in an Age of Globalization* (ed. Markham J. Geller). Discussions on early globalization processes were also prominent at a colloquium held in honor of the late Professor Dr. Burchard Brentjes (1929–2012). The discussions involved experts on ancient Near Eastern archaeology, ancient and medieval Central Asian archaeology, Islamic art history, museology, economic history, and Syriac studies.

The “Cuneiform Digital Library Initiative” (CDLI), a cooperative venture with UCLA and Oxford University, continues to serve as a backbone for historical explorations of the early history of writing and quantitative thinking, now mainly pursued by guest scholars at the Department (Jens Høyrup, Imad Samir, Luděk Vácín, Jacob Dahl, Robert Englund). In line with efforts to collect and publish cultural heritage sources pertinent to the Department’s projects, cuneiform artifacts preserved in different collections all over Europe and the Middle East have been digitized and made openly available. In the meantime, more than one thousand tablets from the collection of the Vorderasiatisches Museum, Berlin, have been added. A collection of cuneiform tablets from the Ebla archives (2400 BC) includes detailed information about the economy and administration of the kingdom of Ebla. The Department has contributed to the editorial work and to a linguistic and historical analysis of these texts (Imad Samir). Another major collection of ancient texts is the Hilprecht Collection



An administrative text from Ebla (ca. 2350–2250 BC) recording the monthly distribution of textiles—various types of fabrics and quantities of wool—to people with diverse functions (CDLI n° P242278).

preserved at the University of Jena. It is the focus of a pioneering digitization endeavor featuring 3-D scans of cuneiform tablets (Manfred Krebernik, Matthias Schemmel, Dirk Wintergrün).

Globalization processes in the first millennium, as studied in the contributions to the Melammu volume, had far-reaching consequences. In the second half of the first millennium BCE, previously accumulated and diffused practical knowledge as well as knowledge about natural phenomena became the object of reflections leading to a partial reorganization of this knowledge. Interestingly, these reflection and transformation processes took place almost simultaneously at both the western and eastern ends of the Eurasian continent. This concurrence raises questions about the interdependencies of such processes. These questions are usually answered without taking into account the complex architecture and developmental dynamics of knowledge. However, to understand processes of knowledge transfer, it is particularly important to recognize the hierarchical structure of knowledge that conditions its developmental dynamics. Whereas certain knowledge structures shared by different societies may be attributed to a universal knowledge base, and others to earlier processes of knowledge transmission, still other structures may have evolved independently but on the basis of shared knowledge.

One striking parallelism between European and Chinese antiquity is the emergence of the theoretical knowledge that results from reflections on practical and elementary knowledge. In the European case, it is documented, among others, by the writings of the pre-Socratics, Aristotle, Euclid, and Archimedes. In the Chinese case, such theoretical knowledge is documented in the later Mohist corpus, a Chinese source from around 300 BCE. Earlier research at the Department has clarified that differences in the character of theoretical reflection may ultimately be explained by the path-dependency of the emergence of different forms of knowledge, such as reflections on language preceding or following cosmological worldview building.

The translation into English of and commentary on the 57 sections of this corpus, which deals with matters of mechanics, optics, and spatial relations, have been completed. One aspect of the new understanding resulting from this work concerns the character of theoretical reflection in ancient China as compared to ancient Greece. While similarities in the independent sources from the two societies can be explained, at least in part, by similarities in the elementary and practical knowledge reflected on by these sources, concrete theoretical concepts such as “effectiveness” and “hard-and-whiteness” in China and “center of gravity” and “contraries” in Greece are clearly dependent on the developmental pathways that are conditioned by the larger context of theoretical debate (William G. Boltz, Matthias Schemmel).

In the Chinese case, we are dealing with a rather small corpus of very limited influence on the later development of Chinese thinking, and with no impact outside the Chinese realm. In contrast, in the European case, we are confronted with a considerably larger corpus which profoundly shaped the global history of knowledge. In order to understand this globalization process, a series of workshops were held to trace what we have somewhat provocatively termed the “Aristotelization of the World.” The workshops were organized by members of the Department and involved international groups of experts for the different aspects of Aristotelianism. What were the processes and the reasons for the spread of the Aristotelian corpus and of Aristotelian ways of thinking, and how was Aristotelianism transformed over the course of its long history from classical antiquity to the emergence of modern science and beyond?

The first workshop took place in 2012 and dealt with the spread of Aristotelian doctrines from Greece to the Hellenistic world (Matteo Valleriani). The second workshop focused on the intensive engagement of Galen (d. 216) with Aristotelian doctrines (Helge Wendt). The discussions elucidated the complex relation between new medical knowledge, its cultural legitimation, and epistemic norms within the Aristotelian knowledge system. The third workshop encompassed two different, but spatially and chronologically interrelated, linguistic spheres: Syriac and Arabic (Sonja Brentjes). The participants discussed the content and context of translations of Aristotelian works, in particular the *Organon*, into Syriac and the trajectories that interlinked the study of Aristotelian works in Syriac with those in Greek in either of the two main Syriac cultural environments (Byzantine, Sasanian). The fourth workshop was dedicated to the transmission and appropriation of Aristotelian knowledge in Byzantine times (Joyce van Leeuwen). It mostly focused on the treatment of Aristotle’s natural philosophy in the middle Byzantine period and in particular on the meteorological treatise by Eustratios of Nicaea, which combines a strong reliance on the Aristotelian tradition with pedagogical intentions. A comprehensive analysis of the Greek manuscript transmission of the Aristotelian *Mechanics* is currently in press (Joyce van Leeuwen). A fifth workshop will be dedicated to Aristotelianism in the Latin Middle Ages. An investigation of the impact of the Latin Avicenna on the Western culture of the period is being undertaken in preparation for this workshop (Isabelle Draelants).

Burgerbibliothek Bern, Cod. 402, f. 102v.
A page from a fifteenth-century manuscript of the pseudo-Aristotelian *Mechanics*, copied by Niccolò Leonico Tomeo. The diagrams illustrate balances with different suspension points as explained in Problem 2 of the treatise.



Transformation processes of ancient knowledge cannot, however, be understood by referring exclusively to textual traditions. It was thus important to connect the study of transformation and globalization processes with the Department's emphasis on practical knowledge. Recent research has in fact shown how processes of the appropriation and, consequently, transformation of ancient science can be best described historically from a perspective that focuses on the context provided by technological knowledge. Several studies, published in a special journal issue, were dedicated to land-surveying practices from the Hellenistic theoretical tradition to Roman practice, to the transmission of Aristotelian mechanics from antiquity into Byzantine science, to the appropriation of Euclid's *Optics* in the context of the Arabic scientific tradition, and to the role of ancient pneumatics in the practice of early modern hydraulic engineers (Matteo Valleriani). The role of technical terminologies at different stages in the long-term development of theoretical knowledge has also been investigated in the context of a workshop organized in the Topoi framework by Markus Asper (Matthias Schemmel).

The Finale of Antiquity

In the period immediately following the breakdown of the Western Roman Empire, the wider Mediterranean world remained highly connected, with distant territories eventually becoming strongly related to it, such as the Arabian Peninsula, the Indian subcontinent, and central Asia, mainly in the sequel to the expansion of the early Islamic empires. In the centuries often characterized as "post-antiquity," people, material objects, ideas, and knowledge continued to migrate across vast geographical spaces. But knowledge exchange took place in an increasingly heterogeneous political, economic, and cultural landscape, implying immense losses but also striking innovations. Some historical actors attempted to construct a distance from the ancient world and at the same time strongly relied on its cultural heritage. This dialectical reference to the ancient heritage may be characterized as a process of recentering. Such recentering took place not only in the successor states of the Roman Empire, but also in what became the Byzantine Empire and the Islamic world.

A workshop held in October 2012 was dedicated to processes of the globalization of knowledge in the Mediterranean world of post-antiquity. It dealt with themes that ranged from the transfer of knowledge of mechanics, alchemy, navigation, philosophy, mapmaking, bookmaking, religion, and medicine to a reflection on modern historiography of the Islamic world and the Christian world in cross-cultural contexts. Extended versions of all papers presented at the conference were precirculated. The results of the workshop are being published in a working-group volume, edited by Sonja Brentjes and Jürgen Renn.

A further collaborative book project reviews current historiographical debates among historians of the late antique and early Islamic economy (Khodadad Rezakhani). An important issue for understanding the globalization of knowledge in the transition from late antique to Islamic states is the interpretation of the variegated efforts to

translate texts and their cultural, political, linguistic, and religious contexts. Major historiographical narratives of translation are therefore being re-examined in a collaborative research project with the University of Seville, cofunded by the Spanish Ministry of Economy and Competitiveness (José Luis Mancha, Sonja Brentjes). In 2014 the Department hosted a research seminar on Byzantine and cross-denominational cooperation in western Europe and the Middle Eastern Crusader states. In addition, an interdisciplinary study circle was created, bringing together classicists, Byzantinists, Coptologists, Iranologists, archaeologists, Islamicists, and historians of science (Sonja Brentjes).

Apart from the transmission of various forms of practical knowledge and the dynamics of translation and transformation processes, one of the key topics investigated was religious knowledge or, rather, more generally, “identity knowledge.” Such knowledge is characterized by its inherently self-reflexive or second-order character, relating all other forms of knowledge to questions of one’s own identity and belonging to a larger community. Such “identity knowledge” evidently counted among the most precious forms of knowledge in the era of post-antiquity, a time of rapid political turnovers, of shifting boundaries and alliances, of identities shaped by far-reaching networks, and of the powerful resilience of an ancient heritage which as a totality, however, was irrecoverably lost to the past.

The relation between knowledge and identity formation will also be central in the collaborative research project “Convivencia,” which has been in preparation for some time and has now been granted support by the Max Planck Society. Dedicated to studying the processes leading from Iberian to global dynamics in the period between 500 and 1750, this project is a collaboration with the Kunsthistorisches Institut in Florenz (Max Planck Institute), the Max Planck Institute for European Legal History, and the Max Planck Institute for Social Anthropology, together with their international partners, in particular the Consejo Superior de Investigaciones Científicas in Madrid and the University of Chicago (Sonja Brentjes, Jürgen Renn, Matteo Valleriani, Helge Wendt). Preliminary results were presented at a conference organized by the Department in 2013, which was dedicated to transfer processes of knowledge in the Iberian colonial world, and at the panel “Speaking through Objects” at the EHS conference in Lisbon in 2014 (Sonja Brentjes, Helge Wendt).

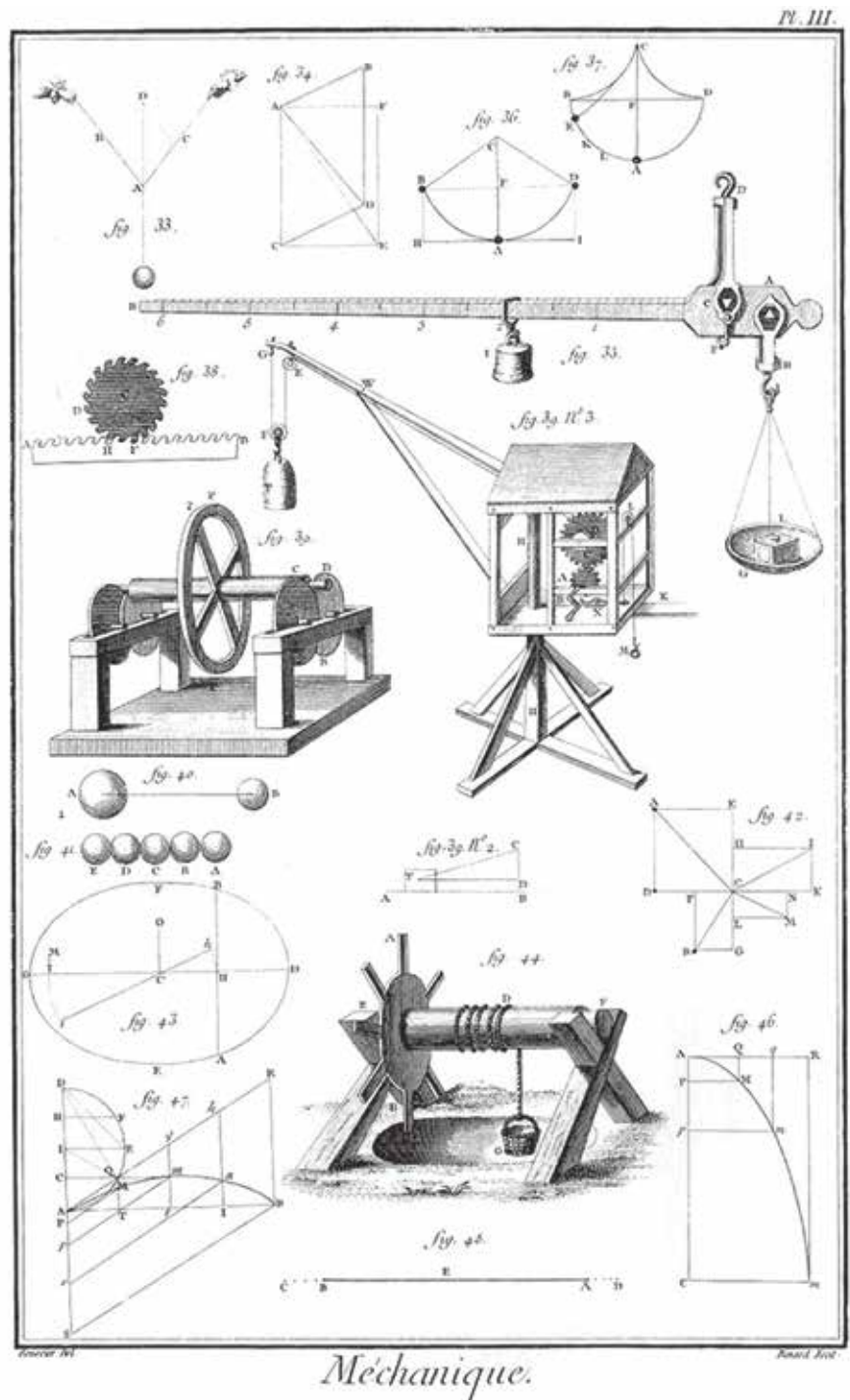


Page from a Mamluk manuscript (fourteenth century) depicting the use of scales. Courtesy Bridgeman Images.

The spread of religions, in particular through missionary activities, has also played a major role as a conduit for the globalization of other forms of knowledge. The transmission of European science to China in the seventeenth century is a paradigmatic case for science as a fellow traveler of religion. Surprisingly, however, many aspects of the interaction between the two systems of knowledge remain unexplored. They are now being investigated as an example of an epistemic *histoire croisée* in which the encounter of different forms of knowledge is not conceived as an ultimately cumulative process, but as an interference of mutually exclusive perspectives. The *Yuanxi qiqi tushuo luzui* (A Record of the Best Illustrations and Explanations of Remarkable Machines from the Far West) was the first Chinese book on Western mechanics in the Chinese language, compiled and written by the German Jesuit Johann Schreck and the Chinese scholar Wang Zheng and published in 1627. In an earlier cooperative venture with the Institute for the History of Natural Sciences at the Chinese Academy of Sciences, a Chinese edition with commentary and explanatory essays had been published. In the period covered by this report, work on a critical English edition has advanced, and the network of acquaintances of the two authors has been further explored. One finding is that, in late Ming times, the influence of only a few Jesuit missionaries in China was multiplied by the network of Chinese scholar-officials interested in their scientific and technical expertise. In the course of this work, surprising aspects of the transformation of European knowledge in its transfer to China have come to light, such as the arithmetization of geometrical procedures and the replacement of proofs by systematic variations of problems (Jürgen Renn, Matthias Schemmel, Zhang Baichun, Tian Miao, William G. Boltz).

A long-term and cross-cultural history of mechanical knowledge remains an important reference point for research in the Department, and a workshop was dedicated to this objective in 2014. The *Liber de triplici motu* by Alvarus Thomas (1509) has been studied as a missing link between medieval and preclassical mechanics, further illuminating the ramified pathways along which Aristotelian science shaped the emergence of modern science (Stefan Trzeciok). A central theme of recent research was the models of causality underlying scientific theories and practices in the Middle Ages and the early modern period. Several studies have been dedicated to Renaissance notions of the “contingency” of nature as an explanation for the evident lack of absolute regularity among observed natural phenomena when confronted with the stringency of mechanistic and mathematical laws allegedly governing their behavior (Jürgen Renn, Pietro Daniel Omodeo, Rodolfo Garau). In this context, investigations of the way in which early modern mathematics was shaped by the interaction between practical and theoretical traditions also turned out to be relevant (Antoni Malet). A book project dedicated to a comprehensive analysis of preclassical mechanics and its transformation into classical mechanics is being completed (Rivka Feldhay, Peter McLaughlin, Jürgen Renn, Matthias Schemmel, Matteo Valleriani). Some of its findings regarding the transformation of key concepts of mechanics have been confirmed and complemented by research on the emergence of the concept of pressure (Alan Chalmers).

The key question guiding research on the history of mechanical knowledge in the period covered by this report was, however, that of the “finale” of antiquity. In which sense can the profound transformations of science during the eighteenth century, in particular the emergence of analytical mechanics, be understood as a definitive break with earlier traditions going back to classical antiquity? Research on this question was performed in the larger context of the Collaborative Research Center (CRC) 644 “Transformations of Antiquity.” One study in this context was dedicated to a reconstruction of the development of analytical mechanics in connection with a shift from Aristotelian and scholastic arguments to a mathematical representation based on analytical geometry and infinitesimal calculus (Christoph Lehner). Another study was dedicated to related aspects of the transformation of scientific practice and science organization in the long eighteenth century (Helge Wendt). Some of the results were presented in 2014 at the annual conference of the collaborative research center in a paper entitled “Mechanics in the *Querelles des Anciens et des Modernes*.”



The plate on mechanics from the *Encyclopédie* edited by Denis Diderot and Jean Le Rond d'Alembert relates, technological problems to the new methods of analytics, representing the emerging field of analytical mechanics.

Networks and Institutions of Knowledge: From the Late Middle Ages to the Early Modern Period

The transmission of knowledge can be understood as taking place within an epistemic network in which the nodes (or vertices) constitute possessors or potential possessors of knowledge, such as individuals, groups of artisans, and scientific communities, and the links (or edges) constitute the routes that knowledge must travel to reach from one node to another. Epistemic networks are not random networks, but rather are characterized by a topology in which certain nodes—termed hubs—are especially important in that they are connected to many other nodes. As to the longevity of knowledge accumulation within such networks, it is their high interconnectivity that prevents knowledge growth from being limited by the ephemeral fortunes of local centers, as knowledge travels easily and is no longer dependent on a single center. In sum, traveling is a way of preserving knowledge.

The creation and development of epistemic networks from the late Middle Ages to the early modern period has become a central concern of research in the Department. This research is mainly performed within the framework of the Collaborative Research Center 980 “Episteme in Motion” at the Freie Universität Berlin. It focuses on two areas: the spread and transformation of astronomical knowledge, and the emergence of scientific institutions. For the new narrative of the globalization of knowledge in history, these areas are relevant because the successful expansion of scientific knowledge within late medieval and early modern Europe created a model essentially followed by all later globalization processes of science, including the replication of institutional settings and canons of knowledge. The thus emerging network of scientific knowledge exhibited self-organizing behavior, as is evident from the fact that there was no central control of scientific practice, and yet scientific knowledge accumulated at an astonishing rate and traveled quickly among scholars throughout Europe. Positive network externalities fostered the inherent dynamics of spreading science, so that it became more useful as more people became engaged in it.

The Pioneering Role of Astronomy

On the basis of conceptual instruments borrowed from network theory—as developed in sociology over the last fifteen years—a set of scholarly treatises that went under the name *De sphaera* by Johannes de Sacrobosco is being analyzed in order to understand how knowledge was transferred and transformed during the early modern period (Matteo Valleriani). The treatise is a qualitative disquisition on geocentric cosmology. It was written during the thirteenth century but then continuously rewritten, commented on, expanded, and, after the diffusion of print technology, reprinted about four hundred times until the end of the seventeenth century. The

different versions of Sacrobosco's treatise are just a subset of the treatises dedicated to the same subjects related to cosmology and printed during the early modern period. The impressive total number of publications addressing these subjects during the Renaissance implies that the results of this analysis could represent the basis for understanding one of the most significant contributions to the emergence of a common scientific and therefore cultural identity in Europe during this era.

The investigation of the *sphaera*, seen as the medieval and early modern discipline of spatial and natural order, also brought into focus the gradual diversification of this "interdisciplinary" subject into the modern fields of geography, astronomy, meteorology, physics, and natural philosophy between the sixteenth and the seventeenth centuries (Pietro Daniel Omodeo, Klaus Vogel). Research on the *sphaera* benefited from the creation of a database of early modern publications in spherical astronomy (Matteo Valleriani, Johanna Biank), which fostered new research on the Renaissance reception and circulation of classics from authors such as al-Farghani, Sacrobosco, and Pseudo-Proclus. A series of workshops on the history of spherical astronomy took place on a regular basis with several international guests (Anna Jerratsch, Pietro Daniel Omodeo).

More generally, epistemic continuities and discontinuities in the passage from the medieval cosmos to post-Copernican astronomy have been investigated by a research group of the Collaborative Research Center 980 "Episteme in Motion" (Pietro Daniel Omodeo). Special attention was dedicated to the cultural debates associated with Copernicus's major work, *De revolutionibus orbium coelestium* (Pietro Daniel Omodeo, *Copernicus in the Cultural Debates of the Renaissance*, 2014). Copernicus's heliocentric astronomy also encouraged a new critical appropriation and reworking of classical sources of astronomy and natural philosophy, such as Ptolemy and Pliny (Pietro Daniel Omodeo, Irina Tupikova).

A regular colloquium, involving an international group of invited speakers, focused on astronomical and philosophical issues of spherical astronomy (Miguel Ángel Granada, Jonathan Regier, Pietro Secchi, Irina Tupikova, Rienk Vermij, Ido Yavetz). The ethical dimension of early modern cosmology has been studied in particular in connection with Giordano Bruno's work (Luiz Carlos Bombassaro). In this context, early cometary theories can be seen as a paradigmatically in-between topic bringing together meteorology, natural philosophy, astronomy, astrology, and theology

Frontispiece of a cometary tract depicting the dual character of comets as observable natural phenomena and divine signs. From Christian Theophilus, *Cometen, Propheten*, 1665.



(Anna Jerratsch). The conference “Meta-Scientific Foundations of Astronomy (IX–XVII Centuries) and Their Cultural-Institutional Settings” (Berlin, 2014) explored the embedding of ancient and medieval astronomy in metaphysical and institutional frameworks (Pietro Daniel Omodeo, Luis Miguel Carolino, Sonja Brentjes, José Luis Mancha, Matteo Martelli).

The Institutionalization of Knowledge in the Early Modern Period

Institutions are means of reproducing the social relations existing within a society, and in particular the societal distribution of labor. They involve knowledge on various levels. They must embody and transmit the knowledge required by individuals to anticipate actions complying with institutional regulations, including knowledge on social control and on how to resolve conflicts. With the separation of intellectual and manual labor in ancient societies, the production and transmission of knowledge became part of the societal distribution of labor. A separate knowledge economy with its own epistemic institutions emerged, which had to be sustained by the material economy of a society and integrated into its other institutional frameworks. The latter challenge was enhanced by a feature characteristic of institutions, namely, their struggle for autonomy as self-referential fields of societal interactions. Universities and academies as they were created in the Latin West during the Middle Ages and the early modern period are studied as examples of the evolution of such knowledge economies.

The institutionalization of knowledge (including its canonization) in the framework of universities was marked by the embedding of novel theories into existing curricula and cultural traditions. The latter consisted in practices of teaching and of knowledge dissemination (notably *lectio*, commentary, *disputatio*, *quaestio*, and *exercitatio*), in customary forms of professors’ recruitment, and in disciplinary separations linked to faculty hierarchies (e.g., the subordination of the professors at the Faculty of Philosophy to those of Medicine or Theology), as well as in the reliance on a codified corpus of canonical sources and textbooks prescribed by statutes (Pietro Daniel Omodeo). The investigation of early modern teaching institutions concentrated on universities and gymnasia that were initially based in Germany (Wittenberg, Leipzig, Rostock, Frankfurt an der Oder, Helmstedt, Stettin) and became part of far-reaching connections ranging from England and Scotland (e.g., Aberdeen) to the Netherlands (Utrecht, Leiden, Groningen), Denmark (Copenhagen), Sweden (Uppsala), and Poland (Gdańsk), including East Prussia (Königsberg).

In the wake of Philipp Melanchthon, Aristotelianism was allotted a central function for the organization of knowledge, scientific production, and teaching at Protestant universities from the mid-sixteenth up to the late seventeenth century. In this context, the interactions between Copernican and Cartesian cosmology, on the one hand, and Protestant Scholasticism, on the other, shed light on the mechanisms of knowledge transfer and epistemic transformation in European academic networks. Conflicts between innovators and traditionalists often led to quarrels but also to negotia-

tions with the aim of merging novel and old doctrines. Furthermore, the transfer of mathematical and astronomical knowledge from German *Mitteleuropa* to Great Britain has been considered through the reconstruction of the education and career paths of modern *clerici vagantes* (Karin Friedrich, Pietro Daniel Omodeo). Finally, the political dimension of early modern teaching institutions could be studied on the basis of the contrasts between established universities and Jesuit colleges, in particular in Paris, Padua, and Turin at the end of the sixteenth century.

In the case of the early modern scientific academies, institutionalization was characterized by the progressive shift from a social system of knowledge grounded on patronage networks to one based on state-sponsored organizations (Giulia Giannini). This transition was marked by the creation of collective and experiment-based scientific organizations, complementary to universities, and in various ways tied to the political power (either simply patronized or wholly established by sovereigns). The establishment of these new learned bodies institutionalized, fostered, and prescribed specific scientific practices, alternative processes of legitimacy, and new protocols of argumentation and communication. The analysis of the emergence of scientific academies has been undertaken from a comparative perspective taking into account three major case studies: the Accademia del Cimento in Florence (1657), the Royal Society in London (1660), and the Académie Royale des Sciences in Paris (1666). In the period covered by this report, a great deal of the work focused on the study of the Cimento academy in Florence and its large corpus of manuscripts. The conference “The Institutionalisation of Sciences in Early Modern Europe” (Berlin, 2014) was devoted to the study and comparison of early modern scientific institutions (Giulia Giannini, Mordechai Feingold).

Henri Testelin, “Colbert Presenting the Members of the Royal Academy of Sciences to Louis XIV in 1667.”



Moreover, alongside universities and academies, less formalized circles and international networks of scholars have been scrutinized. These communities of learned people circulated ideas, knowledge, and techniques through intense exchanges of letters, books, data, and scientific objects, and reinforced their collective identity through adherence to sets of values (e. g., those of humanism). The *respublica literarum* of Erasmian humanists is a case in point. At the outset of the sixteenth century, Erasmus of Rotterdam and his pupils established an early network of scholars on a continental scale, fostering literary and natural knowledge (Pietro Daniel Omodeo, Enrico Pasini).

Universities and academies fostered the emergence of scientific communities and of a society open to their insights. Publicity through journals, books, public talks, and demonstrations presenting research results became an important precondition for societies increasingly aware of the potential of science not only for their epistemic but also for their material economies.

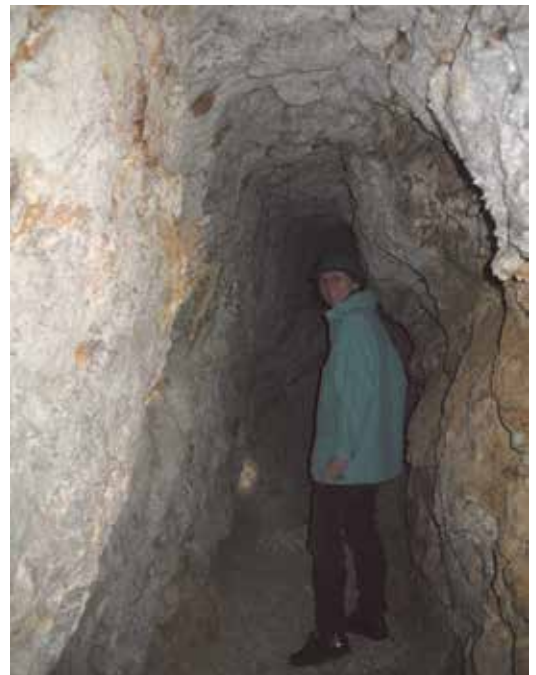
Toward an Epistemic History of the Anthropocene: From the Early Modern Period to the Present

The Emergence of the Matrix

In the early modern period the advancement of scientific knowledge became closely related to economic processes involving practical knowledge, as well as to widely spread ideas about the usefulness of science for society. Although such couplings did not immediately engender self-reinforcing dynamics between epistemic and material economies, they nevertheless created what we have tentatively called a “matrix” of close but flexible relations between technical and economic practices, the production and circulation of scientific knowledge, and societal images of knowledge. This matrix was reinforced, for instance, by the involvement of scientific knowledge in large building projects, by attempts to address the challenges of maritime trade and warfare through enhanced scientific expertise, and by major economic developments involving networks of trade, the accumulation of private and public capital, and the invention of new products. However, this matrix was not a direct cause of later developments toward an industrial capitalism relying ever more strongly on a technological and scientific knowledge economy. However, it did apparently constitute a potential that enabled such developments under appropriate local conditions. In the period between the sixteenth and the eighteenth centuries, the matrix spread across Europe, bringing with it the potential for inventing a new, strongly knowledge-based economy. This historical process, connecting the Scientific with the Industrial Revolution, has become a new research focus of the Department.

Two related studies were carried out during the period covered by this report, one dedicated to exploring the transition process from an organic to a fossil fuel energy system (Helge Wendt), and the other to the role of scientific expertise in the Prussian industrial revolution (Ursula Klein). The first study has yielded insights into the path-dependency of industrialization processes. While, for instance, in England a situation of scarce timber pushed the emergence of the coal mining industry, in Brazil an important iron industry emerged that (until today) uses charcoal. The latter study has scrutinized the training and practices of “hybrid experts,” that is, experts recruited by the Prussian state from the physical and mathematical classes of the Royal Prussian Academy of Sciences, for organizing state-directed mining and metal production, the manufacture of porcelain in the Royal Porcelain Manufactory, the production of beet sugar, the improvement of forestry and agriculture,

Ursula Klein on a research trip to a seventeenth-century mine in Banská Štiavnica.



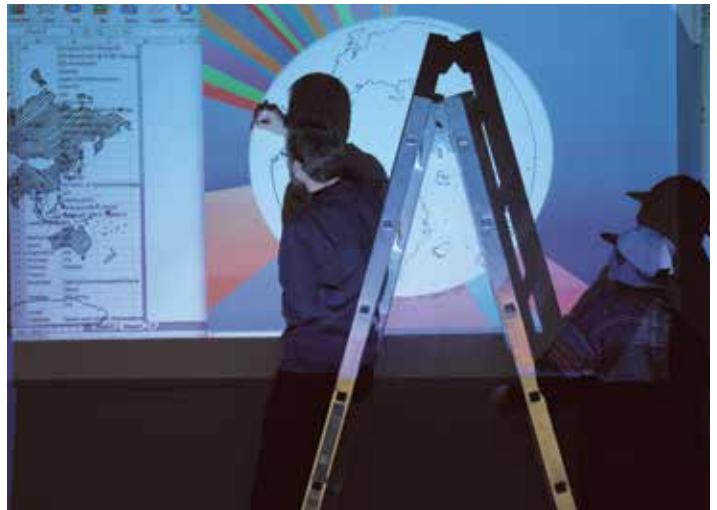
and similar technological enterprises. These hybrid experts' combination of natural inquiry and technologically innovative projects has been identified as the fundamental step in the early industrialization of Prussia as well as in the emergence of nineteenth-century technological science and the analyzing, exact natural sciences. A book manuscript entitled *A. v. Humboldts Preussen: Wissenschaft, Technik, Staat* (A. v. Humboldt's Prussia: Science, Technology, State) is nearly completed. The book examines the early industrialization of Prussia, the role played by the technical state departments, and the so-called useful sciences in this process. All of the major actors promoting these processes were hybrid experts, among them the mining master Alexander von Humboldt and the chemist, apothecary, and official Martin Heinrich Klaproth.

Depiction of layers of rocks. From:
 Friedrich Wilhelm Heinrich von Trebra,
Erfahrungen vom Innern der Gebirge.
 Dessau and Leipzig: Verlagskasse für
 Gelehrte und Künstler (1785), Table 1.



The Anthropocene Project

The Anthropocene is the proposed new geological age of humankind which foregrounds the profound and long-lasting impact of human activities on the Earth system. “The Anthropocene Project” is dedicated to exploring the implications of this concept for the understanding of human culture and society. It is a joint endeavor by the Haus der Kulturen der Welt (HKW, Berlin), the Max Planck Society, the Deutsches Museum (DM, Munich), the Rachel Carson Center for Environment and Society (RCC, Munich), and the Institute for Advanced Sustainability Studies (IASS, Potsdam). In the period covered by this report, the project has hosted numerous international conferences, workshops, lecture series, art events, two major exhibitions, and an “Anthropocene Campus”—an intensive ten-day summer school that brought together 27 renowned university teachers and more than one hundred young researchers from the sciences, humanities, and art and design. The Anthropocene Project was co-developed by members of the Department with Christoph Rosol as general co-curator and several other members and guests contributing intensively to its activities (Jürgen Renn, Helge Wendt, Elena Bougleux, Manfred Laubichler, Roberto Lalli).



Participants in the Anthropocene Campus draw a map of the “upper technosphere” (photo: Sera Cakal).

In the framework of the Anthropocene Project, the role of long-term developments and dissemination of knowledge for the human capacity to exploit and metabolize natural resources has been a central research topic of the Department. This perspective has made it possible to band different historical horizons together, in particular *longue durée* and accelerated environmental and socio-epistemic changes, but also core areas and peripheries in the production of goods and scientific knowledge. The interaction between knowledge production and accelerated industrialization has been conceptualized as a process of co-evolution (Manfred Laubichler, Helge Wendt, Jürgen Renn). The history of the climate and paleoclimate sciences has been studied with a focus on the interaction between modeling and observation as crucial means of understanding the Earth as an evolving system (Christoph Rosol). In contrast to the widespread assumption that the introduction of electronic computing represented an epistemological rupture, the study has revealed a profound epistemological continuity in approaching the Earth as a fluid dynamical entity.

Results of the Anthropocene Project were published in early 2015 in the four-volume work *Textures of the Anthropocene: Grain, Vapor, Ray* (edited by Katrin Klingan, Ashkan Sepahvand, Christoph Rosol, and Bernd M. Scherer, with a contribution by Jürgen Renn on the co-evolutionary dynamics of early writing, bookkeeping, mathematics, and agricultural production at the dawn of history). Another outcome is the exhibition catalog *Welcome to the Anthropocene: Our Responsibility for the Future of*

the Earth, displayed at the Deutsches Museum (Munich), with a contribution on the role of knowledge in anthropogenic changes of planetary extent (Jürgen Renn, Manfred Laubichler, Helge Wendt).



“Oblique Night Image of Taiwan and China.” Hundreds of fishing vessels are seen in clusters throughout the panorama. International Space Station Expedition 40 (July 27, 2014).

The Anthropocene Campus comprised a set of nine different interdisciplinary seminars and a two-day public workshop, dealing with a vast array of topics such as the modeling of “wicked” problems and the economic valorization of nature. Two seminars were developed with direct participation of the Department. One tested new research methods for the issue of “Anthropogenic Landscapes” (Elena Bougleux, Arno Brandlhuber, Erle Ellis), whereas the other was dedicated to “Technosphere and Coevolution” (Jürgen Renn, Manfred Laubichler, Armin Reller, Jan Zalasiewicz, Peter K. Haff). Owing to the overall success of the Anthropocene Campus, a second campus will be held in 2016, and a range of publications is underway.

In the context of the Anthropocene Project, the question of how basic research can provide new answers to the challenges of planetary sustainability has also been approached in an interdisciplinary lecture series of the Scientific Council of the Max Planck Society (initiated by Alexander Bradshaw and Karl-Ernst Kaissling and organized by Jürgen Renn and Helge Wendt). Topics discussed included the consequences of reduced biodiversity, models of how to register changes in the biosphere, the importance of communicating basic science to a broad audience, the challenges of atmospheric chemistry, and the role of big data in a sustainable memory of science and science-based society.

Transforming and Melding Classical Physics: From the Late Nineteenth Century to the Present

Research on twentieth-century science has focused on the major conceptual transformations of fundamental physics and their institutional and social contexts. It has built on key insights resulting from earlier research on these transformations, in particular concerning the role of borderline problems between different disciplinary and subdisciplinary scientific traditions for generating novelties. The research has also followed the general trend in the Department to broaden the perspective of a historical epistemology toward an epistemic history of knowledge and institutions. The temporal focus has been pushed forward considerably. Building on the work of two earlier large-scale projects dedicated to the genesis of general relativity and the history of quantum mechanics, respectively, the continued restructuring of modern physics after the quantum and relativity revolutions has become a key topic of research. This research involves studying the further development of relativity and quantum theory, but also the attempts to unify the two in a theory of quantum gravity.

History and Foundations of Quantum Theory

The Department's project "History and Foundations of Quantum Physics" was funded until 2012 by the Innovation Fund of the President of the Max Planck Society. The Department has been able to continue the project with the support of the German-Israeli Foundation. The research results of the first phase of the project are being presented in three volumes.

The first volume, published in 2014, analyzes early textbooks of quantum theory and their role in establishing and promoting the theory (Massimiliano Badino, James Navarro). It explores the ways in which physics textbooks reacted to the novelties of the emerging quantum physics and how scientific revolutions affect the pedagogical aspects of knowledge transmission.

The second volume (Giuseppe Castagnetti, Jürgen Renn) addresses the role of scientific institutions and networks in the development of quantum theory. It contains case studies of the major centers where the development of quantum physics took place: Berlin, Munich, Göttingen, and Copenhagen.

Finally, a working-group volume describes the development of quantum mechanics as a long-term process of knowledge transformation (Christoph Lehner, Jürgen Renn). It emphasizes the continuity of scientific methods and structures through the fundamental changes in the mechanical worldview since the nineteenth century.

In the period covered by this report, work on this last volume focused on the emerging overall picture of the quantum revolution, and the integration of individual contributions into this picture. In addition, the existing material was complemented by an extended study of the historical roots of Werner Heisenberg's seminal paper "Über die quantentheoretische Umdeutung kinematischer und mechanischer Beziehungen" (1925). The study is based on an extensive survey of the intellectual context and the scientific problems that occupied Heisenberg at the time (Alexander Blum, Martin Jähnert, Christoph Lehner, Jürgen Renn). It gives a detailed reconstruction of Heisenberg's first description of his novel ideas in a letter to Ralph Kronig and compares this description with the finished paper. Thus, for the first time, an in-depth account of the motivations and the trajectory of Heisenberg's ideas could be given, which also has led to new insights regarding Heisenberg's well-known epistemological justification for abandoning the classical description of atomic orbits. This work relied substantially on two dissertation projects in the Department: a study of the long-term history of optical dispersion (Marta Jordi, completed 2015), and a study of the applications of the correspondence principle (Martin Jähnert, ongoing).

From left to right: Enrico Fermi, Werner Heisenberg, and Wolfgang Pauli during a trip to Lake Como. Taken during the International Conference of Physics, September 11–20, 1927, in Como, Italy, to commemorate the one hundredth anniversary of the death of Alessandro Volta. During his lecture "The Quantum Postulate and the Recent Development of Atomic Theory," Niels Bohr presented for the first time his ideas on complementarity, which became the basis for the Copenhagen interpretation of quantum mechanics. Following Pauli's work applying Fermi's statistics to electron gas and computing its diamagnetic properties, Arnold Sommerfeld presented the first results on his electron theory of metals and the Volta effect, solving in principle the problem of metallic electrical conductivity. Courtesy of the Physics Department of Sapienza Università di Roma.



Another study closely connected to the working-group volume argues for the importance of specific applications in the development of quantum mechanics and in its acceptance as a general theory of matter on the atomic and molecular scale (Jeremiah James, Christian Joas). It was found that these applications of quantum physics to such diverse systems as atomic nuclei, molecules, and crystal lattices not only created some of the main disciplines of twentieth-century physics, but also had an important impact on the establishment and theoretical form of quantum physics in its modern form.

The Department also continued its collaborative project with the University of Haifa (Meir Hemmo) and the Hebrew University of Jerusalem (Orly Shenker), entitled

“Probability in Classical and Quantum Mechanics” and funded by the German-Israeli Foundation (GIF). The project has published its results in thematically interconnected research papers focusing on two thematic complexes: a historical analysis of the evolution of statistical mechanics (Hajime Inaba), with particular attention to the role of the classical concept of probability in the development of quantum mechanics (Massimiliano Badino), and a philosophical analysis of central features of classical and quantum statistical mechanics. Concerning the latter, a historical study has shown how, after the development of quantum mechanics, the notions of statistics and probability were separated from each other, with central theoretical developments, such as the famed spin-statistics theorem, being worked out independently of considerations of probability (Alexander Blum).

Another collaboration with a working group of historians and philosophers of physics based at the University of Urbino in Italy studied the interaction of mathematics and physics, especially quantum physics, since the late nineteenth century. In the workshop “Mathematics, Physics and Logic at the Crossroads” (October 2013), this interaction was analyzed from both a historical and a theoretical perspective. In the context of this collaboration, a study on Joseph Boussinesq’s analogy between singular solutions of differential equations and triggering processes in living beings (including the execution of acts of free will) pointed out an interesting intersection of mathematics, physics, biology, and philosophy in the debate on indeterminism in the late nineteenth century (Stefano Bordoni).

Several individual studies focused on specific topics in the history of quantum physics, such as the work of English mathematical physicist Charles Galton Darwin, in particular his ideas on the statistical conservation of energy and their influence on his fellow scientists, most notably Niels Bohr (Benjamin Johnson). Another study dealt with the scientific research on piezoelectricity in the interwar period, following its successful technological application during the First World War and its aftermath (Shaul Katzir). A book section on modeling in atomic and molecular physics examined the contributions of quantum physics to the rapid developments in chemical theory that occurred between 1914 and 1941 (Jeremiah James). A study that is part of a larger project on the demise of the ether in early twentieth-century physics examined the impact of the developing quantum theory on traditional ideas about the ether that still were prevalent at the time (James Navarro).

The process of transmission of quantum theoretical developments into an industrial research setting in the period from the 1920s to the 1930s has also been explored. For this purpose, the long review articles by Bell Labs’ industrial physicist Karl K. Darrow have been analyzed. In his writings, Darrow depicted physics as an evolutionary enterprise and openly challenged the view promoted by some theoretical physicists that quantum mechanics was a revolutionary theory. Darrow argued for the “historic continuity of physics” in order to ward off the perils of an extreme compartmentalization of physics. This view was influenced by the multidisciplinary industrial research environment of Bell Labs as well as by contemporary attempts of leading American scientists to build an ideology of national science (Roberto Lalli).

A major focus of the Department's research in the area of modern physics was the historical development of quantum field theory. A first study showed how quantum field theory was originally viewed as the capstone of the development of quantum mechanics, but already in the late 1920s it showed calculational difficulties that went far beyond the interpretational and philosophical difficulties associated with quantum mechanics. Consequently, quantum mechanics and quantum field theory drifted apart and became two distinct theories with common features, but also very different

conceptual and mathematical frameworks (Alexander Blum, Christoph Lehner). In particular, the notion of the quantum state, which is so central to quantum mechanics, became marginalized in quantum field theory. The origins of this marginalization were traced back to attempts to get rid of quantum states altogether (Alexander Blum).



One of the first pictures of a 540 GeV proton-antiproton collision, as recorded in the big streamer chambers of the UA5 experiment at the CERN Super Proton Synchrotron in 1981. Courtesy of CERN Archive.

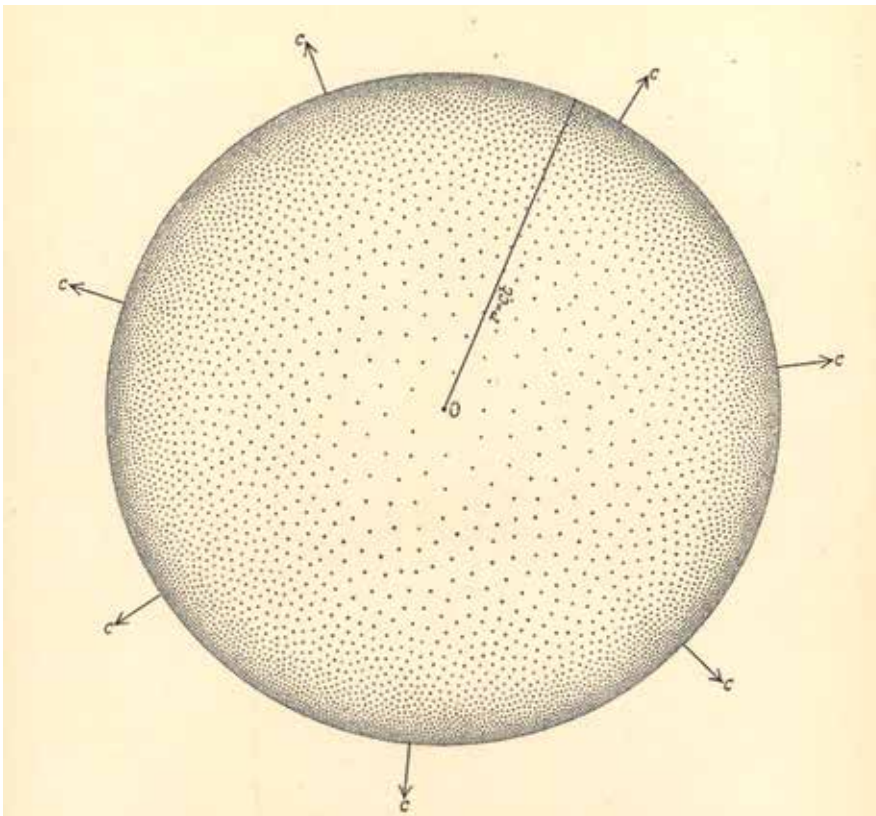
Whereas the development of quantum mechanics was still largely centered in Europe, the development of quantum field theory became a more global endeavor. In the period immediately following the Second World War, similar results in quantum field theory were discovered independently in Japan and the United States, while scientific communication was only slowly being (re-)established. A study showed how on the Japanese side, it was falsely assumed that the Americans had already obtained their results before the war and had only failed to see their importance because of a calculational error. This reading was adopted on the American side, leading to an overestimation of the conceptual continuity between prewar and postwar quantum field theory (Alexander Blum).

A further aspect of the study of quantum field theory was its role in the formation of the modern notions of reduction and emergence. A study showed that the philosophical notion of derivability (i.e., the idea that a macroscopic theory can be reduced to a microscopic theory if the macroscopic theory can be derived from the microscopic one) is highly problematic historically. What is considered to be a derivation (i.e., which mathematical operations are considered legitimate within a theory) is subject to even more historical change than the foundational theories themselves. In quantum field theory, novel mathematical techniques led to the introduction of new emergent entities in the 1950s, without a change in the fundamental equations of the theory (Alexander Blum, Christian Joas). The facility with which quantum field theory is able to describe different physical entities at different length scales within a unified theoretical framework has changed the worldview of physics in general, far beyond the immediate applications of quantum field theory. The far-reaching impact of this change has been compared to that wrought by the introduction of probabilistic reasoning into physics in the nineteenth century (Sam Schweber).

History and Foundations of Relativity Theory

In the century following Einstein's formulation of general relativity in 1915, the general theory of relativity evolved from a revolutionary mathematical curiosity to an experimentally based cornerstone of modern physics and cosmology. This momentous shift started around the mid-1950s. Whereas in the previous decades general relativity was perceived as a highly formalistic subject involving very few theorists, by the mid-1960s Einstein's theory had become an extremely vital research stream of theoretical physics, at the same time sparking entirely novel fields such as relativistic astrophysics. This process came to be known as the "renaissance of general relativity."

Because the study of the large-scale development of specific areas of physics following the Second World War requires the cooperation of several scholars from different disciplines and with different expertise, a large working group was established in 2014, comprising MPIWG researchers (Jürgen Renn, Alexander Blum, Luisa Bonolis, Roberto Lalli, Christoph Lehner, Matthias Schemmel) and experts from other institutions (Markus Aspelmeyer, Jeroen van Dongen, Jean Eisenstaedt, Domenico Giulini, Hubert Goenner, Dennis Lehmkuhl, Donald Salisbury, Tilman Sauer, Robert Schrader). Their collaborative efforts are aimed at elucidating the interconnections of epistemic, sociological, and technological factors that permitted the revitalization of general relativity as well as the development of new disciplines such as relativistic astrophysics and relativistic cosmology.



This diagram, taken from *Relativity, Gravitation and World-Structure* by E. A. Milne, is a representation of the expanding universe seen by the observer O at a particular epoch. Plate I in Edward A. Milne, *Relativity, Gravitation and World-Structure*. Oxford: Clarendon Press, 1935.

A historiographical framework for the “reinvention” of general relativity has been outlined; it takes into account—in an integrated narrative—intellectual developments, epistemological problems, technological advances, the characteristics of post-World War II and Cold-War science, and the newly emerging institutional settings (Alexander Blum, Roberto Lalli, Jürgen Renn). This framework leads to an understanding of the reinvention as a result of two main factors: the recognition of the untapped potential of general relativity and an explicit effort at community-building, which allowed this formerly disparate field to benefit from the postwar changes in the science landscape.

Synge’s lecture at the international conference held in Warsaw and Jablonna in July 1962. This conference was the fourth international conference to be dedicated to topics related to general relativity. It was later referred to as GR3, whereas relativists christened the Berne conference “GR0” to imply a starting point for the stable tradition of international conferences, a tradition that continues to this day. From left to right (first row): Leopold Infeld, Vladimir Fock, James L. Anderson, Ezra Ted Newman, Roger Penrose, Banesh Hoffmann; at the far right: Roza Michalska-Trautman. In Leopold Infeld (ed.) *Relativistic Theories of Gravitation* (Oxford: Pergamon Press, 1964), p. XVII.



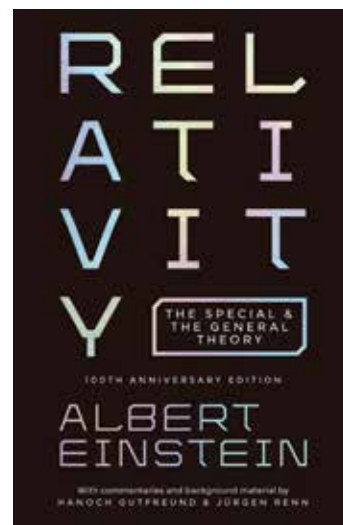
Concerning the emergence of new disciplines, the emergence of relativistic cosmology has been investigated in a detailed study of H. P. Robertson’s attempts to establish a standard approach to relativistic cosmology as an empirically based discipline, and the interconnection of these attempts with Robertson’s preference for the expanding universe theory (Roberto Lalli). In December 2013 the Department co-organized a historical roundtable at the XXVII Texas Symposium on Relativistic Astrophysics in Dallas. This event marked the fiftieth anniversary of the first Texas Symposium, which is widely regarded as one of the key moments in the development of relativistic astrophysics. Members of the Department organized a panel that included prominent participants of the 1963 meeting and also conducted individual interviews.

This research ties in with a series of activities throughout 2015 on the occasion of the one hundredth anniversary of Einstein’s formulation of general relativity in Berlin. Organized by the Department in collaboration with other institutions (Freie Universität Berlin, Technische Universität Berlin, the Albert Einstein Institute of the Max Planck Society, CalTech, and the Hebrew University of Jerusalem), the series of activities includes conferences, public lectures, exhibitions, and theatrical events. The

Department has co-organized a conference on the history and philosophy of space-time theories in Jerusalem (January 2015), and is the main organizer of a major conference on the history of general relativity in Berlin (December 2015).

In time for the anniversary, the *Cambridge Companion to Einstein* has been published (ed. Michel Janssen, Christoph Lehner). It is the first systematic survey of Einstein's work, comprising fourteen essays written by leading Einstein scholars, among them several affiliated with the Department. Ten essays focus on Einstein's contributions to physics, including a study of his path to the papers of the *annus mirabilis* of 1905 (Jürgen Renn, Robert Rynasiewicz) and a study of his critique of quantum mechanics (Christoph Lehner). The remaining essays treat Einstein's impact on twentieth-century philosophy and his political writings (Robert Schulmann). Work on Einstein's political contexts and on his "rediscovery" of Judaism was further pursued by Robert Schulmann during his stay as a guest scholar.

A wide spectrum of studies on the history of relativity was also presented at a colloquium held at the Institute in October 2013, celebrating the 85th birthday of John Stachel. Department work presented there included a study of the life and science of Achilles Papapetrou, which covered the major fault lines of modern physics in a single biography (Alexander Blum, Dieter Hoffmann, George Vlahakis).



In preparation for the one hundredth anniversary, in 2015, of the formulation of general relativity, a number of Einstein studies are being published by Princeton University Press, among them a commented edition of his popular 1917 account of relativity, which was translated into over 25 languages (Hannoch Gutfreund, Jürgen Renn).



Albert Einstein. With kind permission of the Albert Einstein Archives, Hebrew University of Jerusalem.

Quantum Gravity

In 2009, a working group was established (Jürgen Renn, Donald Salisbury, Matthias Schemmel, Kurt Sundermeyer, Alexander Blum, Dean Rickles), with the aim of studying the borderline problems at the interface of quantum theory and general relativity, which began to capture the attention of physicists after those two theories had emerged from similar conceptual clashes within, and the consequent restructuring of, the knowledge of classical physics. The search for a successful theory of quantum gravity that bridges this divide has now been going on for almost a century. This search offers a unique opportunity to test and refine dynamical models of knowledge development.

An awareness of the severity of this conceptual divide has customarily been read into very early works on quantum gravity from the 1930s. A study of these early arguments and of the context in which they were made revealed, however, that they are very different from modern-day explanations of the divide. It was shown that, at the time, the divide was seen not between quantum theory and general relativity, but rather between quantum mechanics and field theory. This latter divide is a continuation of the nineteenth-century conflict between atomistic and field theoretical models, which was really only bridged through the development of renormalized quantum field theories in the 1950s to 1970s (Alexander Blum).

The open-endedness of the search for a quantum theory of gravity despite its long history also allows for the unique possibility of long-term studies of different approaches, without the danger of a Whiggish bias toward the approach that won out in the end. Such studies were at the center of a workshop in Pasadena, California, which was jointly organized with the Einstein Papers Project at CalTech; it has resulted in a book project that is collecting and commenting on early sources in quantum gravity between 1916 and 1950 (Dean Rickles, Alexander Blum).

Scientific Networks and Academic Institutions: From the Twentieth Century to the Present

Crucial to an understanding of twentieth-century science is the investigation of the interaction between knowledge networks, experimental and theoretical cultures, academic institutions, and the growing involvement of science in ever more global economic, political, and military operations. The Department has undertaken several exploratory forays into this territory and launched one systematic research project, dedicated to the history of the Max Planck Society. One of the forays was dedicated to the emergence of a scientific infrastructure in Cuba, focusing on the case of physics, with particular attention to the local conditions and the global factors that have influenced its development. The book *The History of Physics in Cuba* retraces the history of two centuries of intensively interrelated developments in politics, society, and science (Angelo Baracca, Jürgen Renn, Helge Wendt).

The second major foray was a two-year collaborative project with the Council for the Lindau Nobel Laureate Meetings, exploring the history of key issues of twentieth-century physics and chemistry that were decorated with the Nobel Prize. An important methodological approach used in some of these investigations of recent science is oral history. As part of this larger project of oral history, interviews with relevant figures of postwar physics have been conducted. For instance, the interview method

The cosmonauts Arnaldo Tamayo Méndez and Yuri Romanenko with colleagues Valerij Riumin and Leonid Popov on board the 1980 spaceflight Soyuz 38 to the Salyut-6 orbital station. Reflecting the magnitude of collaborative efforts in physics between Cuba, the USSR, and other socialist countries, joint scientific experiments were carried out on Salyut-6.



has been used to reconstruct the formation, during the 1960s, of an internationally recognized school of condensed matter theory in the physics department of the University of Rome (La Sapienza), (Luisa Bonolis).

Key Issues of Twentieth-Century Physics and Chemistry

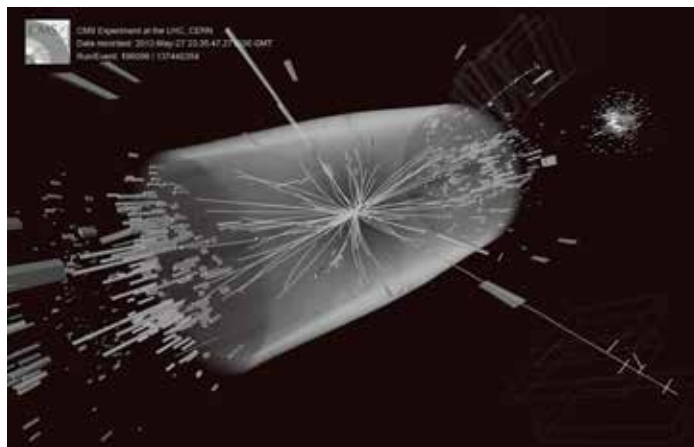
More than eighty research profiles of Nobel Laureates in physics and chemistry have been written with the intention of providing historical background information on major breakthroughs in these fields (Luisa Bonolis, Roberto Lalli). The selection of laureates has been made with a view to understudied topics in the history of modern physics and chemistry at the boundary of both disciplinary fields.

The large group of research profiles of Nobel Prize laureates available in the field of nuclear science has provided an initial mapping of how the synergetic bonds between some key figures in both fields helped shape the emergence of the two subdisciplines of nuclear physics and nuclear chemistry as new domains of practice at the crossroads of a variety of scientific cultures, including physics, chemistry, geology, medicine, and biology (Luisa Bonolis).

Rome, October 11–18, 1931: First international conference of nuclear physics organized by E. Fermi and O. M. Corbino. In the middle of the first row: M. Curie and R. Millikan (behind them, A. Compton), G. Marconi, N. Bohr, and F. W. Aston. On the right: W. Bothe, B. Rossi, and A. Sommerfeld. In the second row, from the left: O. Stern, P. Debye, and J. Perrin. Before the blinds, on the left: W. Heisenberg and P. Blackett. In the middle of the photo: P. Ehrenfest and E. Fermi, talking animatedly. Courtesy of the Edoardo Amaldi Archive, Physics Department, the University of Rome (La Sapienza).



The research profiles of theoretical physicists who contributed to solid-state physics and particle physics aim at shedding light on how specific theoretical tools are transferred from one field to another, and on the ways in which these theoretical tools were transformed during the process. The focus on scientific biographies allows the drawing of a map detailing the reciprocal influences between authoritative theoretical physicists with respect to the transmission of mathematical methods, approaches to problems, and philosophical views (Roberto Lalli).



The research profiles of scientists working in the field of crystallography have provided a transversal line of investigation through the process of cross-fertilization between mathematics, physics, chemistry, biology, and medicine that over the entire twentieth century contributed to the shaping of the multicultural character of a field now informing almost every branch of the natural sciences (Luisa Bonolis).

A further aspect of the project was to investigate how national scientific communities organized themselves through the creation of research networks that furthered the development of specific subdisciplines and areas of investigation. The research focused on scientists whose activities were especially central to the establishment and the development of research networks as well as to the transmission of scientific innovations.

In following the evolution of cosmic-ray physics during the crucial period from the late 1920s to the early 1960s through the work of Bruno Rossi, a historical study investigated how cosmic-ray research developed its interdisciplinary character. One particular focus was the intersection between national and international dimensions at a time when cosmic-ray physics both became a proving ground for testing the validity of the laws of quantum electrodynamics and made a fundamental contribution to the origins of particle physics. Against this backdrop, it has been shown how the exchange of knowledge about experimental practices and theoretical discussions helped form a European scientific community out of many different national realities (Luisa Bonolis).

Journals and their editorial policies arguably played a fundamental role in the spreading of knowledge and in its standardization. The establishment of the journal *Reviews of Modern Physics* has been investigated as a case in point; it was to become one of the most prestigious physics periodicals from the 1930s onward. The research shows that the final format of the journal was the outcome of a negotiation between very different views about the role of review articles in the activities of the American Physical Society. This “genetic” process made the journal flexible enough to adapt to the changing needs of the American physics community throughout the years that followed (Roberto Lalli).

Event recorded with the CMS detector at LHC on May 27, 2012, showing characteristics expected from the decay of the Standard Model Higgs boson to a pair of Z bosons. The Nobel Prize in Physics 2013 honored Peter Higgs and Francois Englert “for the theoretical discovery of a mechanism that contributes to our understanding of the origin of mass of subatomic particles, and which recently was confirmed through the discovery of the predicted fundamental particle, by the ATLAS and CMS experiments at CERN’s Large Hadron Collider.” Photo: T. McCauley, L. Taylor. Courtesy of CERN Archive.

Interdependencies of politics, industry, and armed forces have been analyzed with regard to epistemic and cognitive developments in fluid dynamics (Florian Schmaltz). A comprehensive institutional study of the history of the Aerodynamic Research Institute (Aerodynamische Versuchsanstalt – AVA) in Göttingen and its predecessor organizations (1907–1950) has been pursued in the context of a long-term cooperation with Moritz Epple (Goethe Universität Frankfurt). It has analyzed specific patterns of adaptation of scientists and their research to armament purposes and war conditions and has shown how these patterns have shaped fluid dynamics during the First World War. Under the influence of the military and war, certain hybrid, multidisciplinary forms and reconfigurations of research emerged, while common epistemic patterns were reshaped by military and industrial needs.

The History of the Max Planck Society

→ p. 246ff

The research program “History of the Max Planck Society” (Geschichte der Max-Planck-Gesellschaft – GMPG) emerged from work on a historical epistemology of scientific institutions in Department I and was launched by former Max Planck Society (MPG) President Peter Gruss, after an initial colloquium in 2011 and the symposium “Contemporary History and the Max Planck Society” in October 2012. With the approval of MPG President Martin Stratmann, the research program resumed its work in June 2014. In the next seven years it will investigate the development of the MPG from its foundation in 1948 until the society’s completion of its “Aufbau Ost” in 2002. The research program is headed by Jürgen Kocka (Berlin Social Science Center – WZB), Carsten Reinhardt (Chemical Heritage Foundation, Philadelphia), and Jürgen Renn. Florian Schmaltz serves as the program’s research coordinator.

Unlike its predecessor organization, whose history has been studied in depth—and most prominently by the Presidential Commission “History of the Kaiser Wilhelm Society in the National Socialist Era” (1997–2005)—the history of the MPG still largely remains terra incognita despite institute chronicles, anniversary editions, and a few significant historical case studies. The GMPG will open new and so far neglected perspectives on the relation between the history of science and contemporary history, including the development of global science and the politics and economic development of the Federal Republic of Germany and its international relations. The objective is not so much to investigate individual institute histories, but rather to pursue a comprehensive approach that allows clusters of institutes to be covered which are active in the same scientific field. The research program will focus on the dynamic interactions of research practice and institutional history, on the changes in working methods and research objectives of the MPG, on its local and global networks, and on how these are embedded in science, society, and politics.

The GMPG agenda follows a multidimensional approach covering issues such as continuity and discontinuity, research and politics, knowledge and gender, excellence and structures, innovation and research practices, and science and social responsi-

bilities. Currently five scholars are investigating a wide range of perspectives: to combine the history of science with contemporary history, the institutional development of the MPG is being scrutinized, including its statutes and governance, its management and executive organs, as well as the MPG's finance and fundraising in a long-term comparison (Jaromír Balcar). Gender issues and feminist perspectives on epistemology and history of science in the development of the MPG are being addressed (Birgit Kolboske). The life sciences in the MPG are being examined, with a specific emphasis on their molecularization and the emergence of molecular biology, molecular biomedical sciences, and bioengineering (Alexander von Schwerin). Another central question is how the MPG generated new knowledge in the field of chemistry, physics, and materials science (Thomas Steinhauser). The widely unknown social history of the MPG and its relations to the public are also being investigated. Using methods of empirical social research, it is being investigated how the MPG constructs itself as an institution and what part the employees play in this process (Ulrike Thoms).

Reflecting the massive investments in education and science in Western societies following the 1957 Sputnik crisis, historians of recent science are confronted with an exponential increase in information. This also constitutes a major challenge for a history of the MPG, which requires innovative methodological approaches in the digital humanities to manage the vast complexity of research activities (Manfred Laubichler, Juliane Stiller, Sebastian Kruse).

Transformation of knowledge: from analogue archives to digital research.



Department II

Ideals and Practices of Rationality

DIRECTOR *Lorraine Daston*

Introduction: Essential Tensions

The research projects of Department II (established 1995) chart the history of epistemic categories and practices that have become so fundamental to modern science and culture that they seem self-evident. Examples described in this report include “data” (“Sciences of the Archive”), “gender” (“Gender Studies of Science”), and modern classifications of knowledge (“Between the Natural and the Human Sciences”). Because the hidden histories of these taken-for-granted objects only become visible when contexts vary, most projects have a comparative dimension, spanning many centuries, several cultures, or both (“Science in Circulation”).

These projects seek to reconcile tensions that have dominated research in the history of science and the humanities more generally in recent decades: first, the tension between localized case studies focused on a particular place and time, and developments that emerge on larger temporal and geographical scales; second, the tension between modern ways of understanding science (including the very terms “science” and “scientist”) and the ways in which knowledge was pursued and conceptualized in other times and places; and third, the tension between whether to conduct research individually or in groups.

Department II’s Working Groups address all three tensions. They tackle big topics that fundamentally reshape the scientific landscape across many disciplines and contexts (e. g., “natural law” or “observation”); they historicize current terms of analysis and debate (e. g., “big data” or “empirical research”) and thereby widen the angle of contemporary perspectives; and they offer individual scholars a collective framework within which to situate their more focused projects—a framework that emerges only through intense and prolonged discussion with the aim of forging shared chronologies, geographies, and concepts. By turning up the amplitude on both dials—maximum specificity *and* generality in scope of topics; maximum clarity about present *and* past categories such as “knowledge” and “science”; maximum freedom for individual research *and* opportunity to make sense of long-term, large-scale developments collectively—the Working Groups have produced a series of volumes that have opened up new areas of research, including *Biographies of Scientific Objects* (2000), *Things That Talk: Object Lessons from Art and Science* (2004), *Natural Law and Laws of*

Nature in Early Modern Europe (2008), *Histories of Scientific Observation* (2011), *Beyond the Academy: Histories of Gender and Knowledge* (2013), and *How Reason Almost Lost Its Mind: The Strange Career of Cold War Rationality* (2014).

At any given time, there are approximately 25 resident scholars in Department II: pre- and postdoctoral fellows, visiting scholars, and research scholars. Their backgrounds are international and multidisciplinary; their stays are funded by both MPIWG stipends and external sources (see individual entries for details). All resident scholars gather at the bimonthly departmental colloquium to discuss precirculated works in progress, starting with the all-day departmental workshop in September. In addition to the several meetings of the Working Groups, conferences are organized each year in conjunction with departmental research projects. The organization of this report follows that of the Department's major research projects: Working Groups, conferences, and individual projects are listed under each project rubric, as is information on institutional cooperation partners.

During the reporting period 2013–2014, Department II bade a fond farewell to two of our colleagues: Research Scholar Etienne Benson, now assistant professor at the University of Pennsylvania, USA; and Dilthey Fellow Viktoria Tkaczyk, now Research Group Leader at the MPIWG/Humboldt-Universität zu Berlin. We were delighted to welcome two new Research Scholars in 2014: Lino Camprubí, from the Universitat Autònoma de Barcelona, Spain, and Philipp Lehmann, from Harvard University, USA. Two longtime Research Scholars advanced to professorial status: Christine von Oertzen was promoted to the position of W-2 professor within the Max Planck Society, and Annette Vogt received the title of Honorary Professor at the Humboldt-Universität zu Berlin. Department II congratulates both most heartily.

Members of Department II



Project

The Sciences of the Archive

DURATION 2010–2016

MPIWG ORGANIZERS *Elena Aronova, Etienne Benson* (MPIWG/University of Pennsylvania, USA), *Lino Camprubi, Lorraine Daston, Philipp Lehmann, Christine von Oertzen, David Sepkoski, Fernando Vidal* (MPIWG/ICREA/Universitat Autònoma de Barcelona, Spain)

COOPERATION PARTNERS Laboratoire SPHERE (CNRS, France), Universität Göttingen (Germany), University of Wisconsin at Madison (USA), Universität Hamburg (Germany), Universidade de Lisboa (Portugal), Universitat Autònoma de Barcelona (Spain)

“Data” (literally, “the givens”) is perhaps the most taken-for-granted word in all of the sciences: short and unpretentious, it expresses the simplest and apparently most straightforward elements of empirical research. Whether inscribed as jottings on notecards, traces on photographic emulsions, entries in lab notebooks, or digital information, data supply the essential raw materials for all further scientific activity, from observing to theorizing. It is a category considered too basic to merit a history, too innocent to deserve a philosophy.

Yet no other aspect of science has commanded a greater commitment of ingenuity, resources, and sheer tenacity than the taking, making, and keeping of data. Since ancient times, cultures dispersed across the globe have launched monumental data-centered projects: the massive collections of astronomical observations in ancient China and Mesopotamia, the great libraries from Alexandria to Google Book Search, the vast networks of scientific surveillance of the world’s oceans and atmosphere, the mapping of every nook and cranny of heaven and earth. These projects are typically superhuman in scale, spanning continents (sometimes even galaxies) and centuries. The sciences of the archive embrace both the human and the natural sciences: history and astronomy, meteorology and archaeology. All sciences make some use of data, but the sciences of the archive are defined by it—and their practices in turn define what data means. The history of the sciences of the archive raises questions about the evolution of categories such as “data,” “information,” and “knowledge”; the cultural preconditions for titanic undertakings that project themselves in imagination far into the future; the modalities of classification, from the physical arrangement of books on library shelves to the digital indexing of the data sent by space probes; the fantasy of completeness, whether expressed in a photograph or a museum collection; and the techniques for registering and manipulation of information, from the table to the database.

Four Working Groups were formed under the auspices of the “Sciences of the Archive” project: “Documenting the World” (completed, publication 2015), “Endangerment, Biodiversity, and Culture” (completed, publication 2015), “Historicizing Big Data” (in progress), and “The Archives of the Sciences” (in progress).

The Sciences of the Archive
Working Groups

The Archives of the Sciences

July 29–31, 2013 and July 28–29, 2014

ORGANIZER *Lorraine Daston* (MPIWG)

The type specimens enshrined by botanists, the core samples drilled by geologists, the ancient observations still referred to by astronomers, the data banks assembled by geneticists, the museum collections that hold the corpora of art historians and archaeologists, the case histories published in medical journals, the weather diaries and ship logs trawled by climate scientists, and, of course, the libraries and archives visited by historians: these are the archives of the sciences, both human and natural. Many but not all scientific archives are dedicated to phenomena that unfold on a superhuman timescale: geology, evolutionary biology, paleoanthropology, and astronomy are obvious examples. But other data-hungry sciences of the archive, such as

genetics, see no need to reach back into the deep past: terabytes of information about the present will serve as well for their meta-analyses. What all these scientific archives have in common is not past- but rather future-consciousness: they imagine the archives that they have taken such pains to amass and conserve as a bequest to their successors, to the archaeologists, astronomers, geneticists, geologists, and climate scientists of the future. The Working Group met twice to produce the first volume devoted to the role of archives in the natural and the human sciences. Twelve chapters cover episodes in the history of astronomy, geology, genetics, classical philology, climatology, history, medicine, and ancient natural philosophy, as well as fundamental practices such as collecting, retrieval strategies, and data mining. The manuscript *Science in the Archives: Pasts, Presents, Futures* will be published in fall 2016.

G. F. Morrell, Pictorial representations of the successive strata of the earth's crust, with suggestions of characteristic fossils. J. Arthur Thomson, *The Outline of Science*, New York 1928. Photo: Private Collection© Look and Learn/Bridgeman Images

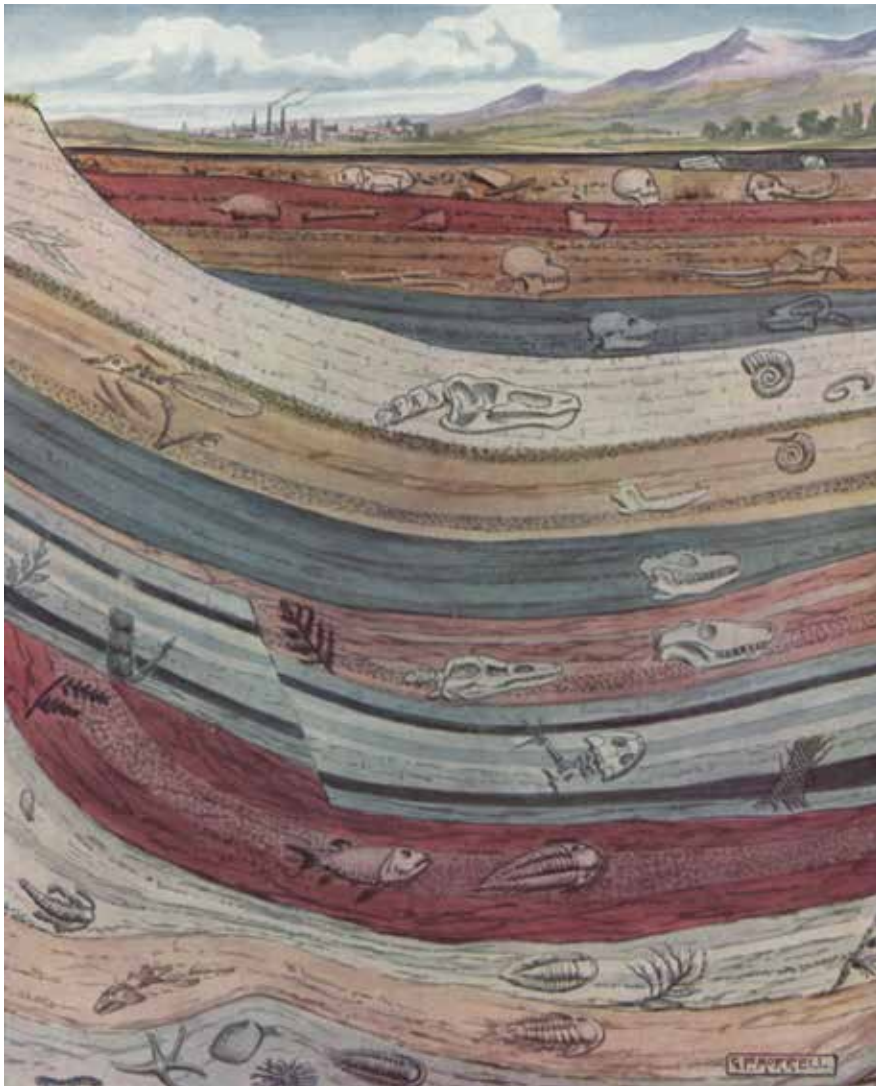


Table of Contents

- Lorraine Daston, *Introduction*
- Florence Hsia, *Astronomy after the Deluge*
- David Sepkoski, *The Earth as Archive: Contingencies, Narrative, and the History of Life*
- J. Andrew Mendelsohn, *Empiricism in the Library: Medicine's Case Histories*
- Liba Taub, *Archiving Scientific Ideas in Greco-Roman Antiquity*
- Suzanne Marchand, *Herodotus in the Age of Archival Research*
- Lorraine Daston, *The Immortal Archive: Nineteenth-Century Science Imagines the Future*
- Bruno J. Strasser, *The "Data Deluge": Turning Private Data into Public Archives*
- Catherine Gere, *Evolutionary Genetics and the Politics of the Human Archive*
- Vladimir Janković, *Climatological Data Archiving and the U.S. National Climate Program*
- Rebecca Lemov, *The Vicissitudes of Time and Self in a Technologically Deterministic Future*
- Daniel Rosenberg, *An Archive of Words*
- Matthew L. Jones, *Querying the Archive: Database Mining from A Priori to Page-Rank and the National Security Agency*

Historicizing Big Data

November 1–2, 2013 and October 16–18, 2014

ORGANIZERS *Elena Aronova* (MPIWG), *Christine von Oertzen* (MPIWG),
David Sepkoski (MPIWG)

Over the last few years, considerable scholarly and media attention has been focused on a phenomenon known as “big data.” The increasing ubiquity of huge databases across virtually all fields in the natural and human sciences, coupled with rapid advances in technologies for storage and analysis of data, has suggested to some observers that twenty-first-century science has entered a “new era.” At the same time, however, scholars have begun to critically examine the proposition that the data-driven science of today is an entirely new phenomenon, and have stressed important historical continuities in data practices and epistemologies that stretch back over several hundred years. The Working Group builds on this critical historical inquiry, assembling an international lineup of scholars historicizing “big data” in disciplines ranging across the natural and human sciences, covering eras from the early modern period to the recent past. Collectively, this group aims to present the first genuinely large-scale history of practices, epistemologies, material culture, and political consequences of data across scientific disciplines, adding a much-needed comparative dimension and historical depth to

Painting of aurora borealis by William Crowder, *National Geographic* (1947).



the ongoing discussion of the revolutionary potential of data-driven modes of knowledge production. A Working Group volume will be published as part of the *Osiris* book series; it is scheduled for publication in 2017 and provisionally entitled *Data Histories*.

Table of Contents

- Elena Aronova, Christine von Oertzen, David Sepkoski, *Introduction*
- Dan Bouk, *Data's Three Acts: The Political Economy of Personal Data in the Last Two Centuries*
- David Sepkoski, *The Database before the Computer*
- Judith Kaplan, *Basic Vocabulary and the Study of Language Prehistory*
- Etienne Benson, *A Centrifuge of Calculation: Spinning Off Data and Enthusiasts in the U.S. Bird Banding Program, 1920–1940*
- Christine von Oertzen, *Machineries of Data Power: Manual versus Mechanical Census Compilation in Nineteenth-Century Europe*
- Patrick McCray, *The Biggest Data of All: Making and Sharing a Digital Universe*
- Hallam Stevens, *The Infrastructures of Sequence Data in Biology*
- Staffan Müller-Wille, *Counting Species in Classical Natural History*
- Mirjam Brusius, *Data and Material Culture: Finds and Specimens as “Raw Archival Data”*
- Joanna Radin, *Off the Rez: How Indigenous Bodies Became “Big Data”*
- Markus Krajewski, *Tell Data from Meta: A Brief History of the OPAC*
- Elena Aronova, *Do (Big) Data Have Politics? The Cold War and the Political Economy of Data Exchange*
- Rebecca Lemov, *The Dream of Data and the Data of Dreams: How to Make the Invisible Visible, 1935–1965*
- Markus Friedrich, *Early Modern “Big Data”? The Case of Genealogy in France and Germany*

The Sciences of the Archive

Completed Projects

Documenting the World

DURATION 2008–2014

ORGANIZERS *Gregg Mitman* (University of Wisconsin-Madison, USA),
Kelley Wilder (MPIWG/De Montfort University, UK)

This Working Group investigated how photographic and film documents, through their creation and circulation, continually shape and reformulate the status of the archive. It addresses photographic and film documents drawn from a wide variety of archives, ranging from the files of Mars Rover Mission scientists to the private collection of the 1926 Harvard African Expedition, and from the tunnels of Corbis's Iron Mountain storage facility to the Nazi films about and photographs of the disabled. Scholars from the fields of anthropology, history of science, photographic history,

science and technology studies, media studies, art history, and archaeology come together in the volume to address the making, archiving, circulation, and recirculation of these photographic and film documents. Their contributions highlight the sheer excesses, both physical and ideological, of the film and photographic archives of today, and investigate how such documents shaped personal identities, disciplinary boundaries, archival organization, and historical narratives. The book makes a compelling argument for the consideration of the material qualities of these archives, from the initial impulse to amass photographic and film records of “the world and all that is in it,” to the making, cataloging, storage, and eventually digital circulation of them. The Working Group volume *Documenting the World: Film, Photography, and the Scientific Record* will be published by the University of Chicago Press (2015).



The Educated Eye (2008). Collage by Josephine Fenger

Endangerment, Biodiversity, and Culture

DURATION 2011–2014

ORGANIZERS *Nélia Dias* (Universidade de Lisboa, Portugal),

Fernando Vidal (MPIWG/ICREA/Universitat Autònoma de Barcelona, Spain)

The notion of endangerment stands at the heart of a network of concepts, values, and practices dealing with entities threatened by disappearance, and with the devices, such as archives, catalogs, and databases, that aim to preserve them. Protecting the endangered and memorializing the extinct assume that the objects to be safeguarded or remembered are valuable; these objects are often associated with a supposedly natural or original state, sometimes with a condition of primeval authenticity. Architectural patrimony conserved in photographs, extinct species in museum displays, and dead dialects in recordings nurture nostalgia for a more diverse world, and may give rise to resuscitation fantasies. Together with dramatized depictions of imperiled places and organisms, they dynamize tensions between risk and heritage, and acquire political valence inside and outside science. The notion of endangerment transforms natural objects into cultural ones. Its centrality to projects for the protection of languages, the preservation of biodiversity, the defense of architectural patrimony, and much more started to crystallize around the mid-nineteenth century in different European and American lands. An “endangerment sensibility” emerged that now perceives the world as essentially under threat. The Working Group volume *Endangerment, Biodiversity, and Culture* is forthcoming from Routledge (2015).

Cover based on artwork by Vasco Araújo. Courtesy of the artist.



The Sciences of the Archive

Planned Conferences

Practices of Historical Research

July 2–4, 2015

ORGANIZERS *Markus Friedrich* (Universität Hamburg, Germany),
Philipp Müller (Universität Göttingen, Germany); funded by the Deutsche
Forschungsgemeinschaft (DFG), Universität Hamburg, and Universität Göttingen

How did learned as well as amateur historians pursue their studies in libraries and archives from the mid-eighteenth to the mid-nineteenth century? The conference will assess the day-to-day practices and conditions of historical work in this transition period in order to reconsider the widely spread assumption that historical empiricism emerged around 1800, marking a new beginning for the discipline.

August Rieper, *Der Archivar* (oil on canvas, ca. 1900, detail). Courtesy of Boris Wilnitsky Fine Arts, Vienna.



Experiencing the Global Environment

February 4–6, 2016

ORGANIZERS *Lino Camprubí* (MPIWG) and *Philipp Lehmann* (MPIWG)

How did new technologies and ways of perceiving intertwine to make new experiences of the environment possible? And how did the construction of a global, interconnected environment change the perception and evaluation of locally gathered data? This workshop will turn our attention to the ways in which individual and collective experiences of nature have been transformed within the environmental sciences.

The Sciences of the Archive

Individual Projects

Elena Aronova (Research Scholar, MPIWG)

Doing Things with Data: The Cold War Political Economy of Environmental Archives

The International Geophysical Year (IGY, 1957/ 58) was the largest scientific international venture in the twentieth century. The most important part of the program was the mobilization of a global data collection network, with free and open data exchange through a World Data Centers (WDCs) system. In the aftermath of the Second World War, when extensive nuclear secrecy regimes were extended to geophysics, data relating to these fields became an “exchange currency” between the United States and the Soviet Union. The WDCs functioned as gigantic copy-centers, microfilming and multiplying “pieces of data” received from the IGY stations, accumulating enormous amounts of “data-sheets”



and hundreds of miles of microfilms. This project seeks to explore what made such unprecedented data-sharing possible by assessing the value of these data in the Cold War political economy, and by tracing how Cold War politics affected data practices and technologies.



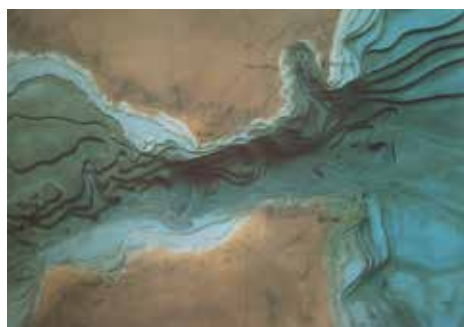
Elena Aronova

The Soviet State Meteorological and Environmental Monitoring Service (1972). Courtesy of the Russian State Archive of Cinematographic and Photo Documents.

Lino Camprubí (Research Scholar, MPIWG)

Listening below the Surface: A Sonic Epistemology of Cold War Oceanography

In the midst of the Cold War, the U.S. Navy launched the Sound Surveillance System, a global network of hydrophones connected to central operation rooms that would go on to produce a catalog of Soviet submarines classified according to their sound signatures. The auditory skills of the sonar operator were complemented, and at times replaced, by graphic descriptions of frequency produced by LOFAR grams. When part of this big global data was declassified and disclosed to civilian scientists, marine biologists were confronted not only with more information than they could easily compute, but also with new ways of hearing mammalian signals. Moreover, environmental scientists began to rely on this extensive network of listening devices and the oceanographic studies they made possible to conduct their own research on climate change. This project aims at producing a history of underwater acoustics, paying particular attention to practices and technology-mediated experiences of nature technology.



Lino Camprubí

Bathymetry model of the Strait of Gibraltar (ca. 1932). Instituto Español de Oceanografía.



Lorraine Daston

Lorraine Daston (Director, MPIWG)

The Immortal Archive: Nineteenth-Century Science Imagines the Future

Big Science—and before that, Big Humanities—were invented in the nineteenth century; what was big about both of them were their ambitions to create the archives of the future. Two of the largest and longest of these projects were the *Corpus Inscriptionum Latinarum*, a collection of all extant Latin inscriptions from the territories

covered by the ancient Roman empire, and the *Carte du Ciel*, an astrophotographic map of all stars visible from earth circa 1900 down to the fourteenth magnitude. Both of these emblematic archival projects devoured time and resources on a grand scale; both were expressions of the growing prestige and authority of the sciences—but also of the dark side of accelerating scientific progress in the mid-nineteenth century. Sooner or later, every scientific doctrine would give way to another. Only the archives endured, a legacy of present science to its posterity.



Dedication to the Aufanian Mothers (AE 1930, 19), Rheinisches Landesmuseum Bonn. Photo: Marco Prins.



Judith Kaplan

Judith Kaplan (Postdoctoral Fellow, MPIWG)

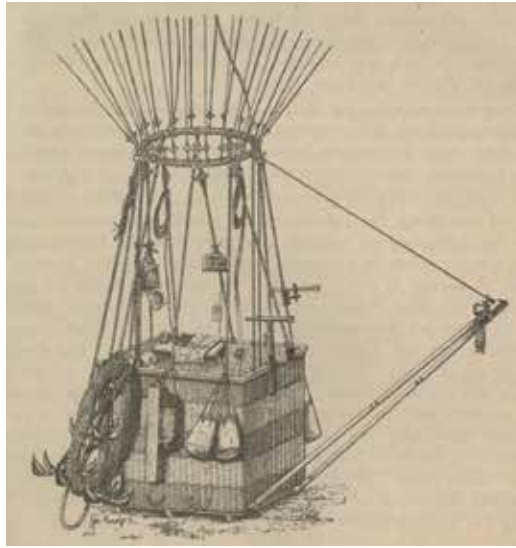
Big Data and the Reconstruction of Linguistic Prehistory

In 2001, an international and interdisciplinary team of researchers joined forces to establish the Evolution of Human Languages (EHL) project at the Santa Fe Institute. Their goal was to sustain long-range research on linguistic prehistory through the development of a comprehensive online database. Described as a “sort of Human Genome Project for historical linguistics,” founders hoped that the EHL project would eventually house data on every human language ever attested (roughly six thousand), and that this collection would facilitate both comparative analysis and quantitative modeling of linguistic diversity. Though it is tempting to view the EHL project as a novel approach to the production of historical linguistic knowledge, the project itself argues that its methodological and epistemic roots reach back to the nineteenth century. The study examines these roots through case studies on lexicostatistics, Nostratic linguistics, and more recent interdisciplinary projects, and considers critical reactions to this work from more mainstream sectors, in order to highlight cultural and conceptual investments in the “comparative method” of historical linguistics.

Philipp Lehmann (Research Scholar, MPIWG)

From Herodotus to Global Circulation

Around the turn of the twentieth century, some European climatologists started to abandon the wealth of different sources—ranging from ancient manuscripts and medieval vintage dates to eyewitness accounts of indigenous observers—and endeavored to focus on more easily quantifiable instrumental data of atmospheric phenomena. This project aims to uncover the reasons and repercussions of this slow and always contentious emergence of a new kind of climatology, which did not



overcome but rather coexisted in a tense relationship with telluric approaches over the first decades of the twentieth century. It examines the role of data in the methodological development of climatology from the middle of the nineteenth century to the 1920s and pays particular attention to the changing understanding of what scientists deemed appropriate and significant information on weather and climate, highlighting the embeddedness of evaluative processes in both internal academic developments and external techno-political and cultural dynamics.



Philipp Lehmann

Fully equipped air balloon for atmospheric research. From Richard Aßmann (ed.), *Beiträge zur Erforschung der Atmosphäre mittels des Luftballons*. Berlin: Mayer & Müller, 1900.

Rebecca Lemov (Visiting Scholar, Harvard University, USA)

Database of Dreams: Social Sciences' Forgotten Archive of How to Be Human

The book resulting from this project (to be published in Fall 2015 by Yale University Press) provides a parable about pioneers of data and dead media. It examines a vast yet almost entirely forgotten social science archive. Built in 1955, this archive holds the collected records of people's inner lives: their dreams, their life histories, their psychological test results, and even their hallucinogenic experiences, all gathered together in the middle of the twentieth century, shrunk into dollhouse size, and stored



Rebecca Lemov



in the then-most-modern data-collecting format, the Microcard. These “subjective materials” came from around the world, from South Pacific islanders to Pashtun frontier villagers to the Sioux Indians of the American West, and were engineered to be accessible at any library in the world by means of the futuristic READEX

Advertisement for desktop Readex machine to read Microcards, 1955. Microcard Corporation, Bert Kaplan Papers, Santa Cruz, CA, USA.

machine or its handheld pocket-sized reader. The resultant data bank was poised to remake the social sciences and cutting-edge data-storage practices more generally. It pioneered the gathering of personal data in large amounts, a practice that has grown astronomically in scale and scope since then.



Sabina Leonelli

Sabina Leonelli (Visiting Scholar, University of Exeter, UK)

Understanding Life in the Digital Age

This project aims to provide a philosophical framework through which the current emphasis on data-intensive biology, and more generally the role played by data in scientific inquiry, can be studied and understood. To this end, the project's focus is on the history and contemporary instances of what can be called *data journeys*: the ways in which scientific data are disseminated in order to function as evidence for knowl-

edge claims. The more widely data are disseminated and re-used, the more significant their epistemic role is deemed to be. To be transformed into knowledge, scientific data need to be ordered, labeled, and packaged so as to make them portable—that is, capable of being picked up and transported across different sites. A book manuscript provisionally titled *Researching Life in the Digital Age: The Epistemology of Data-Intensive Biology* is in preparation.

Looking for plant data. Michel Durinx/
GARNet.



Staffan
Müller-Wille

Staffan Müller-Wille (Visiting Scholar, University of Exeter, UK)

Names and Numbers: Classical Natural History and its Archives, 1758–1859

This project analyzes changes in the media, collecting practices, and institutions of natural history in the late eighteenth and early nineteenth centuries. Its empirical focus is on the many posthumous re-editions, translations, and adaptations of Carl Linnaeus's taxonomic works that appeared throughout Europe during this period. The guiding hypothesis is that classical natural history became an "archival" science in the same sense in which physics and chemistry became experimental sciences. The rules and conventions of Linnaean nomenclature and taxonomy—often denounced as "artificial"—articulated the growing masses of facts that naturalists collected in fundamentally new ways and thus produced phenomena that eventually became the very object of naturalists' quest for the order of nature. Like records in a well-kept archive, species became units that were added to or eliminated from collections, kept track of in lists and catalogs, and counted and distributed among naturalists and their collections in ever new ways.

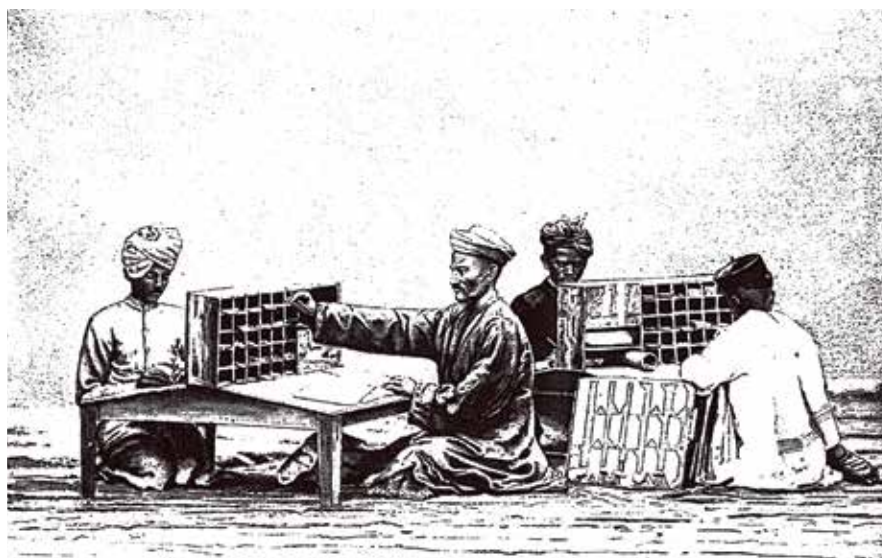
Christine von Oertzen (Research Scholar, MPIWG)

The Birth of Data: Technologies, Practices, and Politics of Nineteenth-Century Census Compilation

The project explores how the American punch cards and tabulating machines for census abstraction, invented in 1889, were assessed by European census officials. The new data regime triggered debates about not just the technical but also the practical and social dimensions of census tabulation, which reveal the material, political, and social ramifications of manual census-data processing. Paying special attention to Prussia, and taking seriously the tools, techniques, and practices as well as skills and infrastructures necessary to compile population statistics manually, the project examines the concrete means of nineteenth-century census abstraction. Concepts and methods introduced for the manual abstraction of census information in the mid-nineteenth century marked the birth of data as an epistemic category, bringing about a revolution in the statistical complexity of census tables. Punch cards and machines made a difference much less in conceptual than in logistical and practical terms.



Christine von Oertzen



Manual census-data processing with German counting-slip technology in India, 1901. C. E. Luard, *Census of India*, 1901. Volume XIX. Central India. Part I.

Daniel Rosenberg (Visiting Scholar, University of Oregon, USA)

Toward a Quantitative History of Data

The twenty-first century is a century of data. Our lives are tangled in webs of data, and tools for creating, storing, communicating, and manipulating this data have grown more sophisticated and ubiquitous. Even our self-understanding is mediated by data-analytic techniques. Yet the cultural and intellectual frameworks that underlie our present condition are substantially older, and their histories illuminate important aspects of the present. This project aims to account for the emergence of the modern concept of *data* since the seventeenth century and its later development into an area of central cultural concern. The project employs both qualitative and quantitative methods and examines the implications of new data-driven approaches in humanities research.



Daniel Rosenberg



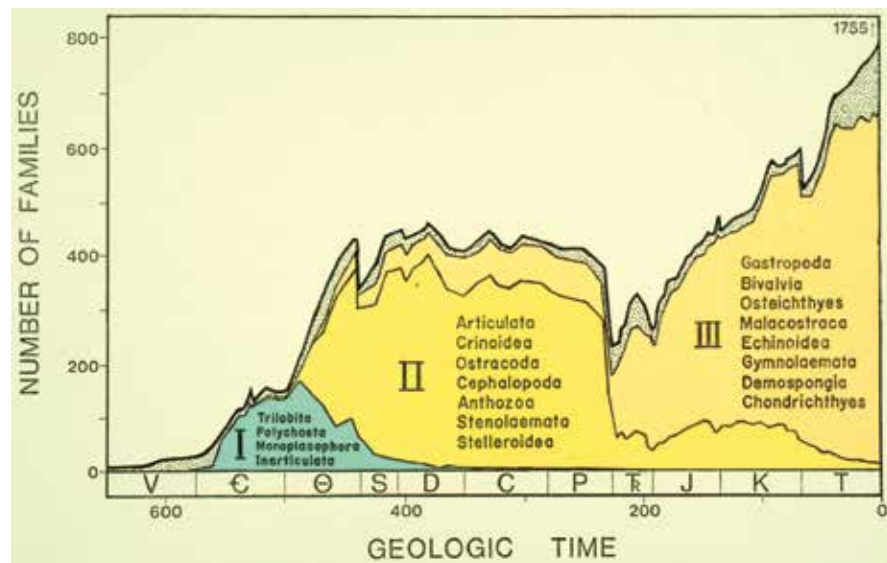
David Sepkoski

David Sepkoski (Research Scholar, MPIWG)

A Natural History of Data

While the term “data” has been in circulation in the English language for several hundred years, its current meaning—a collection of (perhaps quantitative) information that serves as the basis for scientific inquiry—only came into wide scientific use in the nineteenth century. Newer still is the notion of a “database,” or a structured set of randomly accessible data stored and accessed by means of digital computers. This project seeks to historicize the development of data-driven science by tracing current data practices back to earlier, pre-digital antecedents, particularly in natural historical disciplines (e.g., paleontology, geology, botany). By comparing pre- and post-digital practices of data collection, storage, and analysis in natural history, the project

Unpublished lecture slide by J. John Sepkoski, depicting changes in global marine diversity during the Phanerozoic eon. Personal collection of David Sepkoski.



asks the provocatively anachronistic question, “Did the database predate the computer?” Although the advent of digital computers did have a significant role in directing research toward particular kinds of questions and methods, many of the characteristics and methods of modern data-driven science were in place well before the digital age.



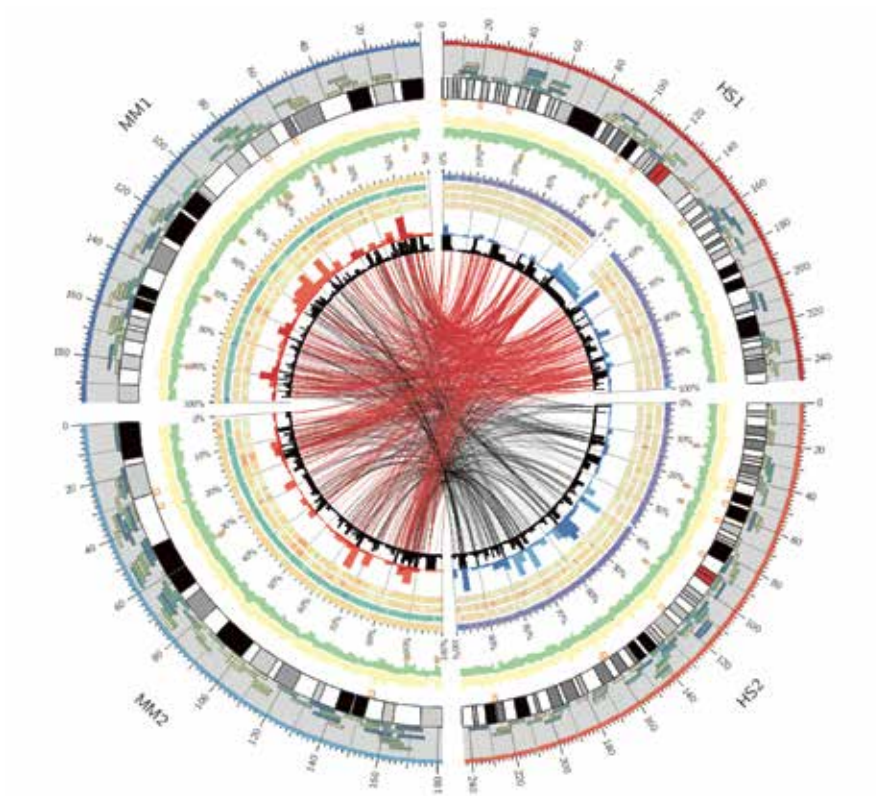
Hallam Stevens

Hallam Stevens (Visiting Scholar, Nanyang Technological University, Singapore)

Data Infrastructures in Biology

The project examines the recent history of data in biology, paying particular attention to the “infrastructures” (hardware, software, databases, data structures) that make working with data possible. For instance, the work of assembling a human genome from hundreds of thousands of small sequenced fragments required not only massive computational power but also software capable of dealing with large, messy, and heterogeneous data-sets. In exploring such examples, the project aims to highlight some of the novelties of big data and big-data practices. These novelties have less to do with size and more to do with how data are manipulated and used within computer-based infrastructures. They demand new methods for studying data that allow tracking

inside machines, software, and databases: we need to supplement material culture approaches with “data culture” approaches in order to understand the manifold consequences of “big data” as it moves from science into a range of other social, economic, and political domains.



Circos: an Information Aesthetic for Comparative Genomics. From: Krzywinski, M. et al. *Genome Res* (2009) 19:1639-1645.

The Sciences of the Archive
Short-Term Visiting Scholars

Mirjam Brusius (Harvard University, USA), *Estelle Blaschke* (EHESS/Université Paris I – Sorbonne, France), *Dan Bouk* (Colgate University, USA), *James Delbourgo* (Rutgers University, USA), *Nélia Dias* (ISCTE/IUL, Portugal), *Florence Hsia* (University of Wisconsin-Madison, USA), *Andreas Mayer* (CNRS/Centre Alexandre-Koyré, France), *Simone Turchetti* (University of Manchester, UK), *Fernando Vidal* (ICREA/Universitat Autònoma de Barcelona, Spain)

Project

Between the Natural and the Human Sciences

ORGANIZERS *Lorraine Daston* (MPIWG), *Glenn W. Most* (MPWIG/Scuola Normale Superiore, Italy)

COOPERATION PARTNERS University of Chicago (USA), London School of Economics (UK), Humboldt-Universität zu Berlin (Germany), Johns Hopkins University (USA), Universität Bochum (Germany), Forschungszentrum Gotha, Universität Erfurt (Germany), Princeton University (USA), Wissenschaftskolleg zu Berlin (Germany)

Questions about the history of kinds of knowledge, evidence, and objects are common to all the sciences, from astronomy to psychology, from meteorology to sociology. Yet the natural sciences have received immeasurably more historical and philosophical scrutiny than the human sciences, with the result that conceptions of knowledge—what it is, how to get it, what to do with it—are correspondingly lopsided. The division between the natural and the human sciences and the resulting neglect of the latter by historians and philosophers of science are the products of late nineteenth-century shifts in the classification of knowledge, which remapped the

disciplines in order to sharpen the distinction between the human and the natural realms and therefore between the sciences dedicated to each. Although the methods and forms of explanation of, for example, evolutionary biology and historical sociology had more in common than either of them had with physics, on the one hand, or demography, on the other, the newly drawn boundary between the natural and the human sciences divided disciplines once linked by shared histories and practices. The projects conducted under this rubric investigate the historical and contemporary interactions between the human and the natural sciences, as well as their shared epistemic values, practices, and institutions, in order to create new models for the history of both the natural and the human sciences.

Detail from Marcus Schinnagel's winged astronomical polyptych (1489). Photo: P. Frankenstein, H. Zwietasch. Courtesy of Landesmuseum Württemberg, Stuttgart.



Between the Natural and the Human Sciences

Working Group**The Learned Practices of Canonical Texts**

→ p. 144f

January 29–30, 2010 and July–August 2012

ORGANIZERS *Anthony Grafton* (Princeton University, USA), *Glenn W. Most* (Scuola Normale Superiore, Italy/MPIWG), *András Németh* (MPIWG/Bibliotheca Apostolica Vaticana, The Vatican)

The history of science has expanded in recent years to embrace the history of learning, especially philological scholarship centered on canonical texts. Shadowing and helping to shape the traditions generated by canonical texts themselves are the learned traditions of the textual practices that serve the canon: the sciences of the text. This Working Group examines historically and comparatively the scholarly practices associated with canonical texts, especially in the following linguistic traditions: Ugaritic, ancient Greek, Latin, Coptic, Hebrew, Arabic, the languages of the Indian subcontinent, and Chinese. The Working Group volume will be published in 2015 by Cambridge University Press under the title *Canonical Texts and Editorial Practices: A Global Comparative Approach*.

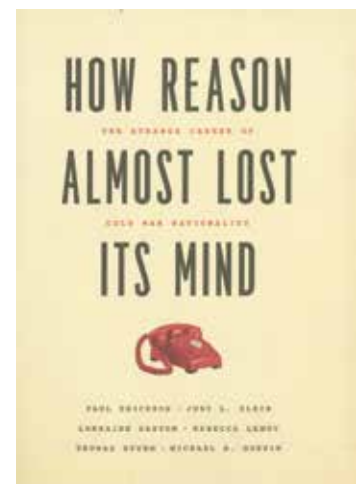
Between the Natural and the Human Sciences

Completed Project**Cold War Rationality**

DURATION 2010–2013

ORGANIZERS *Lorraine Daston* (MPIWG), *Michael D. Gordin* (Princeton University, USA)

A loose conglomerate of game theory, nuclear strategy, operations research, Bayesian decision theory, systems analysis, rational choice theory, and experimental social psychology, Cold War rationality in its heyday seemed the last, best hope for the unification of the human sciences and the recipe for their successful application to everything from diplomatic negotiations to agricultural price-setting to social stability. This brand of rationality was very much the product of a specific time and place: the United States at the height of the Cold War, roughly between the bombing of Hiroshima and Nagasaki in August 1945 and the early 1980s. Lavish funding, new institutions like the RAND Corporation which straddled university, military, and industry, networks woven by select summer schools and conferences, and, above all, the sense of urgency created by the threat of catastrophic war or even human annihilation—all these set the stage for Cold War rationality. Written collectively by Paul Erickson, Judy L. Klein, Lorraine Daston, Rebecca Lemov, Thomas Sturm, and Michael D. Gordin, the Working Group volume *How Reason Almost Lost Its Mind: The Strange Career of Cold War Rationality* was published by the University of Chicago Press in 2014.



Between the Natural and the Human Sciences

Workshops and Conferences

Postcontextualism

June 21–22, 2013

ORGANIZERS *Lorraine Daston* (MPIWG), *Brooke Holmes* (Princeton University, USA), *Constanze Güthenke* (Princeton University, USA)

Cosponsored with Princeton University

All disciplines that deal with long-lived and culturally dispersed traditions confront a shared conceptual and methodological predicament: What to make of materials—literary and religious texts, works of art, scientific data and arguments—that are generated in highly specific historical contexts and received (even revered) in other, multiple contexts, each equally specific, but all crucially different from one another and from the milieu of origin? The contextual approaches that have dominated most of the humanities in the past two decades, which seek to explain the generation and reception of works of literature, philosophy, art, and science by embedding them firmly in a particular then-and-there, have only sharpened the challenge of explaining that which endures or recurs across epochs and cultures.

Participants

- *Yve-Alain Bois* (Institute for Advanced Study, USA)
- *Shane Butler* (University of Bristol, UK)
- *Caroline Bynum* (Columbia University/ Institute for Advanced Study, USA, emerita)
- *Andrew Cole* (Princeton University, USA)
- *Lorraine Daston* (MPIWG)
- *Constanze Güthenke* (Princeton University, USA)
- *Brooke Holmes* (Princeton University, USA)
- *Elisabeth Hsu* (University of Oxford, UK)
- *Glenn W. Most* (MPIWG/ University of Chicago, USA/ Scuola Normale Superiore, Italy)
- *Dominik Perler* (Humboldt-Universität zu Berlin, Germany)

The Role of Narratives in the Sciences and Mathematics

August 7–8, 2013

ORGANIZERS *John Beatty* (University of British Columbia, Canada), *Lorraine Daston* (MPIWG), *Mary S. Morgan* (London School of Economics, UK), *Norton Wise* (University of California, Los Angeles, USA)

The workshop focused on the role of narratives in the sciences and mathematics—in, for example, the explanations of evolutionary biology, the case studies of the human sciences, and the proofs of mathematics. As these examples suggest, the rhetoric of how scientists and mathematicians narrate their results was of less interest than how

narratives structure explanations, evidence, demonstrations, and perhaps even the object of inquiry—however difficult it may sometimes be to disentangle these episodic functions from the rhetoric of presentation.

Participants

- *John Beatty* (University of British Columbia, USA)
- *Lorraine Daston* (MPIWG)
- *Moritz Epple* (Goethe-Universität Frankfurt, Germany)
- *Brian Hurwitz* (King's College London, UK)
- *Veronika Lipphardt* (MPIWG)
- *Mary S. Morgan* (London School of Economics, UK)
- *Norton Wise* (University of California, Los Angeles, USA)

Down-to-Earth Chemistry: Between the Country and the City

February 27–March 1, 2014

ORGANIZER *Elena Serrano* (MPIWG); funded by the Thyssen Foundation

The aim of this workshop was to discuss the relationship between chemistry and agriculture during the period from 1760 to 1860. Participants paid close attention to the different sites of experimentation and material production, both in the countryside and in the city, such as laboratories, manufactories, private gardens, farms, and state-ly homes. Focusing on case studies from Scotland, New York, the Netherlands, Spain, France, and England, the workshop explored how rural settings and the actors' experiences on productive sites such as farms and manufactories shaped chemical knowledge—and how the latter in turn influenced their agricultural practices. The workshop was a contribution to the international network “Situating Chemistry, c. 1760–1840,” which brings together 41 European scholars from different institutions.

François-André Vincent, *La Leçon d'Agriculture* (1798), Musée des Beaux-Arts, Bordeaux, France.



Participants

- *Robert Anderson* (Cambridge University, UK)
- *Francesca Bray* (University of Edinburgh, UK)
- *John Christie* (University of Oxford, UK)
- *Joppe van Driel* (University of Twente, The Netherlands)
- *Rachel Dunn* (University of Durham, UK)
- *Matthew Eddy* (University of Durham, UK)
- *Ernst Homburg* (Maastricht University, The Netherlands)
- *Frank James* (Royal Institution, UK)
- *Peter Jones* (University of Birmingham, UK)
- *Ursula Klein* (MPIWG)
- *Emily Pawley* (Dickinson College, SA)
- *John Perkins* (Oxford Brookes University, UK)
- *Lissa Roberts* (University of Twente, The Netherlands)
- *Elena Serrano* (MPIWG)
- *John Stewart* (University of Oklahoma, USA)

Between the Natural and the Human Sciences

Planned Conferences

Epistemic Genres

June 26–27, 2015

ORGANIZERS *Gianna Pomata* (Johns Hopkins University, USA), *Yvonne Wübben* (Universität Bochum, Germany/Freie Universität Berlin, Germany); funded by the Mercator Foundation

The workshop will address the history and theory of epistemic genres in medicine, such as the recipe, the case study, the textbook, and the commentary. The main focus will be on the early modern period. The workshop's goal is to deepen our understanding of cognitive practices and observation in the history of knowledge.

Towards a History of Error

December 11–12, 2015

ORGANIZERS *Lorraine Daston* (MPIWG), *Fabian Krämer* (Universität München, Germany), *Martin Mulrow* (Forschungszentrum Gotha, Universität Erfurt, Germany)

Error is a central concept in the history of epistemology; in the history of science, various concepts of error have generated equally various strategies for avoiding, diagnosing, and correcting it. The origins of both modern philosophy and modern science have been traditionally linked to sixteenth- and seventeenth-century texts (e. g., those of Bacon and Descartes) devoted in large part to the diagnosis and correction of certain kinds of errors. Starting with the late medieval and early modern periods, the workshop aims to map the broad contours of a history of error, both in its concepts and its practices.

Between the Natural and the Human Sciences

Individual Projects

Kevin Ku-ming Chang (Visiting Scholar, Academia Sinica, Taiwan); funded by the Alexander von Humboldt Foundation

Separation of Linguistics and Philology, 1910–1945: Identity, Formation, and Practices of Discipline



This project studies the break-away of linguistics from philology during the first few decades of the twentieth century. At that time, most of the scholars who identified themselves as “linguists” were trained in philology, almost always in Germany, and had professorial positions in that field. In Germany, which celebrated a glorious tradition of philology, *Sprachwissenschaft*, or the study of languages, had

already developed as a subfield of philology, though assigned a place subordinate to it. This subordinate position was no longer acceptable, the early advocates of linguistics asserted. With a different object and different methods, linguistics broke away as an independent discipline. This project aims to recover what the general histories of philology, whether simplistic or sophisticated, have missed: the early linguists’ non-German alliance with French- and English-speaking countries for the independence of linguistics. It also examines philological communities’ reactions and the consequent redrawing of disciplinary contours.

Angela Creager (Visiting Scholar, Princeton University, USA); funded by Princeton University

Science and Policy in a World of Carcinogens

The project examines how environmentalism, changing ideas about cancer causation, and new tools for detecting carcinogens interacted between the 1960s and the 1980s, and follows the consequences of these interactions for biomedical research and government regulation. Several laws enacted in the United States between 1958 and 1996 aimed at limiting public exposure to pollutants, ionizing radiation, and other environmental contaminants suspected of causing human cancer. Agencies implementing these laws looked to new methods for identifying potential carcinogens. The study examines how testing practices were used by researchers, regulators, and companies throughout the 1980s, during a time when biologists and public health officials shifted emphasis away from industrial pollutants and toward lifestyle and hereditary predispositions in cancer causation. Through a focus on carcinogens, the project aims to excavate the changing cultural and scientific perceptions of the natural as they related to life, health, and disease in the late twentieth century.



Kevin Ku-ming Chang

Giving sound a visible existence: Wilhelm Heinitz and his Kymograph. Wilhelm Heinitz Nachlass, Staats- und Universitätsbibliothek Hamburg.



Angela Creager



Lorraine Daston

Lorraine Daston (Director, MPIWG)

Rules: A Short History of What We Live By

Rules—in the form of everything from traffic regulations and government directives to etiquette manuals and parliamentary procedures—structure almost every human interaction. The increasing use of computers has intensified a trend that began in the eighteenth century of increasingly rigid and ever more rules for ever more domains of public and private life. But the algorithm became the prototypical rule only relatively recently, in the late nineteenth century. The long history of rules prior to that point shows surprising affinities with concepts now considered to be the antithesis of rule-following, such as thinking in terms of models and paradigms. Based on the Lawrence Stone Lectures delivered at Princeton University in April 2014, this book on the history of an impossible but indispensable genre will be published by Princeton University Press in 2016.

Lucas van Leyden, *La Partie d'Échecs* (ca. 1508), Gemäldegalerie Berlin.



Anna Echterhölter

Anna Echterhölter (Postdoctoral Fellow, MPIWG)

Paper Weights: August Boeckh's Metrology and the Transformation of the Economic Archive

John Maynard Keynes once mentioned the tedious duties of a friend who served as a colonial official in Uganda: apparently his preoccupation was to decide on the “standard goat.” This animal served as a key unit in many disputes over possession. The incident indicates an early stage in the quantification of value and points to the endless negotiations and reinforced state controls necessary to establish today's seemingly stable and nearly globalized systems of weights and measures, units, and currencies. In order to recuperate historical conceptions of quantification, the project examines the auxiliary science of historical metrology, a discipline that emerged

around 1820. The most eminent authority in this field, August Boeckh, developed a numerical prose; his lists should be seen as a contribution to political economy understood in historical terms. For Boeckh, metrology belonged to the household regime and was since antiquity a technique to govern all things, people, and animals belonging to an estate.



Metrologie als Balanceakt (Detail). From Jakob Leupold, *Theatrum Staticum Universale das ist Schauplatz der Gewichts-Kunst und Waagen*. Leipzig (1926), vol. 1, p. 254.

Yulia Frumer (Postdoctoral Fellow, MPIWG /Assistant Professor, Johns Hopkins University, USA)

A Matter of Time: Transforming Timekeeping in Nineteenth-Century Japan

When mechanical timekeeping technology was introduced to Japan from the West in the sixteenth century, it underwent a metamorphosis adapting to the Japanese time system, in which hours changed their length with the seasons; yet in the mid-nineteenth century, Japanese scholars wholly accepted the Western conventional notion of time as a universal and abstract entity independent of human activity. In order to determine how this transformation occurred, this project examines the changing timekeeping practices of Japanese astronomers. Time measurement was an essential feature of any astronomical practice, yet the kind of time used by various Japanese astronomers changed throughout the eighteenth and nineteenth centuries, stimulating major changes in Japanese astronomy and in geography and navigation. Looking at the notion of time measurement as a web of practical, visual materials and conceptual associations, the project shows how by adopting Western practices that corresponded with the Western notion of time, Japanese scholars came to eventually favor the characteristics of the Western temporal system.



Yulia Frumer

Cathy Gere (Visiting Scholar, University of California, San Diego, USA)

Utilitarian Psychology and the Science of Pain and Pleasure

This project investigates the way in which utilitarian ethics and politics were naturalized in the neuroscience of pleasure and pain. Using the case of Robert Heath, a neuroscientist conducting electrical stimulation experiments on the neural “pain-pleasure circuits” of indigent psychiatric patients, the project aspires to clarify the scope and nature of the rejection of utilitarian reasoning in medical ethics in the Watergate period. Ultimately, the goal is to understand what lasting significance the informed consent mandate might have for medical, neurological, and scientific definitions of personhood. The book digs down to the deepest origins of utilitarian science with Thomas Hobbes’s *Leviathan* and traces how full-blown utilitarian neurology developed at the end of the eighteenth century in response to the French Revolution. The book ends with the resurrection of utilitarian science in our own time, employing a historical analysis to mount a critique of neo-Benthamite psychology and economics.



Cathy Gere



Donatella Germanese

Donatella Germanese (Research Scholar, MPIWG)

Science and Technology in Italian Postwar Cultural Journals

After the Second World War, Italy invested heavily in the country's industrial reconstruction. Overcoming traditional boundaries between art, the humanities, and science, new journals expressed a holistic will to renewal that was intellectual and artistic as well as economic: a claim to interpret and even influence economic developments and an effort to aestheticize mundane aspects of life. The project focuses on the state-owned holding Institute for Industrial Reconstruction (IRI) as well as the private publishing house Giulio Einaudi Editore and their three main journals: *Il Politecnico* (1945–1947), *Il Menabò* (1959–1967), and *Civiltà delle Macchine* (1953–1979). Especially the latter, founded as the house organ of the IRI's subsidiary Finmeccanica, showcased the industrial potential of the country next to its artistic and intellectual strengths, before it was transformed into a scholarly journal for the history of science and technology.



Elaborazione fotografica. From Enzo Ragazzini, *Civiltà delle Macchine* 21 (1973), p. 5.



Whitney Laemmler

Whitney Laemmler (Predoctoral Fellow MPIWG/University of Pennsylvania, USA)

The Choreography of Everyday Life: Rudolf Laban and the Analysis of Modern Movement

Labanotation was a system developed by the German choreographer and amateur physiologist Rudolf Laban to preserve dance on paper. By melding scientific ideas about space and physiology with a complex vocabulary of triangles, arrows, and boxes, Laban believed he could infinitely replicate and preserve a dance's subtle artistic core. Labanotation was also used to coordinate mass movement spectacles and eventually became entangled with the National Socialist bureaucracy. Moreover, though largely ignored, Labanotation was everywhere in the postwar Anglo-American world—crucial to efforts to copyright movement in the United States in the 1950s and to massive changes in staffing at mid-century corporate behemoths like IBM, Monsanto, and BP.

The project explores each episode in this technology's history and examines the corresponding changes in its social and political meaning. In creating a notation system capable of turning any movement into easily analyzable data, Laban's work not only served to preserve a fading past, but opened up new possibilities for the literal choreographing of modern life.



"Toe Writing: Ballet Dancers Learn How to Put Muscles in Black and White." *Time Magazine* (April 11, 1941).

Erling Sandmo (Visiting Scholar, University of Oslo, Norway)

Olaus Magnus and the Epistemologies of the Renaissance

In 1539, the Swedish priest Olaus Magnus published a large map of Scandinavia, *Carta Marina*, in Venice. The map was unprecedented in its geographical exactitude and its wealth of information on history, politics, anthropology, and natural history. It also presented an image of northern Europe in religious turmoil: the rich imagery of the map conveyed a set of statements and revelations about the battle between Lutheranism and Catholicism. Olaus's aim was to provide the map with a substantial accompanying text, a huge work in 22 volumes, published only in 1555. At this time, the religious division of Europe was a *fait accompli*, and the universal religious epistemology of the map was no longer valid. Consequently, the book had to renegotiate the structuring principles of the knowledge of the North. This project explores the dynamic relationship between the map and the text as an example of the shifting epistemologies of the Renaissance and as an event in the history of knowledge.



Erling Sandmo

Anja Sattelmacher (Predoctoral Fellow, MPIWG/Humboldt-Universität zu Berlin, Germany)

Mathematical Models and Scientific Practice, 1830–1914

This dissertation investigates the rapprochement between so-called mathematical intuition (*Anschauung*) and the practical application of mathematics between 1830 and 1914, as it was promoted in German universities, schools, and technical colleges. Mathematical model collections designated in particular for the training of mathematics teachers and engineers emerged circa 1870 as a concrete expression of the idea that mathematical teaching should be less formal and static and more “intuitive.” The project explores why and how a large number of mathematicians and teachers pushed forward intuitive mathematics while the visualization of mathematical facts was rather neglected. The project draws on history of science as well as media and cultural studies, paying close attention to how the material aspects of scientific objects—such as their weight, density, and mutability—influenced their epistemic function within educational contexts.



Anja Sattelmacher



Mathematical models, produced between 1890 and 1910. Collection Mathematisches Institut, Universität Göttingen, Germany. Photo: FSK Göttingen (2011).



David Sepkoski

David Sepkoski (Research Scholar, MPIWG)
Catastrophic Thinking: Extinction and the Value of Diversity

By the early twenty-first century, biodiversity has come to be seen as having an intrinsic scientific and cultural value. The sheer multiplicity and heterogeneity of living things are now understood to have inherent virtue: the value of diversity is diversity itself. Beginning with the development of biological theories of extinction in the nineteenth century, the book traces the parallel development of scientific and cultural attitudes toward extinction and the related concept of diversity over two hundred years, examining scientific literature (in biology, ecology, paleontology, and genetics), fiction and poetry, film, journalism, popular science writing, and public political discourse. The book's central thesis is that the current "biodiversity crisis"—and analogous fears about the endangerment of forms of cultural and linguistic diversity—can only be understood in the context of the much broader history of humans' grappling with the consequences and causes of extinction.



Poster for the International Year of Biodiversity Exhibition, UNESCO (2010).



Annette Vogt

Annette Vogt (Research Scholar, MPIWG)
The History of Statistics at the Berlin University and the Berlin School of Economics, 1886–1945

This project investigates the development of statistics in mathematical as well as in economic and social statistics. Of central interest is how and by whom statistics was established and taught at the Berlin University and at the Berlin School of Economics (Handelshochschule, founded in 1906). Most members of the respective faculties in mathematical statistics and in social and economic statistics (among them two women) were not only employed by the Berlin University or the Berlin School of Economics, but also working for municipal or government agencies for statistics; others drew their main income from insurance companies or unions, forging links beyond the academic world. How did these connections shape the production and application of scientific knowledge in these fields? And why did applied statistics blossom in the various state agencies in Berlin, whereas mathematical statistics at the university developed only haltingly?



Emma S. Woytinsky and Wladimir S. Woytinsky (ca. 1955). During the interwar years, the couple gained lasting recognition as social statisticians of the German labor unions and the ILO in Geneva. From: Emma S. Woytinsky, *Two Lives in One*. New York, 1965.

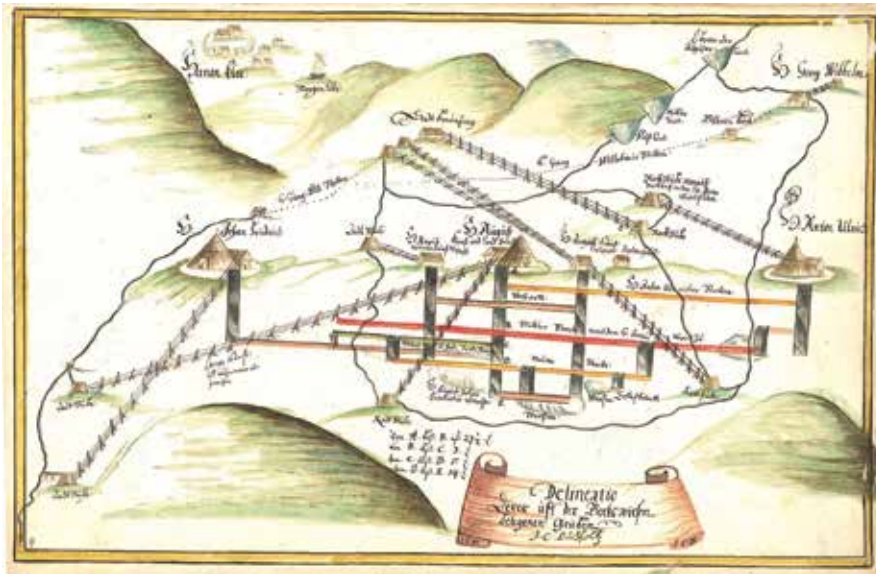
André Wakefield (Visiting Scholar, Pitzer College, USA); funded by the Alexander von Humboldt Foundation

The Logic of Oblivion: Leibniz and Hartsinck in the Harz

Leibniz worked incessantly between 1679 and 1686 to establish wind machines in the mines of the Harz Mountains. This experience informed his *Protogaea* (1691), or history of the earth. Drawing on archival documents from Clausthal and Hannover, the book tells the story of Leibniz's invention, his struggles to establish it, and the ultimate failure of the venture. The book provides a detailed narrative of Leibniz's efforts during the years 1679–1686, when Leibniz was most involved in developing his



André Wakefield



Buchholtz (1681). Bergarchiv Clausthal, Riss No. 3382.

machine. It also sheds light on Leibniz's rival, the Dutch-Japanese inventor Pieter Hartsinck, and the role his original invention played in the story about Leibniz's efforts. The book explores the subsequent history, during which editors of the Leibniz Edition shaped the narrative and largely erased Hartsinck from the picture. It also connects Leibniz's failed entrepreneurship to larger questions about history, enlightenment, and industrialization, and examines why we keep repeating the same stories about the same figures, even when there is evidence that suggests we are wrong to do so.

Hansjakob Ziemer (Research Scholar, MPIWG)

Observing the Listener: Journalists and the Construction of Typologies in the Concert Hall

Since the establishment of the modern symphony concert around 1800, the musical experience has been mediated through journalistic observation. Journalists were in a unique position to report on listening, bringing together observations that reflected on the music, the listening space, and the concert hall visitors. Their reports are attempts to reflect on and convey how listeners approach music, including their physical gestures, their modes of self-representation, the collective mood, and so on. For the journalists, the concert audience was a microcosm of social practices that, when



Hansjakob Ziemer

observed, would yield insights into more general truths about society at large. The aim of this project is to show how journalistic methods and discourse regarding listening and the listener, established in the late nineteenth and early twentieth centuries, provided the basis for the development of the new academic disciplines of music education and music sociology in the mid-twentieth century.

Concerttypen. Eine Humoreske (detail).
Drawing by A. Palm, *Illustrierte Zeitung*
(June 6, 1874).



Between the Natural and the Human Sciences

Short-Term Visiting Scholars:

Tara Abraham (University of Guelph, Canada), *Vanessa Agnew* (University of Michigan, USA), *Stefan Bargheer* (University of California, Los Angeles, USA), *Bruno Belhoste* (Université Paris 1 Panthéon Sorbonne, France), *Martin Brody* (Wellesley College, USA), *John Carson* (University of Michigan, USA), *Karin Chemla* (CNRS, France), *Sarah Everts* (Berlin), *Mechthild Fend* (University College London, UK), *Courtney Fullilove* (Wesleyan University, USA), *Oliver Gaycken* (Maryland University, USA), *Snait B. Gissis* (Tel Aviv University, Israel), *Linda Henderson* (University of Texas at Austin, USA), *Boris Jardine* (Science Museum, UK), *Boris Michel* (Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany), *Anindita Nag* (Calcutta University, India), *Johan Östling* (Swedish Collegium for Advanced Study/ Lund University, Sweden), *Wolfgang Schivelbusch* (Berlin/New York), *Claudia Stein* (University of Warwick, UK), *Riccarda Suitner* (Forschungszentrum Gotha, Universität Erfurt, Germany), *Axel Volmar* (Universität Siegen, Germany/ McGill University, Canada), *Julianne Werlin* (Princeton University, USA)

Project

Gender Studies of Science

ORGANIZER *Christine von Oertzen* (MPIWG)

Research on the history of women and gender in science, technology, and medicine has expanded considerably in recent years. The diversity and creativity of approaches in this field encourage Department II to support individual projects employing the category of gender to historicize the production of scientific knowledge. Our particular interest is the creation of knowledge beyond those realms traditionally associated with scientific endeavor, such as laboratories, universities, and state-sponsored research institutes. In addition, we focus on how tools, objects, and practices have shaped femininities, masculinities, and working cultures in the history of knowledge.



Jacques-Louis David, *Portrait of Monsieur Lavoisier and His Wife* (1788), Metropolitan Museum of Art, New York.

Gender Studies of Science

Planned Working Group

Working with Paper: Gendered Practices in the History of Knowledge

PREPARATORY CONFERENCE January 6–8, 2016

ORGANIZERS *Carla Bittel* (Loyola Marymount University, USA),
Elaine Leong (MPIWG), *Christine von Oertzen* (MPIWG)

Exploring practices, tools, and materials in the history of science has led to a deeper understanding of how intimately learned and scientific activities were embedded in artisanal, cultural, and social contexts. The aim of this Working Group is to build on this rich historiography and to expand the analysis to the notion of gender. The group's aim is to focus on paper-related epistemic practices in order to examine how specific materials and tools impacted the shaping of identities as well as working cultures in the history of knowledge, and how in turn paper tools, technologies, and objects themselves materialized knowledge and notions of gender. The gendered use of paper will be addressed in a variety of different fields, including reading and writing practices in early modern medicine; nineteenth-century paper tools of knowledge, trade, and consumerism; map-making; paper-based systems of labor division in data processing; paper models and instruments; and the afterlife of real-world paper practices in twenty-first-century programming.

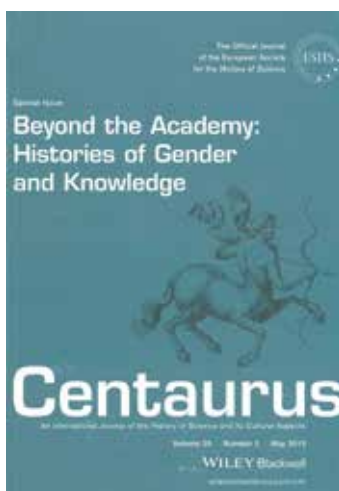
Gender Studies of Science

Completed Project

Beyond the Academy: Histories of Gender and Knowledge

DURATION 2010–2013

ORGANIZERS *Christine von Oertzen* (MPIWG), *Maria Rentetzi* (Technical University of Athens, Greece), *Elizabeth Watkins* (University of California, San Francisco, USA)



The Working Group examined overlooked sites and agents of knowledge production beyond the academy and venues of industry- and government-sponsored research. By using gender as a category of analysis, the group uncovered scientific practices taking place in locations such as the kitchen, the nursery, and the storefront. Published as a special issue of the journal *Centaurus* in July 2013, each contribution of the Working Group volume examines actors, practices, and flows of knowledge production in sites not closely connected to learned societies, universities, or research institutes, evoking a knowledge society *avant la lettre*, in which women and men engaged in the creation, dissemination, and appropriation of scientific knowledge. The essays cover the early modern to the modern period with a special emphasis on the late nineteenth and early twentieth centuries, presenting case studies from North America and western Europe.

Gender Studies of Science

Individual Projects

Sandra Eder (Visiting Scholar, Universität Zürich, Switzerland)

The Birth of Gender: Medicine and the Transformation of Sex in the 1950s

The concept of “gender role” was coined in the early 1950s at the Johns Hopkins Hospital in Baltimore, Maryland. In a set of five publications, co-authored with psychiatrists Joan Hampson and her husband John Hampson and published in 1955 and 1956, John Money developed a new theory of human sexual development claiming that a person’s gender role grew cumulatively through life experiences encountered and transacted. Based on this hypothesis, the team developed a set of treatment recommendations, which advocated early surgery on genitals to adjust the body to the assigned sex. The Hopkins protocols (as the five publications were called) became the dominant guidelines in intersex case management. The book project examines this research and provides a historicized account of how the modern concept of gender was developed in mid-twentieth-century American biomedicine. The book is a study of how gender and sex were enacted within clinical practices.



Sandra Eder

Christine von Oertzen (Research Scholar, MPIWG)

At-Home Observation of Early Childhood Development in Gilded-Age America

This book project illustrates how members of the Association of Collegiate Alumnae (ACA), most prominent among them Milicent Shinn, a graduate of the University of California, engaged in the study of early childhood development. Shinn and her female peers were inspired by contemporary scholarly enthusiasm for the physiological

and mental development of infants and toddlers. On the basis of the unpublished papers of Milicent Shinn and her correspondence with other members of her network, this project reveals how the ACA’s collective at-home observation of babies transformed the nursery into a laboratory and mothers into scientific observers, providing a vivid example of fin-de-siècle civic science. The most visible outcome of the network’s enterprise was Shinn’s authoritative study of 1908, *The Development of the Senses in the First Three Years of Childhood*, which defined pleasure and interest as the driving forces in the evolution of the human mind.



Christine von Oertzen



Milicent Washburn Shinn (1858-1940) with her object of study, Ruth, at the age of seven. From: M. Shinn, *Körperliche und geistige Entwicklung eines Kindes in biografischer Darstellung*. Transl. and ed. by W. Glabbach and G. Weber, Langensalza 1905.



Elena Serrano

Elena Serrano (Postdoctoral Fellow, MPIWG)

Reformist Objects: Gender, Knowledge, and Politics in Spain (1787–1808)

What do the Rumford oven, designed in London for economic cooking, Guyton’s apparatus for purifying air, introduced in Paris, and J. H. Campe’s German children’s bestseller *Robinson der Jüngere* have in common? All three were adapted, redesigned, and marketed in eighteenth-century Spain and depicted as crucial for reforming Spanish society. The project identifies these items as “reformist objects,” and uses them to explore the relationship between technology, politics, and gender in three crucial areas: the managing of the poor, the creation of a healthy environment, and

the education of the future citizen. Originally designed by well-known savants, the objects were flagged as useful applications of scientific theories on hotly debated topics, arguably affecting traditional feminine spheres, such as care and education. Examining how these “reformist objects” circulated from different cultural contexts and the processes that made them work in Spain, the project aims to deepen our understanding of the role of technology in the creation and dissemination of knowledge, political ideologies, and gender identities in societies on the periphery.

Guyton de Morveau disinfection apparatus.
Museo Galileo, Florence, Italy.



Kathleen
Vongsathorn

Kathleen Vongsathorn (Postdoctoral Fellow, MPIWG/ Visiting Assistant Professor, Lafayette College, USA)

Women and the Spread and Adaptation of Biomedical Knowledge in Uganda, 1897–1979

This project aims to develop a better understanding of the role of women in positions of biomedical authority and instruction, and the implications of that role in largely patriarchal societies; to understand the ways in which the largely informal biomedical training of women and children by women was received and adapted; and to develop a more complete assessment of the role of women in the promotion of health in Uganda. At issue are three different types of health education, each of which was primarily the province of European women and the Ugandans they trained: maternal and child health; general health and hygiene; and leprosy treatment and prevention. The project draws upon interviews with former biomedical professionals and elderly Ugandans living in proximity to old medical centers, and upon the archives of the colonial government and of four missionary societies active in biomedical work and education in Uganda.

Gender and Science

Short-Term Visiting Scholar

Carla Bittel (Loyola Marymount University, USA)

Project

Science in Circulation: The Exchange of Knowledge, 9th–17th Centuries

ORGANIZERS *Rivka Feldhay* (University of Tel Aviv, Israel), *Elaine Leong* (MPIWG/MPG Minerva Program), *Jamil Ragep* (McGill University, Canada), *Sally P. Ragep* (McGill University, Canada), *Alisha Rankin* (Tufts University, USA), *Pamela Smith* (Columbia University, USA)

COOPERATION PARTNERS McGill University (Canada), University of Tel Aviv (Israel), Staatsbibliothek zu Berlin (Germany), member institutions of the Islamic Scientific Manuscripts Initiative (ISMI) Board and ISMI sponsors (listed below)

Commodities, ideas, facts, instruments, texts, techniques, and people all travel—but selectively. Knowledge, both implicit and explicit, does not spread simply because it is true or useful; nor do the paths it takes cover the globe. The “Science in Circulation” project focuses on which knowledge circulates, and where, how, and with whom it does so. Although the questions posed by the project potentially apply to many epochs and cultures, the project concentrates on the period from the fifteenth to the eighteenth centuries and the geographical areas of the Mediterranean basin, the Atlantic, and Central Asia because the opening up of new trade routes and markets, advances in navigation, military and colonial initiatives, and religious migrations all conspired to set an unprecedented number of things, people, and thoughts in motion. The Working Groups devoted to this research project combine the perspectives of the history of science and technology with those of social and economic history and the geography of knowledge.

Three Working Groups in Department II address this topic: “Before Copernicus” (organized by Rivka Feldhay, University of Tel Aviv, Israel, and Jamil Ragep, McGill University, Canada), “Testing Drugs and Trying Cures in the Early Modern World” (organized by Elaine Leong, MPIWG), and “Itineraries of Materials, Recipes, Techniques, and Knowledge in the Early Modern World” (organized by Pamela H. Smith, Columbia University, USA). See also the related projects “The Globalization of Knowledge and its Consequences” and “Art and Knowledge in Pre-modern Europe.”

→ p. 147ff

Jan van Kessel and Erasmus Quellinus, *Asien* (ca. 1664/66), detail; Alte Pinakothek, Munich, Germany.



Science in Circulation

Working Groups**Islamic Scientific Manuscripts Initiative (ISMI)**

ORGANIZERS *Lorraine Daston* (MPIWG), *Jamil Ragep* (McGill University, Canada), *Sally P. Ragep* (McGill University, Canada), *Dirk Wintergrün* (MPIWG), *Urs Schoepflin* (MPIWG)

COOPERATION PARTNERS Institute of Islamic Studies (IIS) at McGill University (Canada), Staatsbibliothek zu Berlin (Germany)

Other sponsors include the American Council on Learned Societies (2006–2007); the McGill Arts Undergraduate Research Internship Awards (2011, 2012); Canada Foundation for Innovation (2008–2013); Canada Research Chair in the History of Science in Islamic Societies (2007–2021); Gouvernement du Québec (2008–2013)

Member Institutions of the ISMI Board: Institute for the Study of Muslim Civilizations, Aga Khan University (UK), Archimedes Project, Harvard University (USA), Filologia Semítica, Universitat de Barcelona (Spain), Encyclopaedia Islamica Foundation (Iran), Institute for the History of Arabic Science, Aleppo University (Syria), Institute for the History of Science and Technology (Russia), Institute of Ismaili Studies (UK), Warburg Institute (UK), Written Heritage Research Center (Iran)

→ p. 246

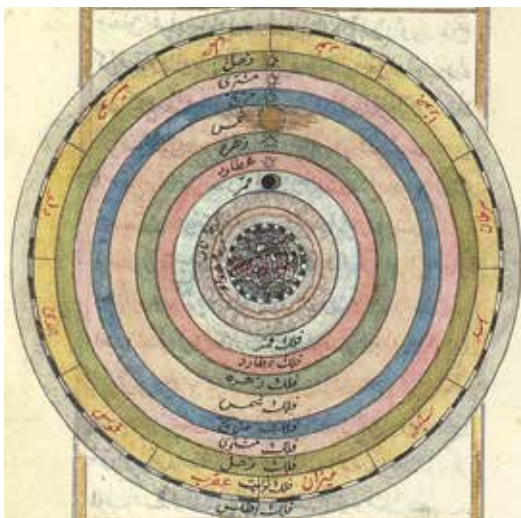
The mission of the Islamic Scientific Manuscripts Initiative (ISMI) is to make accessible information on all Islamic manuscripts in the exact sciences (astronomy, mathematics, optics, mathematical geography, music, mechanics, and related disciplines), whether in Arabic, Persian, Turkish, or other languages. ISMI researchers and their colleagues at the affiliated Post-classical Islamic Philosophy Database Initiative (PIPDI) have collected over 600,000 images from some 4,000 codices that have been the subject of in-depth examination. The collected data are stored and retrieved for analysis in the object-relational database OpenMind, developed by the MPIWG IT group.

At present, the database contains entries for 2,200 “persons” (authors, annotators, copyists, correctors, dedicatees, illuminators, illustrators, inspectors, owners, patrons,

students, readers, teachers, translators), who span the entire Islamic world from Islamic Spain to India and the borders of China, beginning in the eighth and continuing up to the nineteenth century. Currently, the research team has made available images of 150 scientific and mathematical codices from the Staatsbibliothek zu Berlin (STABI), an initiative made possible by the cooperation between the STABI, MPIWG, and IIS. Metadata and data for these codices are based on the catalog of Wilhelm Ahlwardt, published 1887–1899.

In upcoming phases of the project, we expect to add considerably to the number of open-access images. We also intend to make available metadata and data for the entire range of ISMI manuscripts as we check and vet information using images and catalog information. Such an ambitious goal must clearly be an ongoing enterprise, and we seek and welcome the active support of scholars worldwide.

The cosmos of premodern Islamic astronomy; from an Ottoman manuscript dated 1226/1811. Image courtesy of the Nasser D. Khalili Collection of Islamic Art, London, MS 397, fols. 10b–11a.



Itineraries of Materials, Recipes, Techniques, and Knowledge

March 13–14 and July 9–11, 2014; July 13–24, 2015

ORGANIZER *Pamela Smith* (Columbia University, USA)

Global historians have noted the burgeoning commerce and increasing global economic integration of the early modern world, especially with regard to the trade in precious metals and luxury commodities across long-distance commercial networks. Trade had flowed across Eurasia, around the Indian Ocean, and over the Mediterranean for millennia, but in this “early modern” period, larger parts of the globe became connected by the establishment of more or less regularized trading routes. Commodities and tribute bounced and jostled over these routes and along with them flowed knowledge. Knowledge moved not just geographically but also epistemically, as knowledge systems of different social and cultural groups intersected. Much recent work in the history of science has focused on the circulation of knowledge within Europe, across the Atlantic World, and between the two poles of East Asia and western Europe. By comparison, the movement of knowledge across Eurasia (and especially across Central Asia) during the same period has been researched much less. This Working Group considers the movement and circulation of materials, people, practices, and knowledge across the Eurasian continent in the “late medieval” and “early modern period”—circa 750 to 1800 (this large time-span is necessary to include all parts of Eurasia, which define “early modern” differently). A final workshop will take place in July 2015, with the aim of producing a Working Group volume.



Imitation Coral, produced by the Making and Knowing Project, Columbia University, according to the technical recipe contained in BnF Ms. Fr. 640, fol. 3r.

Working Group Members

- *Tara Alberts* (University of York, UK)
- *Francesca Bray* (University of Edinburgh, UK)
- *Che-Chia Chang* (Institute of Modern History, Academia Sinica, Taiwan)
- *Ming Chen* (Peking University, China)
- *Georg Freise* (MPIWG/Humboldt-Universität zu Berlin, Germany)
- *Feza Günergün* (Istanbul University, Turkey)
- *Dorothy Ko* (Barnard College, Columbia University, USA)
- *Angela-Ki Leung* (University of Hong Kong)
- *Luca Molà* (European University Institute, Italy)
- *Carla Nappi* (University of British Columbia, Canada)
- *Dagmar Schäfer* (MPIWG)
- *Tansen Sen* (City University of New York, USA)
- *Pamela Smith* (Columbia University, USA)
- *Ronit Yoeli-Tlalim* (University of London, UK)

Science in Circulation

Completed Project



Ali Qushji, *Fi anna a, sl al-khārij* ... (ca. 1450), Carullah MS 2060, f. 137a. Courtesy of the Süleymaniye Library, Istanbul, Turkey

Before Copernicus: The Cultures and Contexts of Scientific Learning in the Fifteenth Century

DURATION 2008–2014

ORGANIZERS *Rivka Feldhay* (University of Tel Aviv, Israel), *Jamil Ragep* (McGill University, Canada)

This collection of essays explores the multicultural, multireligious, and multilingual contexts of learning on the eve of the Copernican revolution. Although Copernicus’s work and its influence have been the subject of a number of excellent studies, there has been surprisingly little attention paid to Copernicus’s sources and the diverse cultures and contexts of learning in which he lived and was educated. Previous authors who have attended to this background have tended to put forth singular and rather narrow explanations of Copernicus’s turn to heliocentrism. In contrast, this volume does not seek to provide “the” explanation, or even “an” explanation, but rather provides the reader with insights into the complex and surprisingly rich intellectual and scientific world before Copernicus. The main topics are (a) the European cultural background, (b) the fifteenth-century astronomical background, (c) epistemological and conceptual foundations, (d) intercultural transmission, and (e) Copernicus’s immediate predecessors. The Working Group volume will be published by McGill University Press in 2015.

Science in Circulation

Planned Conference

Working with ISMI: Scholars Take Stock of a New Tool

February 29–March 1, 2016

The ISMI database has proven to be an excellent tool for storing and retrieving information. In the next phase of development, scholars in relevant fields have been invited to describe their experiences using ISMI and to offer suggestions that will make it an even more powerful research tool through the enhancement of a number of features and the addition of others. As in all digital humanities projects, the central question will be: What new kinds of research questions will ISMI allow you and other scholars to pursue?

Science in Circulation

Working Group

Testing Drugs and Trying Cures in the Early Modern World

ORGANIZED BY MPG Minerva Research Group.

→ p. 102ff

Science in Circulation

Individual Projects

Nele Diekmann (Predoctoral Fellow, MPIWG/Freie Universität Berlin, Germany)

Talbot's Tools: Scientific Notebooks as a Laboratory of Victorian Scholarship

Research dealing with scientific notebooks is primarily concerned with comparing their contents with later publications, tracing the thought process from the beginning to the end. In contrast, this dissertation addresses the question of how notebooks can influence thinking and trigger epistemic processes. Rooted in Assyriology, the study is particularly invested in the early history of that discipline, especially in the means by which the ancient writing system known as cuneiform was deciphered. It explores these processes by analyzing the notebooks of William Henry Fox Talbot (1800–1877), a Victorian polymath and gentleman of science, who became interested in cuneiform during the 1850s and spent the remainder of his life studying it. The dissertation deals with the ways in which Talbot used his pen-and-paper tools to explore the mystery of a hitherto very little known writing system.



Nele Diekmann

Sietske Fransen (Postdoctoral Fellow, MPIWG)

Visualization as Translation of Scientific Knowledge in Early Modern Europe: The Personal Use of Tables and Images in Alchemy, Geomancy, and Medicine

The project focuses on alchemy, geomancy, and medicine as taught and practiced in northern Europe (England, Germany, and the Low Countries). By connecting these three different disciplines as practiced throughout the fifteenth, sixteenth, and seventeenth centuries, the study expects to show that practitioners of science and natural philosophy developed various forms of visualization as an intermediary step between textual information and its practical implementation. The innovations in techniques of observation, experimentation, and organizing knowledge can be best appreciated if we consider how the relationship between text and practice was reconfigured. Paradoxically, this line of research yields the most profound insights when it encompasses fields such as alchemy and geomancy, disciplines that, in contrast to medicine, eventually fell by the wayside with the emergence of modern science.



Sietske Fransen

Sonam Kachru (Predoctoral Fellow, MPIWG/University of Chicago, USA)

Minds, Bodies, and Worlds: Philosophy beyond Empiricism in Vasubandhu's Twenty Verses

This dissertation offers a new interpretation of the “Monograph in Twenty Verses,” an important essay in the history of philosophy in South Asia by the influential Buddhist philosopher Vasubandhu (fl. fifth century CE), recuperating a paradigm of philosophical inquiry for Vasubandhu distinct from the kind of epistemology that served as the dominant paradigm for philosophers in South Asia after the sixth century CE and not misleadingly termed “natural philosophy,” or perhaps, “metaphysics as natural philosophy.” An interpretation of the “Twenty Verses” foregrounds two concerns exemplary of what I am calling natural philosophy: first, the long and neglected history of Buddhist debates concerning cosmology (which Vasubandhu understood to



Sonam Kachru

be the study of physical and non-physical constraints on forms of mentality), and second, debates concerning the atomic constitution of material objects.



Harun Küçük

Harun Küçük (Postdoctoral Fellow, MPIWG/Assistant Professor of History, University of Pennsylvania, USA)

Enlightenment and Imperial Decline: Cultures of Naturalism in the Ottoman Empire, 1650–1750

This study investigates the interface between artisanal and scholastic ways of knowing during a transformative period in Ottoman history. Some of the salient dynamics of this century were the empire’s emerging cosmopolitan culture, Istanbul’s changing relationship with global commerce, structural transformations in Ottoman politics,



Abd al-Jalil Levni, *A Cosmopolitan Maritime Spectacle with Mechanical Devices* (1720). Courtesy of Istanbul Topkapi Museum.

and, last but not least, the extension of Europe’s cultures and countercultures to the Eastern Mediterranean. In this context, the narrative of Ottoman decline became a common trope among conservative authors of the seventeenth and eighteenth centuries. Decline meant, quite simply, the mismatch between the idealized feudal society of medieval Islamic ethics and the realities of the Ottoman Empire as a mercantile and urban polity with Muslim, Orthodox Greek, Armenian, Jewish, and European stakeholders. By the eighteenth century, the decline narrative had given way to a far more enlightened discourse that defined the Empire as a multiconfessional monarchy that thrived on commerce. This project’s key themes are the valorization of empirical knowledge, the deconfessionalization of philosophy, the revival of classical Arabic disciplines as humanistic subjects, and the rise of utility as the key value defining the dignity of science.

Katja Krause (Postdoctoral Fellow, MPIWG)

Coming to Their Senses: The Averroist Turn and the Rise of “Empiricism” in the Thirteenth Century

All human knowing is grounded in sense experience. This observation may sound trivial, yet its recognition as a necessary condition for human knowing gained particular momentum among Latin learned thinkers in the thirteenth century, principally due to the translations of Averroës’s Arabic commentaries on major works of Aristotle. Whereas this Averroist turn is well established in scholarship, its positive force as expressed in its coalescence of psychology, epistemology, and the scientific method has received little attention. Averroës’s commentaries enabled the Scholastics to appreciate Aristotle on a different level. Albert the Great began to comprehensively incorporate the new findings, and Thomas Aquinas was the first theologian to endorse sense perception as constitutive ground for *all* natural human knowing. Similarly, Siger of Brabant followed Averroës’s naturalized noetics. The aim of this study is to establish the consequences of this first Latin “empiricism” and investigate how it altered the normative landscape and purpose of human knowing and science in its standards, practices, and ideals.



Katja Krause

Minakshi Menon (Postdoctoral Fellow, MPIWG)

Making Useful Knowledge: British Naturalists in Colonial India, 1784–1820

This project explores the strategies involved in making natural knowledge among British-Indian savants, including the orientalist Sir William Jones (1746–1794) and the East India Company surgeons Francis Buchanan (1762–1829) and William Roxburgh (1751–1815). The project tests the thesis that colonial natural history and the East India Company-State were co-constitutive. It places the histories of Britain and India within a unitary epistemological framework, tracing continuities between Edinburgh University pedagogy and colonial surveying practices, and between the sensiblist epistemology of European savants and orientalist botany. Bringing together a variety of analytical approaches to explore the micro-processes of information transfer between indigenous and European knowledge forms, the study examines Jones’s use of the Sanskrit verse lexicon, the *Amara Kōsa*, as a source for natural historical information about India, Roxburgh’s classification of plants based on information in Indian languages, and Buchanan’s ordering of caste groups through political arithmetic, exploring the significance of their strategies for colonial governance.



Minakshi Menon



Sketch by Lady Anna Maria Jones of Ramlochan, a physician, one of Sir William Jones’s “native informants.” Courtesy of the Royal Asiatic Society of Great Britain (Jones MSS)



Katharine Park

Katharine Park (Visiting Scholar, Harvard University, USA)

Knowledge on the Move: Scientific Encounters in the Muslim and Christian Worlds, 500–1500

Based on a course taught with Ahmed Ragab in the Department of the History of Science at Harvard, the project will yield a co-authored book targeted to students and non-specialist scholars. It will present scientific and medical thought and practice in the Islamic and Latin Christian Middle Ages as a unified enterprise with a unified history, rather than as part of a story describing the transfer of knowledge from Greek antiquity to early modern Europe via the Arabic-speaking world. The book is organized around the exchange and circulation of people, objects, texts, and information within and between the two cultures, with special attention given to social, cultural, and religious contexts.



Mary Terrall

Mary Terrall (Visiting Scholar, University of California, Los Angeles, USA)

Encounters with Indigo: The Circulation of Natural Knowledge among French Colonies in the Eighteenth Century

In 1750, Michel Adanson, a young French naturalist attached to the *Compagnie des Indes* at their outpost in Senegal, sent several small swatches of cotton fabric to Paris. He had dyed the swatches himself, using various preparations of indigo grown locally and following practices he had learned from native inhabitants. While collecting plants, seeds, and animals for occasional shipment to Paris, he also maintained a small laboratory, an experimental garden, and his own collection of specimens that eventually accompanied him back to France. The material vestiges of Adanson's experimental activities with African dye plants—scraps of deep blue cloth folded into a letter and now preserved in the archives—raise questions about Adanson's scientific

work during his five years in Senegal, and about his fraught relations with Parisian scientific institutions and with the *Compagnie des Indes*. In reconstructing the conditions and practices of his Senegal operation, this project focuses on the naturalist's negotiations with his local informants and with his employers and patrons. It situates Adanson's work on indigo within the interlocking networks of science, technology, commerce, and artisanal practices that made natural history possible in the eighteenth century.

Indigo dye test strips, from Adanson's trials in Senegal, 1751. Courtesy of Hunt Institute for Botanical Documentation, Carnegie Mellon University.



Science in Circulation

Short-Term Visiting Scholars:

Kaspar von Greyerz (Universität Basel, Switzerland), *Suzanne Marchand* (Louisiana State University, USA), *Carla Nappi* (University of British Columbia, Canada), *Jessica Ratcliff* (Yale-NUS College, Singapore), *Claudia Swan* (Northwestern University, USA)

MPG Minerva Research Group

Reading and Writing Nature in Early Modern Europe

DURATION 2012–2017

RESEARCH GROUP LEADER *Elaine Leong* (MPIWG/ MPG Minerva Program)

COOPERATION PARTNERS University of Cambridge (UK), Institut für Geschichte der Medizin, Charité-Universitätsmedizin Berlin, Germany

An apothecary with the tools, costume and apparatus of his trade (c. 1721). Engraving by Martin Engelbrecht, Image courtesy of the Wellcome Library London.

This research group explores the myriad of different ways in which early modern Europeans read the “book of nature.” Focusing on health-related knowledge and activities, the group has two main research goals. First, it seeks to understand the codification of vernacular natural knowledge by examining reading and writing practices as epistemic processes. Second, by studying drugs and cures, it investigates how men and women sought to read and understand their own bodies and the natural environment within which they lived.



Reading and Writing Nature in Early Modern Europe

Working Group

Testing Drugs and Trying Cures in the Early Modern World

Workshop: June 25–26, 2014; reading group meetings: May 21, May 22, June 6, June 13, and June 20, 2014

ORGANIZERS *Elaine Leong* (MPIWG/ MPG Minerva Program), *Alisha Rankin* (Tufts University, USA)

Early modern Europe was awash with a dizzying variety of remedies both old and new. Voyagers returning from the New World introduced exciting new *materia medica* such as the famed Jesuit's or Peruvian Bark, whereas others brought antidotes from Turkey and the Far East; chemists invented panaceas and complex medical distillations; enterprising medical practitioners touted the healing properties of the newly fashionable mineral waters and spas; and new religious and occult therapies flourished as well. With so many options to choose from, processes of testing, hands-on trials, and experimentation were central to the evaluation and validation of potential cures.



Paolo Antonio Barbieri, *The Spice Shop*, (1637), Pinacoteca Comunale Spoleto, Italy.

The testing of remedies has long been mentioned as an important precursor to the Baconian “experimental philosophy,” but only recently have historians begun to examine the specifics of drug testing in the early modern world. This Working Group investigates the processes and practices through which pre-modern men and women tested and evaluated medicinal cures. The collection of twelve essays, to be published as a special issue of the *Bulletin of the History of Medicine* in 2016, showcases the rich set of practices utilized in the assessment of cures in the pre-modern world and the diverse goals, methodologies, and theoretical frameworks of testing. The activities surveyed by the group took a wide variety of forms, from theoretical trials on paper in learned tomes to structured, repeated experiments conducted in the newly founded academies to anecdotal tests conducted in domestic spaces. Our historical actors tested not only for efficacy but also in order to uncover the composition and effects of particular ingredients. Aside from observing and testing the substances themselves, early modern medical writers also grappled with “testing” different translations (lin-

guistic or otherwise) as medical knowledge traveled across the world. When taken together, the essays in the collection paint a complex picture of the varied ways in which testing drugs and trying cures feature in histories of science and medicine in the early modern world.

Table of Contents

- Michael McVaugh, *The Earliest Testing Protocols in the Medieval Universities*
- Evan Ragland, *Trying Animals and Patients as Chymical Subjects in Seventeenth-Century Leiden*
- Antonio Barrera-Osorio, *Indian Doctors, the Experience of Medicinal Plants, and Early Modern Science in the Atlantic World*
- Samir Boumediene, *Charitable Experiments: Medical Innovation and the Economy of Risk in Early Modern Europe*
- Michael Bycroft, *The Académie Royale des Sciences and the Evaluation of Mineral Waters in France, 1666–1778*
- Francesco Paolo de Ceglia, *Playing God: Testing and Reproducing Blood Miracles in the Europe of the Eighteenth Century*
- Marta Hanson and Gianna Pomata, *Recipes and Experiential Knowledge in the Seventeenth-Century Epistemic Exchange between China and Europe*
- Erik Heinrichs, *The Live Chicken Cure for Plague Buboes: Medical Experimentation in Late Medieval and Early Modern Europe*
- Lauren Kassell, *Talking Cures in Early Modern England*
- Justin Rivest, *The Lost Secret of the Chevalier de Guiller's Powder Febrifuge: Testing Drugs for Monopoly Privileges and Military Contracts in Early Eighteenth-Century France*
- Valentina Pugliano, *Renaissance Pharmacy and the Language of Truth*
- Jeremy Greene, *Afterword*

Reading and Writing Nature in Early Modern Europe

Conferences

Notebooks, Medicine and the Sciences in Early Modern Europe

July 12–13, 2013 (Cambridge, UK)

ORGANIZERS *Lauren Kassell* (University of Cambridge, UK), *Elaine Leong* (MPIWG/ MPG Minerva Program)

COOPERATION PARTNER University of Cambridge (UK)

This international conference brought together researchers working on early modern paperwork and information management. The twelve presentations illustrated the rich ways in which early modern men and women utilized paper technologies to codify medical and scientific knowledge across Europe. The humble notebook emerged as a crucial epistemic tool in the collation, reworking, and creation of new knowledge across a number of fields, including medicine, natural history, literature, geography, and natural philosophy.

Pieter Jakob Horemans, *Physician in his Study Writing a Prescription for his Waiting Patient* (1745, detail). Image courtesy of the Wellcome Library London.



Participants

- *Ann Blair* (Harvard University, USA)
- *Isabelle Charmantier* (University of Exeter, UK)
- *Anthony Grafton* (Princeton University, USA)
- *Volker Hess* (Charité – Universitätsmedizin Berlin, Germany)
- *Fabian Krämer* (Ludwig-Maximilians-Universität München, Germany)
- *Elaine Leong* (MPIWG/ MPG Minerva Program)
- *Andrew Mendelsohn* (Queen Mary, University of London, UK)
- *Staffan Müller-Wille* (University of Exeter, UK)
- *Nicholas Popper* (College of William and Mary, USA)
- *William Sherman* (University of York, UK)
- *Adam Smyth Birkbeck* (University of London, UK)
- *Michael Stolberg* (Julius-Maximilians-Universität Würzburg, Germany)
- *Angus Vine* (University of Stirling, UK)
- *Joanna Weinberg* (University of Oxford, UK)
- *Richard Yeo* (Griffith University, Australia)

Reading and Writing Nature in Early Modern Europe

Cosponsored Workshops

On January 10–11, 2014, the MPG Minerva Research Group cosponsored the workshop “Physicians, Paper and Polis in Early Modern Europe” with the European Research Council (ERC) project “Ways of Writing: How Physicians Know, 1550–1950” at the Institut für Geschichte der Medizin, Charité – Universitätsmedizin Berlin, and the workshop “Reading How-To: The Uses and Users of Artisanal Recipes” with the “Art and Knowledge in Pre-modern Europe” research group at the MPIWG.

Reading and Writing Nature in Early Modern Europe **Research Blog**

The Recipes Project

EDITORS *Elaine Leong* (MPIWG/ MPG Minerva Program, since 2012), *Amanda Herbert* (Christopher Newport University, USA, since 2014), *Lisa Smith* (University of Saskatchewan, Canada, since 2012), *Laurence Totelin* (Cardiff University, UK, since 2015)

The Recipes Project (recipes.hypotheses.org) is a virtual “hub” for research and teaching on premodern recipes. Publishing twice weekly, the blog showcases the work of over fifty international researchers, including a dozen graduate students. Our broad remit has enabled us to explore recipes in a wide range of contexts—from ancient Mesopotamia to colonial Yucatán to Victorian Britain—and on diverse topics such as histories of magic, alchemy and early chemistry, technical art history, histories of therapeutics and cures, manuscript and text studies, histories of translation, and global history. The blog also provides a useful forum for discussing methodologies and pedagogy, such as the August 2014 series on reconstructing art technological recipes and the September 2014 series on recipes and the classroom. Between September 2012 and December 2014, the Recipes Project featured over 250 posts that altogether received over half a million visits.



Reading and Writing Nature in Early Modern Europe **Digital Humanities Project**

Early Modern Recipes Online Collective

ORGANIZERS *Rebecca Laroche* (University of Colorado, Colorado Springs, USA), *Elaine Leong* (MPIWG/ MPG Minerva Program), *Jennifer Munroe* (University of North Carolina at Charlotte, USA), *Hillary Nunn* (University of Akron, USA), *Lisa Smith* (University of Saskatchewan, Canada), *Amy Tigner* (University of Texas at Arlington, USA)

STUDENT ASSISTANTS *Julia Jäggle* (MPIWG), *Daniel Glombitza* (MPIWG)

This project is an experiment in research-led pedagogy. Conducted on five North American campuses and at the MPIWG, project members work with undergraduate students to transcribe and encode in XML early modern manuscript recipe texts. Through their transcriptions, the students create open-access searchable editions of the texts and contribute to a large-scale international research project. The project uses the Textual Communities Platform developed at the University of Saskatchewan, and all completed transcriptions are encoded by basic XML tagging, adhere to the standards of the Text Encoding Initiative (TEI), and are double-keyed. In the academic years 2012–2014, a group of about sixty students worked together to transcribe over nine hundred manuscript pages.

Reading and Writing Nature in Early Modern Europe

Individual Projects



Samir
Boumediene

Samir Boumediene (Postdoctoral Fellow, MPIWG/University of Cambridge, UK)

Experimenting with Exotic Drugs in Charitable Institutions and Hospitals (16th–18th Centuries)

This project investigates early modern trials and experimentation on “exotic” *materia medica*. It considers these trials to be both epistemological processes designed to produce new natural knowledge and social processes designated to generate trust. A drug is not only experienced as a material affecting the body; it is also experimented with with respect to both the substance and the body. As an interactive inquiry, experimentation with drugs involves practical knowledge mobilizing the five senses as well as instrumentation and medical conceptions. Because they are new and unknown, exotic drugs provide a good opportunity to study this process. The project focuses on four hospitals and charitable institutions in different sites, using a wide range of sources: the Hospital de Naturales of México, where Francisco Hernández, a

Title page of Johannes Christophorus Homann’s medical dissertation on tropical herbs (1725). Engraving by Johann Georg Ebersperger.



physician to the Spanish king, tested hundreds of medicinal plants on Indian inmates; the Hospital de las Cinco Llagas in Seville (Archivo de la Diputación de Sevilla), where most American drugs were first tested; the Parisian hospitals at the end of the seventeenth century; and the Roman hospitals during the eighteenth century.



Elaine Leong

Elaine Leong (MPIWG/ MPG Minerva Program)

Reading for Cures in the Early Modern Household

Early modern householders were bombarded with health-related information. Know-how was exchanged during medical consultations with physicians and other medical practitioners, shared around dinner tables with friends and family, scribbled on little paper slips and sent with letters, and proffered between the covers of printed medical books. These sorts of know-how ranged from recipes detailing how to make secret remedies, information on the wondrous properties of new *materia medica*, and drug shopping tips, to gardening information on the harvesting of herbs. With their fami-



Scholar at a desk. Taken from Joh. Amos Comenii *Orbis sensualium pictus quadrilinguis*, Noribergae (1679). Image courtesy of the Cambridge University Library.

ly's health maintenance and potential sicknesses never far from their minds, householders eagerly collected and treasured such information in large, bound notebooks. With new and seemingly unique and important information flooding in from so many avenues, householders often felt the same sense of information overload experienced by Renaissance scholars; and like scholars, they used a range of sophisticated information management technologies to shape, control, and create their treasuries of health. In-depth studies of these notebooks give historians of science and medicine rare glimpses into practices of natural inquiry and knowledge codification outside the learned academy, and encourage us to consider early modern paper tools, technologies, and information management systems within broader contexts. By examining the various reading and note-taking strategies that householders adopted to manage their ever-growing collections of health-related information, this project traces the shifting boundaries between acts of reading and writing and explores the epistemic consequences of vernacular note-taking.

Reading and Writing Nature in Early Modern Europe

Short-Term Visiting Scholars

Hannah Murphy (Oriel College, University of Oxford/ University of Exeter, UK),
Alisha Rankin (Tufts University, USA), *Emma Spary* (University of Cambridge, UK),
Tillmann Taape (University of Cambridge, UK)

Dilthey Fellowship Research Group
funded by VolkswagenStiftung

The Making of Acoustics in Sixteenth- to Nineteenth-Century Europe

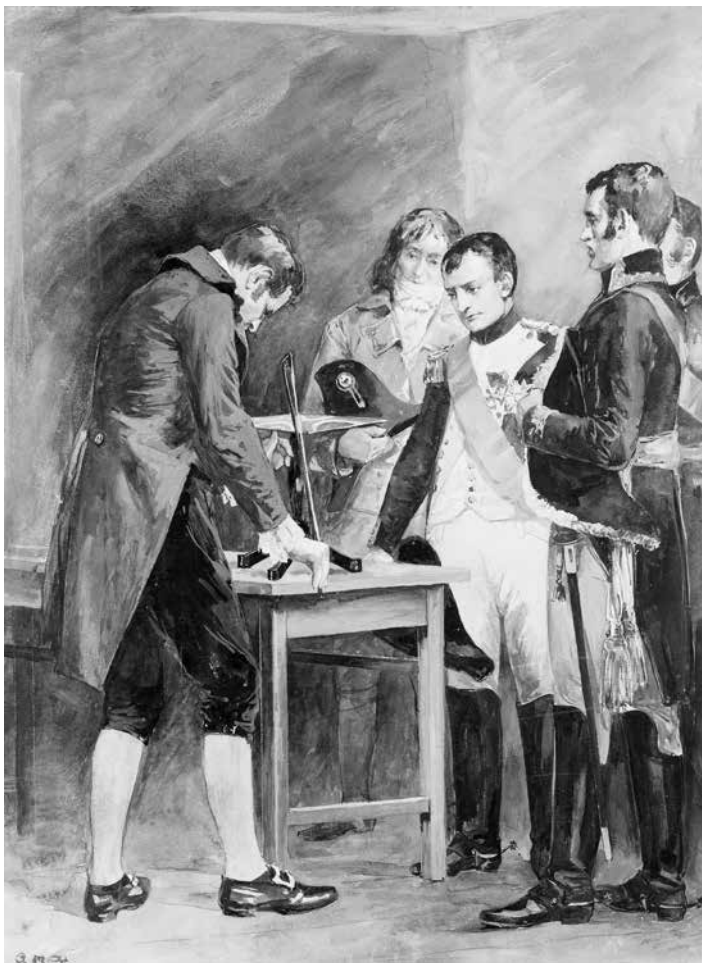
DURATION 2011–2016

RESEARCH GROUP LEADER *Viktoria Tkaczyk* (MPIWG/Universiteit van Amsterdam, The Netherlands)

→ p. 219ff

Ernst F. F. Chladni's audience with Napoleon 1809. Anonymous tempera painting, Deutsches Museum Munich.

The period 1500–1900 witnessed a series of fundamental findings in acoustics. The aim of this project is to show, however, that the history of acoustics is not limited to its emergence as an exact science, but must also be located in a history of religious, cultural, and artistic practices. The “acoustic” is therefore of interest in its dual function as a producer and as an object of science/knowledge.



In 2014, the project co-organized the Winter and Summer School “Sound Signatures” in cooperation with Myles Jackson and Mara Mills (Berlin Centre of New York University) and Carolyn Birdsall (Universiteit van Amsterdam, The Netherlands). The Winter School (January 2014, Amsterdam) focused in particular on sound-based strategies for the configuration of spaces, objects, and embodied practices. The Summer School (August 2014, Berlin) was dedicated to the sonic dimensions of knowledge production. See: <http://soundsignatures.org/>

Starting from March 2015, the group will merge with the Max Planck research group “Epistemes of Modern Acoustics.” See: <http://www.mpiwg-berlin.mpg.de/en/research/projectsRGTkaczyk>

The Making of Acoustics

Individual Projects

Carolyn Birdsall (Visiting Scholar, Universiteit van Amsterdam, The Netherlands)
Archival Impulses in German Radio: Collecting, Ordering and Re-Using Sound (1930–1960)

In 1930, journalist Hans Tasiemka reported on the pioneering introduction of sound recording and archiving at the Berlin Funk-Stunde station, on the initiative of its director Hans Flesch. According to Tasiemka, these *Tondokumente* (“sound documents”) would enable a collective sonic heritage for future generations, and were essential to the maintenance of a shared memory culture. Taking this “archival impulse” as a departure point, this project is undertaking the first comprehensive study of the archival and technological practices established in German broadcast institutions from around 1930 to 1960. Correspondingly, it also examines the institutional beginnings of sound archives in Weimar, National Socialist, and postwar broadcast organizations. Although these archives may be framed according to distinct breaks in political systems and media organization, the project calls for attention to certain continuities and overlaps in archival practice across the first decades of German broadcasting. The study reveals how the process of producing and archiving radio with wax disc recording (and later, magnetic tape) brought about qualitative changes in the live medium of radio. It places radio archives in a broader context of ongoing negotiations with recorded sound as a form of historical documentation and cultural heritage, and of scientific uses of sound archiving in fields such as phonetics, psychology, and musicology.



Carolyn Birdsall

Tape players in the British Library Sound Archive (2009). Photo: Andy Powell.

Anna Kvičalová (Predoctoral Fellow, MPIWG)

Disciplining the Sense of Hearing: Auditory Practices in Mid-Sixteenth-Century Geneva

This dissertation investigates new modes of listening (“attentive listening”), speaking (“plain” and “sincere” speech), and remembering (“word memory”) as they appear in mid-sixteenth-century Geneva in the context of religious Reformation. In this respect, the consistory of Geneva—its church discipline and surveillance policy—offers evidence in connection with a more general “acoustic turn” that can be observed for the period. In sixteenth-century Geneva, spectacular means of communication were rejected in part in favor of verbal instruction in the vernacular. In the Calvinist regime of the management of the senses, the sense of hearing acquired new epistemic functions, and novel rules governing auditory communication emerged. This shift in the interplay between visually and orally/aurally transmitted religious knowledge is studied against the background of a cultural history of hearing and the gradual emergence of acoustics as a scientific discipline. The projects examines historical arrangements of different disciplinary and educational practices, media technologies, and objects of material culture that came together in the articulation of new sensory relations with the world in Calvinist Geneva.



Anna Kvičalová



Viktoria Tkaczyk

Viktoria Tkaczyk (MPIWG/Universiteit van Amsterdam, The Netherlands)
Theatre, Opera and Concert Culture, and the Architects of Sound (1750–1900)



Karl Friedrich Schinkel, *Das neue Schauspielhaus in Berlin* (1823). Etching, Stiftung Stadtmuseum Berlin.

The establishment of the discipline of architectural acoustics is generally attributed to the physicist Wallace Clement Sabine, who around 1900 developed the formula for reverberation time and, with it, the possibility of making calculated prognoses about the acoustic potential of a particular design. If, however, we shift the perspective from the history of this discipline to the history of architectural knowledge and praxis, it becomes apparent that the topos of “good sound” entered the discourse much earlier. This project traces the Europe-wide discussion on the architecture of theaters, opera houses, and concert halls between 1750 and 1900. It shows that the period of investigation is marked by an increasing interest in auditorium acoustics, one linked to the emergence of a bourgeois culture and the growing sociopolitical importance of theater and music. In the wake of this development, the search among architects for new physical methods of acoustic research started to differ fundamentally from analogical reasoning on the nature of sound, which in part dated back to antiquity. Through their attempts to find ways of visualizing the behavior of sound in enclosed spaces and to rethink both the material and media aspects of auditoria, architects helped pave the way for the establishment of architectural acoustics as an academic discipline.

Viktoria Tkaczyk (MPIWG/Universiteit van Amsterdam, The Netherlands)

The Knowledge of the Ear: Auditory Memory Research around 1900

In 1866 the Viennese psychiatrist and neuroanatomist Theodor Meynert located in the human cerebral cortex what he called a “sound field,” responsible for the human powers of recall that are linked to auditory perception and the faculty of speech. Meynert’s discovery was taken up repeatedly in the years that followed: different notions of auditory memorization started to be coined in physiology, philosophy, linguistics, psychology, and pedagogy, and related research on “absolute pitch,” “the reader’s inner voice,” and “the singer’s laryngeal memory” helped pave the way for the field of experimental aesthetics. At the same time, new audio technologies provided

alternate modes of sound reproduction and archiving. Starting from these historical coincidences, the current research project traces the use and circulation of the term “auditory memory” in the sciences, the humanities, and the arts around 1900.

The Making of Acoustics

Research Network

Auditory Knowledge in Transition: An Epistemic History of Listening in Modernity (2013–2016, funded by the Deutsche Forschungsgemeinschaft – DFG)
 July 10, 2013 (Humboldt-Universität zu Berlin, Germany); October 10–11, 2014 (Universiteit van Amsterdam, The Netherlands); November 13–14, 2014 (Humboldt-Universität zu Berlin)

This international and interdisciplinary research network is comprised of fifteen scholars from Germany, Great Britain, the Netherlands, Switzerland, and the United States. The network’s central goal is to explore the epistemic status of hearing and listening throughout modernity since the sixteenth century. So far, the network has hosted the public panel discussion “What Does the Ear Know? On Auditory Knowledge in Transition,” and two workshops entitled “Auditory Knowledge in Science: Listening in the Laboratory” and “Auditory Knowledge in Music: Music between Theory and Practice.” The network members are organized in five working groups and will publish their research in a collective book project.

Network Members

- *Camilla Bork* (Humboldt-Universität zu Berlin, Germany)
- *Mary Helen Dupree* (Georgetown University, USA)
- *Nicola Gess* (Universität Basel, Switzerland)
- *Angela Grünberg* (University of Sheffield, UK)
- *Alexandra Hui* (Mississippi State University, USA)
- *Julia Kursell* (Universiteit van Amsterdam, The Netherlands)
- *Britta Lange* (Humboldt-Universität zu Berlin, Germany)
- *Jan-Friedrich Missfelder* (Universität Zürich, Switzerland)
- *Daniel Morat* (Freie Universität Berlin, Germany)
- *Manuela Schwartz* (Hochschule Magdeburg/Stendal, Germany)
- *Viktoria Tkaczyk* (MPIWG/Universiteit van Amsterdam, The Netherlands)
- *Axel Volmar* (McGill University, Canada)
- *Caroline Welsh* (Universität Erlangen-Nürnberg, Germany)
- *Rebecca Wolf* (Deutsches Museum, Munich, Germany)
- *Hansjakob Ziemer* (MPIWG)

The Making of Acoustics

Short-Term Visiting Scholars

Alexandra Hui (University of Mississippi, USA), *Axel Volmar* (Universität Siegen, Germany/ McGill University, Canada)

Pre- and Postdocs

During the reporting period 2013–2014, Department II has hosted over 35 pre- and postdoctoral fellows from fifteen countries for periods ranging from one month to a year, with both MPIWG and external funding. The research of longer-term, MPIWG-financed pre- and postdocs is described above under the relevant project; dissertations completed with “Writing-Up” Fellowships of Department II are described below. For ready reference, a list of additional pre- and postdoctoral fellows resident in Department II for shorter periods is provided thereafter.

Completed Dissertations



Alma Steingart

Alma Steingart (Predoctoral Fellow, MPIWG/Harvard Society of Fellows, USA)

Conditional Inequalities: American Pure and Applied Mathematics from the Cold War to the Present

Mathematics is often presented as the most historically stable discipline, with its methodology of proof and logical deduction dating back to ancient Greece. However, the precipitous growth of the field and its institutional remaking in the aftermath of the Second World War in America triggered worries over its intellectual boundaries. The emergence of applied mathematics as an independent field of study and the expansion of computing, operations research, and game theory were greatly aided by war-related projects and an increase in federal funding in the postwar period. Albeit with no direct relation to the external world, pure mathematics also enjoyed the fiscal benefit of the Cold War while maintaining autonomy by continuously redefining the nature of the field. With one hand in the humanities and another in the sciences, the development of mathematics demonstrates the malleability of the boundaries of knowledge. The dynamic relation between the natural and the human sciences reveals as much about institutions, practices, and nations as it does about epistemological commitments.



Dora Vargha

Dora Vargha (Predoctoral Fellow, MPIWG/Birkbeck College, University of London, UK); funded by the Mellon Foundation

Iron Curtain, Iron Lungs: Governing Polio in the Cold War

The dissertation uses the series of polio epidemics in communist Hungary to understand the response to a global public health emergency in the midst of an international political crisis. Based on extensive source material from national, international, and regional archives, medical and popular literature, hospital documents, memoirs and interviews, the project narrates the history of polio in Hungary at multiple registers. On an international level, it asks how Cold War divisions can be re-evaluated when viewed through the lens of a disease that disregarded borders and ideologies. On a national level, it investigates how post-war societies and nascent political systems dealt with an epidemic that worked against their modernist projects. On an individual level, it raises questions about definitions of treatment, authority of care and investigates the boundary between professional and lay knowledge. The disserta-

tion was awarded the ICOHTEC Young Scholar Book Prize 2014 by the International Committee for the History of Technology.

Short-Term Visiting Pre- and Postdocs

Sophie Brockmann (University of Cambridge, UK), *Ruben Hackler* (Universität Zürich, Switzerland), *Eric Hounshell* (University of California, Los Angeles, USA), *Katharina Kreuder-Sonnen* (Justus-Liebig-Universität Gießen, Germany), *Lucie Laplane* (IREPH, Université Paris Ouest Nanterre, France), *Jessica Lee* (York University, Canada), *Sigrid Leyssen* (Universität Regensburg, Germany/ EHESS, France), *Hannes Mangold* (ETH Zürich, Switzerland), *Megan McNamee* (University of Michigan, USA), *Daniel Midena* (University of Copenhagen, Denmark), *Birgit Nemeč* (Universität Wien, Austria), *Charles Niveleau* (University of Paris 1 Panthéon Sorbonne, France), *James Phillips* (New York University, USA), *Serge Reubi* (Université de Neuchâtel, Switzerland), *Tim Michael Rogan* (University of Cambridge, UK), *Anja Sattelmacher* (Humboldt-Universität zu Berlin, Germany), *Marco Tamborini* (Ruprecht-Karls-Universität Heidelberg, Germany), *Lukas Verburgt* (Universiteit van Amsterdam, The Netherlands), *Oriana Walker* (Harvard University, USA), *Cecilia Watson* (University of Chicago, USA), *Caitlin Wylie* (New Jersey Institute of Technology, USA), *Xin-zhe Xie* (École des hautes études en sciences sociales, France), *Xinxian Zheng* (Princeton University, USA)

Pre- and postdoctoral fellows, June 2015.
From left to right: Judith Kaplan,
Anja Sattelmacher, Withney Laemmler,
Elizabeth Wallmann, Minakshi Menon,
Sietske Fransen, Katja Krause,
Sonam Kachru, Nele Dieckmann.



The *Zhao Yu Tu* ("map of the area of the mausoleum"), excavated in the late 1970s in Pingshan County, south-central Hebei Province. Hebei Provincial Museum at Shijiazhuang, Hebei Province, China.
© World Map Co. Ltd. Supervised by National Administration of Surveying, Mapping and Geoinformation.



Department III

Artefacts, Action, and Knowledge

DIRECTOR *Dagmar Schäfer*

Research Agenda

Artefacts, action, and knowledge are at the heart of Department III's research agenda. Established in August 2013, Department III studies the historical dynamics of concept formation, situations, and experiences of action through which actors have explored, handled, and explained their physical, social, and individual worlds. Three premises inform this work. First, historically, actors often conceived of forms and expressions of knowledge bound to action in terms of procedures (such as planning, ordering, and designing). Second, different material orders (of life, environment, work, use, or production) contributed substantially to the witnessing of knowledge production. Third, scientific and technological understanding took place in a diversity of forms and formats.

Because the (hidden) subjects and agendas of the knowledge structures of different times and cultures become visible only in context and by comparison, research in Department III is organized collaboratively. Scholars analyze the divergent cultural and material repertoires that actors employed; individual projects incorporate varied disciplinary expertise from fields such as art, medical history, anthropology, science and technology studies, archaeology, and the natural sciences, as well as regional and cultural studies. These multiple perspectives allow questions and methods to cross traditional academic boundaries, enriching research agendas and producing new insights into the histories of science.

In the reporting period 2013–2014, the first seeds of Department III were sown, germinated, and tended into a flourishing crop of twelve researchers and a vital team of three support staff. The first invited guests, leading scholars from diverse fields, took part in a lively forum of “Werkstattgespräche” to discuss and critically reflect on the infrastructure and program of Department III. In October 2014, the Department organized a launch to present its members and concepts to the Institute members and Berlin academic community. A word of thanks here for the immeasurable and indispensable advice and guidance from our colleagues at the Institute and the absolutely fantastic engagement of all first-year members of Department III.

Overall Structure

The Department's research is structured around three approaches: developing concepts, explicating historical contexts, and unlocking sources. Scholars come together around conceptual and topical themes to explore, on the one hand, the processes and structures that lead to varying configurations of collaborative and individual bodies of knowledge and, on the other hand, the changing role of artefacts, such as documents, objects, materials, and spaces, in the creation, diffusion, and use of scientific and technological knowledge. The richness and variety of scientific and technological thinking in a global context is revealed when new and traditional means for the study of pertinent issues of knowledge production and its use and effects are brought to bear on sources such as the corpus of eight thousand Chinese local gazetteers (*difangzhi* 地方志), dating from the tenth to the twentieth centuries, or the Buddhist and Daoist canons.



Idealized episode of a planning process on the Frontispiece of *Architectura Militaris Moderna* by Matthias Dögen, 1647: A prince is presented with the design of a fortress by a fortification engineer. The worker about to use his shovel serves to ensure the quick and smooth realizability of the project.

As the scope of the history of science expands, methodological questions concerning essential characteristics of the discipline must be addressed. Structurally, Department III is investing in the development of innovative methodologies for historical inquiry and new modes of sharing findings. Both technical and innovative social and institutional solutions are required. Digital humanities methods are pursued in close cooperation with Departments I and II, the independent research groups as well as local and international partners to address historical questions that cannot be answered otherwise. In the ongoing Methods Intensive event series, participants from a broad spectrum of disciplines critically compare, confront, and combine their specific methodological skills. Department members review the toolbox of the history of science, discuss broadening disciplinary perspectives, and probe new methods of research.

Enhancing communication and global exchange is central to the work of Department III. The Get-It-Published program aims to foster a collaborative research environment and international discourse by inviting young Asian scholars to introduce their research to an international audience. The Sound of Silk is an explorative project that examines ways of creating scientific articles—editorially and technically—through multimedia to generate both new perspectives and new audiences. Working with the MPIWG's Artist-in-Residence scheme,

Department III scrutinizes the complexities of globalized economies and lives through the theme of garment manufacture, exploring alternate forms of interpretation and narrative. The Department is also initiating formal cooperation with international partners.

All scholars in residence participate in the biweekly Department colloquium with precirculated papers and designated discussants. The colloquium provides a forum in which work in progress on individual projects is presented and discussed in the light of the Department's themes. Contributions are equally shared between resident scholars and invited guest speakers.

Research Themes

In August 2013, the research theme Histories of Planning was launched; by September 2015, a second theme will have been established, centering on animals as both historical actors and subjects. Both research themes address the logic of materiality in relation to the reception of patterns of thought and action when actors engage in processes of knowledge production and regeneration. These research themes question how repetition, re-enactment, and continuity, and thus the predictable or contingent, relate to the unexpected or unlooked-for. Histories of Planning focuses on historical attempts—through plans imagined or implemented—to stabilize logics by creating precedents, algorithms, plausibility in argumentation, or organizational structuring. The theme centered on animals—moving targets—will foreground subjects and materialities as it investigates not only the role of unforeseen developments but also multiple nonhuman agencies. This approach facilitates new insights into major issues of the history of science: the role of inference and deduction, probabilistic models, empiricism and statistical methods, continuity, certainty and reliability in relation to not-knowing and ignorance, ambiguity, doubt, and the role of risk.

Chinese fishing nets, Kochi
(copyright K. Philip).



Research Theme

Histories of Planning

In this research project, the English term “planning” is used as a reflexive tool to inquire into the manifold notions and terms that historical actors have used to address and frame methods to “make things work.” This definition of the term goes beyond both the conception of plans as historical products of a reflection on knowledge and action and the eighteenth- to twentieth-century European elitist and reductionist top-down idea of planning expressed in terms of risk management and future orientation. Whether offered by an individual, a community, or a state, planning historically has meant approaching issues as dynamic and procedural activities: knowledge and skills were subject to purpose, and having “made things work” was the gauge of success.

In the first year, invited guests collaborated with the Department’s scholars in residence, meeting in reading groups and discussing individual projects. The exploratory discussions contributed substantially to the development of the Histories of Planning. Working Groups started in September 2014.

The Department’s first research theme unpacks knowledge production in action, thus emphasizing processes of entanglement among and dynamics within knowledge forms under construction. Because “things” must work out and ends must be met, actors identify physical realities and discuss or ponder how to handle them. They spell out cognitive capacities, validate knowledge, and apply or dismiss ideas and practices. They identify patterns or methods that worked in the past and stabilize them, creating precedents and illuminating sites of attention. Purposeful planning also enables, officially or unofficially, spontaneity and the ad hoc nature of knowledge production to manifest. As it frees or limits space for experiments and novelty, planning makes legible a host of power relations by determining who has space to experiment, and at what level novelty is possible. Histories of Planning asks how individuals, communities, and states envisioned and fashioned processes, and how they developed spheres for creativity and negotiation.

In the foreground is the process of knowledge production and use, rather than the end product or effect per se. The research theme looks at how people deal with the ad hoc nature of knowledge production, whether building a dam, organizing a training program, or baking a cake. Approximation, improvisation, and flexibility are seen in relation to the creation of norms, strategies, and policies. It inquires how and when, between the ideal plan and its implementation, some bodies of knowledge are institutionalized whereas others are ignored. When and why were goals, past experiences, skills, and materials mapped out in guidelines? And when did models, recipes, and blueprints come to indicate the coordinates of the field of effort?

Thinking of planning as a historical variable invites a rethink of the hierarchies of power and knowledge, knowing and doing, and their role and impact as well as the materialities of knowledge-making. When and how is an objective identified; which possibilities and constraints are considered; which materials, skills, tools, and tech-

niques allocated. As thoughts and things are organized, managed, or adjusted, choices are made and implemented. Planning may be an individual act or collaborative, and its actions may happen implicitly or be made explicit. In processes of planning, general patterns attain validity as much through experience and experiment as through theory and abstraction.

From a global perspective, and from the viewpoint of its procedural character, research on planning promises substantial insights into the relationship between management and methodologies, systemic choices and the development of systematic knowledge. Key thematic elements in this collaborative research project draw attention to the ways scale and scope have historically impacted knowledge dynamics, the nature of historical actors' knowledge, belief, and judgment—ethical, economical, technical—and the roles that structuring actions have played in the historical formation of knowledge fields. Histories of Planning thus uncovers how interlocking spheres of profane, administrative, and representational functions, small and large scale, knowledge and action, are coordinated to make complex systems work.

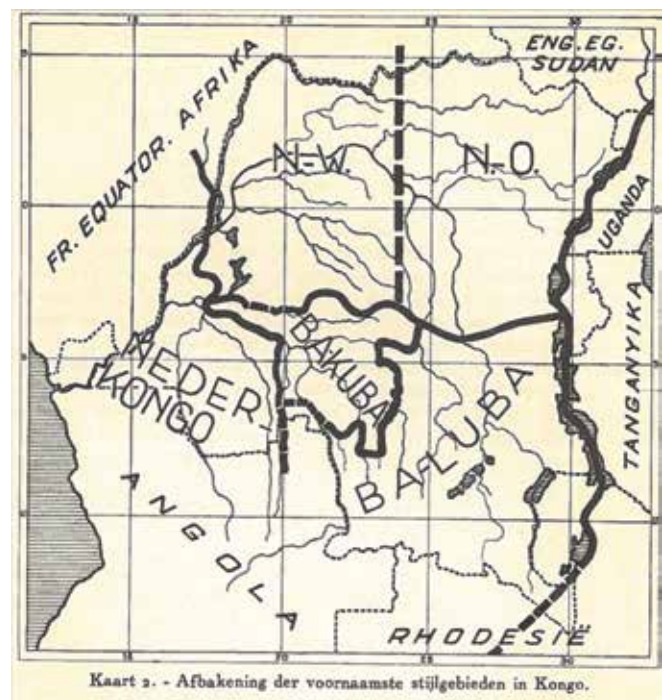
Histories of Planning

Working Groups

Within each theme, conceptual and topical approaches are pursued in tandem. Histories of Planning has three Working Groups thus far: Scale and Scope, the Art of Judgment, and the collaborative project the Palace Machine. Scholars in Scale and Scope discuss the impact that territorial and temporal scale, and processes of synergy or extrapolation, had on scientific developments. In the Art of Judgment, logistics and decision-making are brought into focus: how assessments were made, formal and informal norms imposed, validated, or ignored within the process of making things work. Together with researchers from the Beijing Palace Museum, scholars in the Working Group Palace Machine examine the Chinese imperial palace of the Qing dynasty (1644–1912) as a locus and hub of artefacts and actors in which knowledge production, its maintenance, and its loss depended on judgment and decision-making processes as well as global and individual considerations of the scale of operation or the scope of impact. A fourth Working Group—and a second collaborative project—comparing the Chinese and Ottoman bureaucracies' approaches to dealing with silk and health care, is in preparation for 2016.

Working Group members meet regularly over a period of two years (2014–2016) to discuss their work and jointly develop workshops, conferences, and projects, as well as traditional and innovative forms of publication: single-authored, Working Group volumes and joint essays, blogs, and new media.

Frans Olbrechts, map of Congolese artistic style areas, 1946; from F. M. Olbrechts, *Plastiek van Kongo*. (Antwerp, 1946), p. 38).



The Art of Judgment

ORGANIZER *Nina Lerman* (MPIWG/Whitman College)



Nina Lerman

Primary school class in “sloyd” woodworking (based on the Swedish *slöjd*), 1890s; (John Trevor Custis, *The Public Schools of Philadelphia: Historical, Biographical, Statistical* (Philadelphia: Burk & McFetridge, 1897), p. 199; <http://archive.org/details/publicschoolsph00custgoog>).

The process of “making things work” demands collaborations involving many decisions: small and large; constrained by human plans and material circumstance; shaped by cultural values, knowledge cultures, regimes of attention. Choices made in the

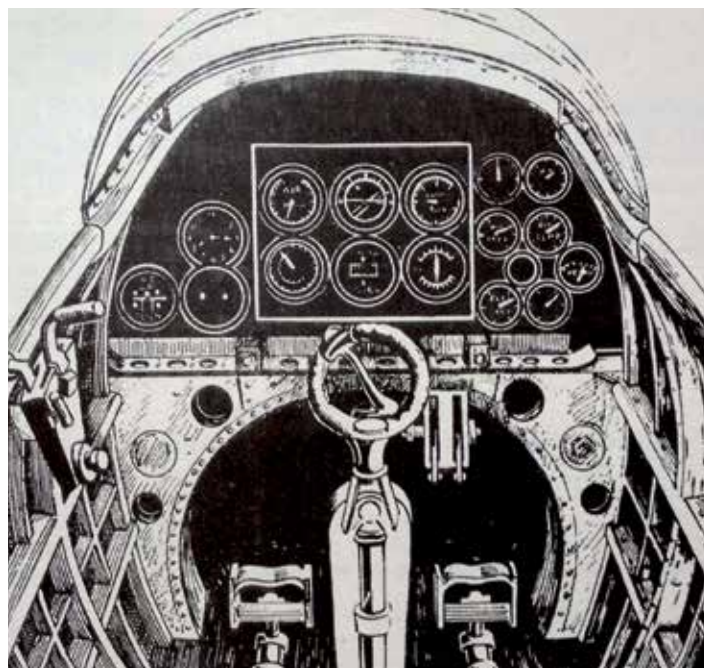


larger schemas of knowledge production, and in specific day-to-day actions, interlock in layers of organization, constraint, and predictability. Judgments about whether a product or technique is good or bad, fine or coarse, useful or superfluous, authoritative or transgressive, may sometimes draw on unspoken rules or values of custom and habit, and may sometimes refer to more explicit yardsticks such as ritual or religious norms, legal codes, or established standards and procedures.

Considering “planning” from this angle, it is clear that whether in the sciences or the arts, knowledge enactment is very rarely a value-free zone. Men, women, and children, professionals and laymen, in and out of the formal workplace, explore and apprehend the nature of their world and its material contingencies, at everyday or specialist levels, within ethical, cultural, social, and political agendas. Judgments may not be unanimous. Further, changes in social, economic, or political order often provoke

new regimes of judgment, as rubrics are rearranged or power is reallocated. Reciprocally, changes in local knowledge cultures and organization, the production of new forms of knowledge, may demand adjustments and new decisions in a network of making things work.

Researching the Art of Judgment also requires attention to how short-term failures may be handled within longer-term continuities of success. How is a structure created to allow for and integrate the necessary adjustments and improvisations required by variations in raw materials, unexpected results, new insights? How is the validity of knowledge authorized, or rejected, and by whom? Additionally, what happens in the case of some more egregious form of rupture: Who calls it failure, and is there anyone for whom it might simultaneously look like success? These questions in turn provoke analysis of rubric and classifica-



D. Russell Davis, *Pilot Error: Some Laboratory Experiments*, London (His Majesty's Stationery Office, 1948).

tion: which problem to study; what or whom to count, or measure, or sort; how, and to what or whom, do the categories apply.

Such questions frequently emerge throughout the research theme Histories of Planning, in a divergent array of topics and contexts. David Bloor focuses on a set of experiments in psychology in Britain during the Second World War: When airplanes crash, what part of the plan failed to work? The Cambridge psychologists decided to study fatigue, and asked what happened to pilot judgment over time and through repetition. They chose key elements of cockpit experience to replicate in simulators in their lab, designing a limited context in which to test pilot judgment. Taking a much broader canvas, John DiMoia looks at census-taking strategies and the challenges of demography in nineteenth- and twentieth-century Korea, comparing political regimes and their on-the-ground methods, and asking both how and which people were counted, and also why many of the potentially countable people resisted this kind of state-level planning and legibility. Turning to the state-initiated structures of the Belgian Congo, Sarah Van Beurden investigates a planned cultural economy in which the colonizers expected to use anthropological and art-historical



David Bloor



John DiMoia



The American military occupation, or USAMGIK, undertook surveys of traditional Korean practitioners during the period 1945–1948. (copyright J. Dimoia; permission from the Byun Family).

knowledge to stabilize rural communities and produce “authentic” craftwork. She asks how the interactions and decisions of Congolese artisans and Belgian colonials meshed or collided, examining the artefacts produced and the judgments of success (or failure) emerging from what colonials deemed to be a failed project. Many centuries earlier, another set of state solutions to a problem of making things work is illustrated by Dagmar Schäfer’s and HAN Yi’s research on veterinary medicine in Song China: here officials sought a different kind of stability in the wake of a different rupture, as loss of territory necessitated a reinvention of the knowledge forms and practices of large animal husbandry. Finally, examining largely decentralized decisions in one industrial city in the United States, Nina Lerman, research scholar in Department III and organizer of the Working Group, studies the range of options and resources in technical education. She analyzes the ways in which adults across the nineteenth century sorted both children and various forms of technological knowing into “appropriate” schemes for learning—recognizing that educators, reformers, parents, and youths might all make different choices within these schemes.

Art of Judgment members

- *David Bloor* (University of Edinburgh)
- *John DiMoia* (National University of Singapore)
- *Nina Lerman* (MPIWG/Whitman College)
- *Dagmar Schäfer* (MPIWG)
- *Sarah Van Beurden* (Ohio State University)

Scale and Scope

ORGANIZER *Emily K. Brock* (MPIWG)



Emily K. Brock

When a project moves from plan to process, it involves shifts in scale and scope. Small-scale models are used to prognosticate the success of large-scale projects; short-term trials are used to predict the path of long-term developments. Expanding complex ventures from the local to the regional, national, or even global scale involves revisiting and revising the axioms for success. Repeated iterations of the same event create new patterns unforeseen in planning processes. Scientists, planners, politicians, and laypeople carry out such processes of knowledge creation and manipulation as preplanned projects grow, adapt, and conform to local conditions.

These shifts in scale and scope include transplantations and adaptations of knowledge systems from one locale to another; the imposition of regimes of planning in new social contexts; and the temporal expansion and contraction of systems of control and commerce. When the scale or scope of projects change, knowledge systems must change in accommodation. By shifting between the specific and the general, the instantaneous and the long-term, scientists and planners find ways both to manage complexity and to approach simplicity.

This Working Group researches the ways in which scale and scope factor into the histories of planning. Visiting scholars work on individual projects while the group explores the role of scale and scope in historical knowledge dynamics: on territorial and temporal scales, and as seen in processes of synergy, extrapolation, and scalability.

The members of the Working Group Scale and Scope approach these questions through their relation to technological, environmental, medical, and philosophical, as well as scientific considerations. The work of Emily Brownell probes the tension between state desires and citizen action as a point of departure for looking at both the physical transformation of Dar es Salaam and emerging dis-



Emily Brownell



Masai man walking in Dar es Salaam (copyright Emily Brownell).

courses of urban development and environments. Bertrand Guillaume examines large-scale geo-engineering projects over the last two hundred years in order to probe the specificity of high-scope engineering plans with regard to the history and philosophy of lower-scale land planning technology. The work of Kavita Philip centers on the tensions between the technological assumptions that shaped a “master narrative” of post-independence Indian planning and the messiness of those plans in action, as recognized by both planners and the people they targeted. Marcus Popplow looks at planning processes in medieval and early modern European technology, forms of knowledge that bridged the traditional divide of “theoretical” versus “practical” knowledge in pre-industrial European technology. The work of Martina Schlünder focuses on reproductive sciences and their entanglements at three levels:



Bertrand Guillaume



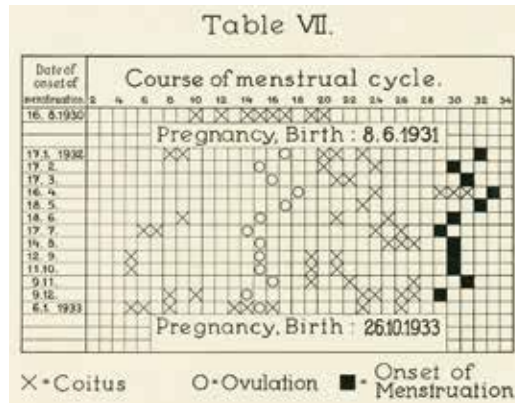
Kavita Philip

reproductive medicine, agriculture and livestock breeding, and the global health movement and international feminism with a specific emphasis on non-Western countries. Emily K. Brock, research scholar in Department III and organizer of the Working Group, studies the rescaling of forest management techniques and predictions in the U.S.-controlled Philippines and beyond, and the larger context of globalized industrial tropical forests in the twentieth century.

With this range of topical historical foci, the members of the Working Group come together to understand the importance of scale and scope within planning histories. By engaging in a dialogue that bridges historical time periods and regions, the group formulates collaborative ideas about these matters and shares them with other scholars.



Martina Schlünder



Hermann Knaus, *Periodic Fertility and Sterility in Woman. A Natural Method of Birth Control* (Vienna: Wilhelm Maudrich Publisher, 1934), p. 103.



Lumberyard, Manila harbor area, circa 1902 (Special Collections, University of Michigan Library); <http://quod.lib.umich.edu/s/scplhiling/x-65/phlk170>

Scale and Scope members

- Emily K. Brock (MPIWG)
- Emily Brownell (University of Northern Colorado)
- Bertrand Guillaume (Université de Technologie Troyes)
- Kavita Philip (University of California, Irvine)
- Marcus Popplow (Technische Universität Berlin)
- Martina Schlünder (Collegium Helveticum, ETH Zurich)

Palace Machine

ORGANIZER *Martina Siebert* (MPIWG)

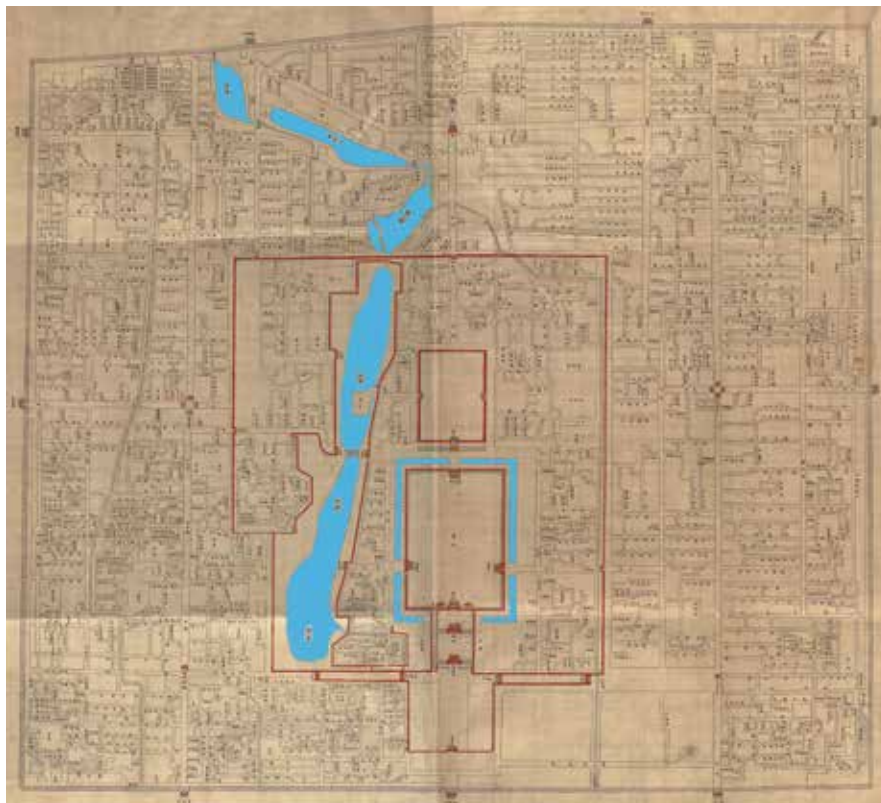


Martina Siebert

Imperial palaces are complex structures with many functions that require planning on many levels: from ensuring financial soundness to the petty business of sweeping floors, from producing extraordinary objects to the performance of state rituals. The metaphor of a machine is used because it invokes the image of interwoven and dependent functional parts that, in the case of imperial palaces, produced money, matter, and identity. Machines, moreover, are not self-sufficient entities, but rather require constant maintenance and repair, the add-on of new features, reconfigurations, a supply of fuel, and much more. In collaboration with the Beijing Palace Museum, researchers are exploring these issues in their focus on the Chinese imperial palace of the Qing dynasty (1644–1912). Extensive source materials make this site ideal for questions and notions raised within the Histories of Planning research agenda, and can help unfold the entangled technological, organizational, and knowledge-making

processes that made the system work: administratively, representationally, economically, and on the profane day-to-day level. The project studies the local functioning also with regard to the palace's role as a representative space in which actors set imperial standards and developed ideas about universal validity. It scrutinizes where and what knowledge was considered crucial and when it needed to be controlled. It looks into how and which agendas were drawn up, the multiple definitions of spaces and roles, and the laying down of rules.

Situated processes, mechanisms, and the interleaving agendas of planned and unplanned objects are in the foreground of this project. The



Manuscript map of the “inner city” of Beijing around 1900 (Library of Congress, Geography and Map Division), here changed to highlight walls of the “Imperial City” and the Forbidden City in red and the bodies of water supervised by the Imperial Household Department in blue.

Working Group members work at the MPIWG in Berlin and at the Beijing Palace Museum, cooperating on a series of conferences, workshops, and seminars.

Studies focus on producing or controlling units (such as regulations, medical treatment, interior decoration, religious paraphernalia) and materials (such as jade or silk). SONG Lingping traces the “Regulations and Precedents” (*zeli* 則例) of the different departments in the palace organization, asking what was regulated and to what extent. The Qing invested huge sums in projects of religious representation and elaborate paraphernalia. LUO Wenhua investigates the budgeting, planning, and opera-

bility of producing Buddhist statues and paintings by the court. ZHANG Shuxian looks into the codification and ruling of knowledge about the interior designs of the Qing palaces, which had to meet the contrasting demands of dignity and grandeur, privacy and seclusion. Technical expertise and large-scale production of porcelain and silk were considered crucial for the Qing court. While WANG Guangyao is studying the technical and managerial skills needed to run the “big business” of imperial porcelain production, ZHANG Qiong is exploring the organization and planning of silks from the perspective of how the court ensured quality and new, beautiful designs by establishing standards for raw materials, working with design models, and introducing the division of labor. GUO Fuxiang investigates how the Qing promoted the production of splendid jade objects and how the material was staged as a symbol and proof of a prospering state. GUAN Xueling reflects on the planning and provisioning of medical treatment at the court to keep the emperor healthy and “make him work.” Martina Siebert, research scholar in Department III and organizer of the Working Group, studies the growing and organizing of lotus in Qing Imperial Spaces, tracing how the cultivation of this symbolic plant and its use was integrated into the organization of representational imperial space.

From the situated experience of the Qing palace, the group scrutinizes how planning was structured by the materials used, and how it was adapted to changing needs or outside influences. The group unfolds small and big planning—what was important, what neglected, what ignored or “black-boxed”—and how different knowledge spheres influenced each other.

Palace Machine members

- GUAN Xueling (Beijing Palace Museum)
- GUO Fuxiang (Beijing Palace Museum)
- LUO Wenhua (Beijing Palace Museum)
- Martina Siebert (MPIWG)
- SONG Lingping (Beijing Palace Museum)
- WANG Guangyao (Beijing Palace Museum)
- ZHANG Shuxian (Beijing Palace Museum)
- ZHANG Qiong (Beijing Palace Museum)

Histories of Planning

Workshops

Palace Machine Workshops: Starting the Machine

November 29, 2014: Palace Museum Complex, Beijing, PR China

ORGANIZERS *Dagmar Schäfer* (MPIWG), *Martina Siebert* (MPIWG)

The Palace Machine began a series of workshops with “Starting the Machine,” a one-day setup workshop on November 29, 2014, at the Palace Museum Complex in Beijing, PR China. Presentations of the Working Group members concentrated on the subjects and institutions of planning in the Qing Palace (1644–1912); what was planned, structured, and controlled, and what seems to have been open to ad hoc negotiations.

Starting the Machine workshop participants

- *CHEN Shih-Pei* (MPIWG)
- *GUAN Xueling* (Beijing Palace Museum)
- *GUO Fuxiang* (Beijing Palace Museum)
- *LUO Wenhua* (Beijing Palace Museum)
- *Dagmar Schäfer* (MPIWG)
- *Urs Schoepflin* (MPIWG, Library)
- *Martina Siebert* (MPIWG)
- *SONG Lingping* (Beijing Palace Museum)
- *WANG Guangyao* (Beijing Palace Museum)
- *ZHANG Shuxian* (Beijing Palace Museum)
- *ZHANG Qiong* (Beijing Palace Museum)

Werkstattgespräche Series

ORGANIZER *Dagmar Schäfer* (MPIWG)

March 11–May 27, 2014: MPIWG, Berlin

In this series Department III invited scholars from various disciplinary backgrounds in history, anthropology and sociology to test-drive planning as a concept and as a common-sense construct for the manifold notions and terms that historical actors have used to address and frame how they “make things work.” Concepts and themes were scrutinized within the framework of Department III with its focus on artefacts, action, and knowledge. Particular attention was paid to different approaches to planning; whether offered by an individual, a community, or a state, planning has historically meant a dynamic and procedural goal-oriented approach; knowledge and skills were subject to a purpose, and having made things work was the gauge of success.

- **World Maps Produced by Specific Planning in the Medieval World**
March 11, *Hyunhee Park* (City University of New York)
- **The World Is Not Enough: Global History, Textiles and Divergence**
March 18, *Giorgio Riello* (University of Warwick)
- **What Does a Plan Want? Fragments of a Response from Kuala Lumpur**
April 1, *Richard Baxstrom* (University of Edinburgh)
- **Knowledge in the Context of Planning: Examples from Prussia**
May 13, *Ursula Klein* (MPIWG, Dept. I)
- **Cloning California: Oranges, Genetics, and the Mediterranean**
May 20, *Tiago Saraiva* (Drexel University)
- **Medical Craftsmanship between Subjectivity and Empiricism**
May 27, *Volker Scheid* (University of Westminster)

Learning How: Training Bodies, Producing Knowledge

February 6–7, 2015: MPIWG, Berlin

ORGANIZERS *Nina Lerman* (MPIWG/Whitman College), *Stewart Allen* (MPIWG)

The Learning How workshop explored processes of learning in relation to material production: how a less-knowing body becomes more-knowing, how mastery is understood by both “masters” and others, and which provisions and resources might be available to whom in a particular time and place. The tools of the research theme Histories of Planning are particularly suited to opening and analyzing processes of knowledge production and regeneration. Modes of action involved in adapting the real world to plans—to “making things work”—highlight both the intentions of actors engaged in perpetuating material techniques and the improvisations and insights produced in artisanal encounters over generations, within communities, and across boundaries. The rubric demands situating knowledge specifically—in particular workplaces, materialities, kinship groups, classrooms, laboratories, markets, structures of power—yet seeking methodological and comparative points of commonality and conversation. Precirculated papers set arguments and ideas in motion, and the workshop attendees engaged in conversation about methods and themes as a first step toward longer-term collaboration.

Learning How workshop participants

- *Stewart Allen* (MPIWG)
- *Francesca Bray* (University of Edinburgh)
- *Clare H. Crowston* (University of Illinois)
- *Gerard J. Fitzgerald* (George Mason University)
- *Johanna Gonçalves Martín* (University of Cambridge)
- *Joshua Grace* (University of South Carolina)
- *Elizabeth Hallam* (University of Aberdeen)
- *Anna Harris* (Maastricht University)
- *Steve Kaplan* (Cornell University)
- *Arun Kumar* (University Göttingen)
- *Whitney Laemmler* (University of Pennsylvania)
- *Claire Lemercier* (University of Illinois)
- *Nina Lerman* (MPIWG)
- *Enrico Marcove* (King’s College Aberdeen)
- *Nathalie Marseglia* (University of Zurich)
- *Jeanette Pei-San Ng* (University of California, Berkeley)
- *Seth Rockman* (Brown University)
- *Dagmar Schäfer* (MPIWG)
- *Martina Schlünder* (Collegium Helveticum, ETH Zurich)
- *Augustine Sedgewick* (University of Toronto)
- *María Ximena Senatore* (Buenos Aires University)
- *Kate Smith* (University College London)
- *Melissa Van Drie* (Maastricht University)
- *Patrick Wallis* (London School of Economics and Political Science)
- *Caitlin Donahue Wylie* (New Jersey Institute of Technology)

Histories of Planning Individual Projects



Francesca Bray

Francesca Bray (Visiting Scholar, University of Edinburgh)

Crops on the Move

During the colonial period, Westerners deliberately planned the introduction of valuable Asian crops (rice, sugar, tea, or cotton) to territories under their own control. In developing the cultivation and processing of these crops, they established a new science of tropical agriculture and distinctive technical systems of production and extraction, notably the plantation system and slavery.

Although driven by very different vectors, planning was frequently involved in the precolonial development and dissemination of the same crops that had played key economic roles throughout much of Asia for centuries. This project presents a China-centered account of the early modern circulation of economic crops throughout Eurasia, and of the knowledge and practices associated with their production and use, focusing in particular on the place of planning in the dissemination and development of these valuable crops, and on the scientific, technical, and organizational changes catalyzed by the shift from smallholder- to plantation-scale production.

The *chaîne opératoire* (operational sequence) is a tool developed by archaeologists to map and analyze the skills, knowledge, and resources, material and otherwise, that constitute complex technical procedures. The project employs this tool to highlight key characteristics of production, circulation, and consumption regimes. The early

nineteenth-century transplantation of the tea industry from southern China to the newly acquired British Indian territory of Assam serves as the pilot case of the project, which maps the richly documented *chaînes opératoires* in each context to compare what was lost, and what created, in the translation of the tea industry from China to the British colonial world.

Diagramming tea (copyright Francesca Bray).



Paul D. Buell (Visiting Scholar, Charité – Universitätsmedizin Berlin)

Distillation in China: Elixirs, New Medicines, and Liquors

Distilling is thousands of years old. Originally confined to a few geographically disparate areas, it was probably independently invented. One of these areas may be in the New World, as indicated by pre-Columbian pottery stills. Later, in the Old World, the basic technology spread and local traditions interacted, yielding two major technological streams: one using coiled serpentines for cooling, the type of distillation used today in commercial distillation, and another with no serpentines, using cooling water and directly based on East Asian technology.



This project focuses on one aspect of the history of distillation: the Mongol-era portable stills of the latter type. They spread the world over, even to western Mexico. The new portable still from East Asia brought with it new types of drinks, usually brandies, but also milk liquor, *kumiss*, distilled into a milk distillate. Although the Chinese may have experimented with distillates made from sorghum and rice and other raw materials perhaps as early as the Tang dynasty, the first of the high-proof distillates to be popular throughout much of Eurasia was Mongolian milk brandy. *Kumiss* was the prestige drink of the Mongol Empire but could not be stored and required distillation to preserve.

Later other materials were fermented and distilled in other parts of the Mongol world, including Korean *soju* (紹酒), from rice liquor. These new drinks were universally called *araq* or some variant of this word throughout Eurasia, including *araq-soju* in Korea, and *araq-sake* (酒) in Japan. This project combines the study of written sources, archaeology, and extensive fieldwork to rediscover early traditions that can still be found among folk communities.

Roy Tzohar (Visiting Scholar, Tel Aviv University)

Scriptural Exegesis as an Episteme: The Case of Early Indian Buddhist Yogacara Hermeneutics

This project explores the procedures and methodologies developed and applied by exegetical cultures with respect to the evaluation of the authenticity, validity, and truth value of scripture as a source of knowledge. Examining a particular moment in Indian Buddhist literary production as a case study, it focuses on the early *Yogācāra* commentaries on the *Mahāyāna sūtras* (roughly, the third to sixth centuries CE) and their reflexive engagement with the question of the proper interpretation of scripture and composition of commentary. These works, often in response to doubts regarding the authenticity and authority of the *Mahāyāna sūtras*, developed various strategies and criteria for establishing the validity and truth value of scriptural passages. The project examines these works in their broader textual, practical, and institutional context, focusing in particular on the extent to which their normative hermeneutical criteria, as a basis for judgments, were adopted by the “normal science” of Buddhist commentarial discourse.



Paul D. Buell

Still from Istanbul of East Asian type. Alchemical apparatus in the Museum of Islamic Technology. (photo by P. Buell).



Roy Tzohar



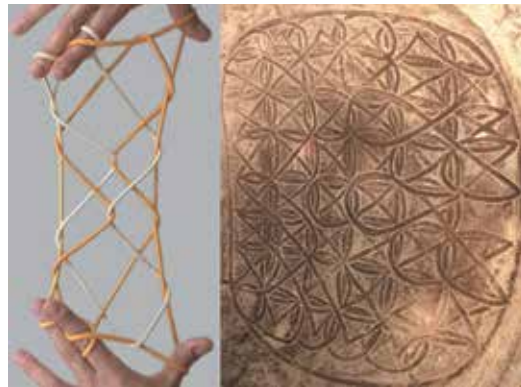
Scenes from Buddha's life and Buddhas with Bodhisattva. Manuscript cover. India, Bihar 1075–1100 (from the *Nasli and Alice Heeramanek Collection, South and Southeast Asian Art*).

Through this case study, the project argues that a commentarial culture may be best understood as an episteme in the following three senses: (a) it always stands in relation to a root phenomena, which it seeks to interpret and explain; (b) it engages in the justification of the authority of these explanations and interpretations; and (c) it develops a system of judgment-making, which manifests a procedural conception of knowledge governed by ethical and institutional considerations.

Eric Vandendriessche (Postdoctoral Fellow, University Paris-Diderot)

String Figures and Sand Drawings from Vanuatu: A Comparative Study of Mathematical Practices

Using an ethnomathematical approach, this project compares two activities carried out by the northern Ambrym Islanders (Republic of Vanuatu), both of which are locally termed *tu* (lit. “to write”). These practices consist in making a figure, either with a loop of string (“string figure-making,” using the fingers and sometimes the feet and the mouth) or by drawing a continuous line in the sand with one finger (“sand drawing”). It is noteworthy that Vanuatu sand drawings have, since 2008, been inscribed in the UNESCO Representative List of the Intangible Cultural Heritage of Humanity.



Left: String figure *wayu* (hairy yam); right: Sand drawing *rem* (yam). Northern Ambrym, Vanuatu, Oceania. Photo by E. Vandendriessche (2006).

This comparative research analyzes the shared and exclusive mathematical properties of these two procedural activities by focusing on concepts such as operation, algorithm, sub-procedure, iteration, and transformation. Because these two practices are both a means of recording and a means of expressing knowledge relating to particular mythological entities, or cosmological and environmental elements in northern Ambrym society, the analysis also focuses on the links between the procedures involved in the making of these figures and particular forms of memory and tradition embedded in these practices.

This project thus aims at a better understanding of how Ambrymese practitioners create these complex string figure and sand drawing algorithms while combining different forms of knowledge in these artefacts. This study also contributes to the identification of “mathematical practices” in the cultural context of oral tradition, an issue at the core of ethnomathematics.

Tools and Methods

Historical scholarship is commonly thought of as generating texts by individual scholars to be read by other individual scholars. However, wonderful things can also develop when historians work collectively, and when they experiment with new methods and innovative tools. In Department III, individuals work together in a number of ways.

Department members develop scholarship and research by using various methods and tools to cross-pollinate and strengthen individual projects. The Department's digital humanities team, working with individual researchers, develops tools to respond to particular analytical needs or handle particular datasets. Projects, such as a database of historical drugs, support particular research needs while also holding potential for wider utility in the future. Methods Intensives is an ongoing series of events that allows Department members to develop their own skills and interests in new methods of research. Thematic workshops, organized by one or more Department members, address departmental research themes and bring together scholars from around the world to discuss their work in a welcoming and thoughtful atmosphere. The Get-It-Published initiative supports outstanding predoctoral Chinese scholars as they face the challenges and opportunities of the transnational communication of historical research.

Members of the Department employ various methods to share their ideas and research with widely varied audiences, both specialists and nonspecialists. Digital and other media are used to create presentations of their research topics and approaches. With the aim of fostering nonscholarly understanding of historical work, outreach projects generate new perspectives and attract broad interest. The long-term Artist-in-Residence interprets departmental research themes and topics through various forms of narrative. Public engagement is an important aspect of the Department's activities. Members of Department III engage in conversation with the wider public through communication with the mainstream press and other outlets of mass communication.

The Department also uses various tools and methods to collectively develop relationships with other research groups and institutions. The Department's digital humanities team facilitates projects in collaboration with historians in Department III and partner institutions. These projects, such as the development of a compendium of Chinese-language local monographs, allow researchers to leverage powerful tools to analyze patterns in historical source data. Workshops organized by Department III in cooperation with other institutions, archives, and research groups address the development of tools and methods. These workshops lay the groundwork for scholarly collaboration, provide space for exchange and communication, and foster the development of joint scholarly ventures.

Tools and Methods

Sources Unlocked: Digital Humanities

CHEN Shih-Pei

DIGITAL CONTENT CURATOR *CHEN Shih-Pei***The Local Gazetteers Project**ORGANIZERS *CHEN Shih-Pei* (MPIWG), *Dagmar Schäfer* (MPIWG)

A voluminous genre, spanning more than nine centuries, is the basis for an analysis of literary landscapes and the creation of materiality, the reception of local diversity, and the development of standard terminology for products and materials in China. Starting in the tenth century, Chinese administrators regularly compiled and updated information on local geographic, social, and economic conditions in the provincial capitals, urban centers, prefectures, districts, circuits, and market places, where they were dispatched. Guidelines, circulated in 1296, spurred the development of this genre, later identified as local gazetteers. Copied, re-edited, and collected throughout the centuries, local gazetteers enacted the social, political, and material composition of a place in written format: the landscape, history, flora, fauna, the taxes and products of a region, the temples and schools, officials and celebrities, local festivities and customs, weather records, and disasters were all documented within. No fewer than eight thousand sets of local gazetteers spanning Chinese history from the tenth century to the year 1949 still exist today. So far, around two thousand of these documents have been full-text digitized and placed in scholar-accessible databases.

Local gazetteers are well studied, but the vast amount of information contained within them has meant that scholars struggle to encompass them analytically. Department III embraces the potential of digital humanities to unlock this source genre for central questions on knowledge production: How was local materiality and environmental diversity received in, validated by, and configured to the mainstream view? Why and which issues were standardized, universalized, or ignored? How did the re-enactment and literary preservation of landscapes and materials (in this special literature that each official could consult) affect a locality's physical identity, its perseverance, or technical and scientific development?

A set of digital tools has been identified that will help historians extract records from digitized gazetteers and transform these records into tabular data. The records from individual gazetteers will be compiled into a single database that can be queried as part of research-oriented methods. Led by the Department's digital content curator CHEN Shih-Pei, project researchers have begun to develop an open research data repository, allowing scholars to share and publicize the data they produce from these sources.

During the reporting period, the infrastructure for the Local Gazetteers project was installed. The concrete challenges and opportunities entailed in this process informed the design of Department III's research support infrastructure.

Tools and Methods

Workshops**What's in a Place? Orientation Workshop for Historical Research Projects Using Geographical Data and GIS Technology**

November 15, 2013: MPIWG, Berlin

ORGANIZERS *Robert Casties* (MPIWG, IT) *Dagmar Schäfer* (MPIWG),
Urs Schoepflin (MPIWG, Library), *Dirk Wintergrün* (MPIWG, IT),

Geographic information system (GIS) technology has become a major field of investment across historical disciplines. In the field of cartographic history, projects around the globe have built up databases of places and historical administrative units in history, working with both early or modern maps and digital images. As data are amassed, project visionaries devise unique possibilities of organizing data in their geo-spatial relations. Scholars, however, ask historical GIS projects to do more: to bring together texts and landscapes, objects and procedural data in ways that allow qualitative insights beyond the possibilities of paper methods and visions of the mind. Although basic challenges still need to be met, some already envision historical GIS platforms as an organic tool for the combination of research and publication.

This workshop brought together several projects working with GIS technology or geo-related data so that participants could discuss challenges and opportunities in collaborating across disciplinary boundaries. Contributors delineated the research questions that are addressed in the project, highlighting the differences in approach and the tools and services in use at the moment.

Also within the framework of the workshop, historians, librarians, and computer scientists examined the new possibilities and new infrastructural challenges of working with archival materials in the digital age. Informed by both precirculated statement papers and in-person presentations, the first workshop critically reflected on the possibilities of these techniques—for example, exploring the historical role and framework of the data presented in local gazetteers—and discussed what new questions could be generated and what new knowledge could be produced when looking at not just dozens, but hundreds or even thousands of these texts.

What's in a Place? workshop participants

- *David Bodenhamer* (Indiana University–Purdue University, Indianapolis)
- *Robert Casties* (MPIWG, IT)
- *Reinhard Förtsch* (Deutsches Archäologisches Institut, Berlin)
- *Jens Klump* (German Research Center for Geosciences, Potsdam)
- *Thomas Kollatz* (Salomon Ludwig Steinheim-Institut, Essen)
- *Dagmar Schäfer* (MPIWG)
- *Urs Schoepflin* (MPIWG, Library)
- *Rainer Simon* (Austrian Institute of Technology, Vienna)
- *Armin Volkmann* (Universität Heidelberg)
- *Dirk Wintergrün* (MPIWG, IT)

Tools and Methods

Masterclass Series

Dagmar Schäfer

ORGANIZER *Dagmar Schäfer* (MPIWG)

The history of science has developed into a comprehensive study of artefacts, practices, action, and knowledge that brings together a multitude of scholars with different methodological skills and preferences. The Methods Intensive Masterclass Series mobilizes this methodological diversity as a reflexive tool for assessing the current state of the history of science and its cross-disciplinary potential. The goal of the series is to identify, analyze, and discuss a number of questions concerning the essential characteristics of the history of science. For example, which topics are of interest for historians of science, and which methods do they customarily draw upon? What methods, presently, are we using to study “artefacts, practices, action, and knowledge”? Which are the exemplary studies? And how will the effectiveness of different methods be assessed?

The masterclass series offers a forum in which participants from a spectrum of disciplines can critically compare, confront, and combine their specific methodological skills and training in scientific, practical, or humanistic analysis. It explores what the particular case says to the broader discipline: Does a historian of science interested in quantum physics have anything in common with a colleague researching the concept of *qi* and *li* in the classical Chinese world? Where would they differ, and what might they learn by comparing notes? This series is a creative platform for members of Department III to explore agendas, discuss limits, and expand the cross-disciplinary boundaries of the history of science.

The format is designed as a twice-yearly meeting over the course of 2014 to 2019. An open lecture will be held on the first day, in which an invited speaker discusses the issues outlined above and elaborates her or his methods through a concrete case study. Workshop participants will respond, assessing the extent to which the method(s) developed by the speaker can tell one something interesting if “applied” to another case, preferably one from a different field or area of expertise.

In the first event of the series, the history of science, technology, and the environment were brought into focus. Inspecting the historian’s engagement with the sciences and public discourse, participants created a blog and Internet outlets and discussed the historian’s reach beyond traditional publishing.

The Transdisciplinary Historian

November 18–20, 2014: MPIWG, Berlin

Dolly Jørgensen (Umeå University)

Upcoming Speakers

- *MEI Jianjun* (Needham Research Institute)
- *Kathleen Morrison* (University of Chicago)
- *Simon Schaffer* (University of Cambridge)
- *Joanna Guldi* (Brown University)

Tools and Methods

Outreach

Department III values maintaining interaction with the larger public as well as within academia. This departmental objective was reflected in the formal launch of the Department III on October 7, 2014. The Department extended its welcome to the launch not only to members of the MPIWG community and scholars from Berlin universities, but also to diplomatic officials, public intellectuals, regional sinologists, and the local and international press. An understanding of the patterns and values revealed by the history of science can have value within larger societal debates, contributing to wiser decision-making and more relevant policy. It is important, therefore, for the public to be invited to discover and understand the Department's perspectives on, topics in, and approaches to the history of science.

Department III integrates outreach and interdisciplinarity into its work. These efforts take the form of press interviews and general-audience writing, the sponsorship of an Artist-in-Residence, and collaboration with multimedia professionals, as well as the forging of long-lasting international collaborations.

Artist-in-Residence

Zoe Svendsen (University of Cambridge)

COOPERATION PARTNERS British Inter-University China Centre and the University of Cambridge

Other than food and shelter, clothing is probably the most essential feature of human civilization, creating and representing economic, state, and societal identities. Zoe Svendsen's World Factory project exposes how clothes make politics. The complexities of globalized economies and lives are examined through the process of garment manufacture. The project unfolds both the historical depth and the contemporary impact of politics translated into the everyday world of clothes. In the world of art, attempts to integrate research often result in mere juxtaposition, with art representing research or research being expressed by arts. The World Factory project interlaces artistic production, public engagement, and thorough research, and presents a set of reciprocally effective activities, research, and events. Each element of the project is valid on its own and connects to divergent audiences. When these elements are seen as a whole, the project makes comprehensible both the complexity of global connectivity and the extensive relationships embedded in manufacturing.

World Factory focuses in particular on garment production in China as it explores consumer capitalism through the lens of the global textile industry. Svendsen and the METIS art group immerse themselves in the system by designing a shirt and having it manufactured in a Chinese factory. Svendsen and the METIS art group immerse themselves in the system. The project questions the relationship between politics and forms of performance. It investigates how public engagement can work in research-led performance projects, as embedded throughout the process of production. To this end, the project is developing an image patchwork termed a "digital quilt," and holding public consultations on the topic through a series of café conversations. The project

also engages in a type of creative process that is resistant to dominant modes of product-focused design, instead researching potential ingredients for expressing its theme. The form of the performance thus emerges from a deep engagement with the nature of the subject matter. World Factory is exploring the idea of planning as a dynamic process.

Sound of Silk: A Multimedia Project

A five-year project initiated by Dagmar Schäfer, this “multimedia journal” examines ways of creating scientific articles—editorially and technically—through various media. Articles are being prepared in the history of science, history of technology, and cultural conditions of science. This new approach to publication in our research field goes beyond the limits of classical print media, video, image, audio, and visualization in time, in two dimensions, and in three. Dagmar Schäfer’s article “Peripheral Matters: Salvage/Chef-de-piece Inscriptions on Chinese Silk Textiles” (2013) is used as a basis to develop tools that will then be used for other historical research. The article is reproduced using developing generalizable multimedia techniques that enable the researcher to provide evidence through electronic sources. This first step concentrates on the production of silk bolts in the Qing era to bring together empirical and historical evidence with electronic data. Text, images, topographical information, archaeological references, and administrative and political information are layered together to underlay the history of the production of silk bolts in the Qing era and to analyze the complex influences that affected marking practices on silk textiles.

Inter-institutional and International Outreach: Get-It-Published

CONVENERS *Emily K. Brock, Gina Grzimek, Martina Siebert, ZHANG Chaonan,*

Department III is committed to developing and maintaining strong ties with researchers and institutions from around the world. Toward that end, the Department is forging agreements to facilitate both intellectual collaboration and structural cooperation across disciplinary and national borders.

The first of these collaborative outreach initiatives is Get-It-Published. Department III’s Get-It-Published initiative aims to foster a collaborative research environment and to encourage fruitful international discourse by hosting young international scholars within the Department. The project centers on scholars whose ongoing doctoral work is in the Chinese language, who are in the final stages of doctoral research, and whose research topics are grounded in the history of science, technology, and medicine, or in science and technology studies. Regular meetings with Research Fellows support both the writing process and academic development as the scholars devote five months to writing and preparing an article in English for journal publication. The Get-It-Published scholars share and discuss their own research, as well as that of other Department III scholars, during their time in residence.

The first round of Get-It-Published took place from August 2014 to January 2015. The selection process for the next round of scholars will be initiated in March 2015.

2014 Get-It-Published Participants

- *GU Zhou* (Institute of Vertebrate Paleontology, Chinese Academy of Sciences, Beijing)
The Maritime Silk Route and Indo-Pacific Beads
- *SONG Shenmi* (Shanghai University of Traditional Chinese Medicine/Shanghai Jiao Tong University)
Heavenly Stems and Earthly Branches: An Acculturation Perspective on Genethliacal Astrology during the Jong and Song Dynasties

Postdoctoral Fellows

Stewart Allen (Postdoctoral Fellow, MPIWG)

Crafting Life: Stonemasonry and Apprenticeships in Contemporary Scotland and the UK

Apprenticeships occupy a unique place in educational and employment contexts, operating at the intersection of practical learning and theoretical knowledge. However, there are questions about their delivery, relevance, and transferability within shifting economic forecasts. In undertaking an ethnographic study of a stonemasonry apprenticeship program in Edinburgh, Scotland, this research focuses on the role that “planning” plays in knowledge production, modes of learning, and the efficacy and organization of vocational training under the UK and Scottish government’s modern apprenticeship scheme. It also considers the kinds of visions and imaginings that ap-



Stewart Allen



Stone crucifix, St. Mary’s Cathedral in Edinburgh (copyright Stewart Allen).

prenticeships evoke during a period of higher education fee rises, squeezed employment outlooks, and changing patterns of globalized labor production.

Four main themes are addressed in the course of this research: the different modalities of learning as they are performed both in situ within the grounds of the stonemasonry workshop yet also in the decontextualized environment of the classroom; the planning and delivery of apprenticeship programs in Scotland, their links with different stakeholders, and their role in a fast-changing economy; the perception and image of apprenticeship schemes among different parties, including young people, the apprentices themselves, and the wider employment market; lastly, the historical precedent of modern apprenticeship in Scotland and its changing status and role as mass production, advanced technologies, and globalization have taken hold. These different themes are united and explored under the broad rubric of “planning”: how knowledge, materials, skills, tools, hopes, and imaginings are organized, adjusted, and ultimately made to work.



Michael Stanley-Baker

Michael Stanley-Baker (Postdoctoral Fellow, Berlin Center for the History of Knowledge)

Charting Interior and Exterior Worlds: Towards a Social Geography of Medieval Chinese Healthcare

Many histories of Chinese medicine assert that the compilation of the classical corpus (ca. 100 BCE–200 CE) resulted in the formation of a rational, correlative system of thought and constituted a radical departure from religious practice. Yet the first formal, central medical institutions and the first state bibliographies to separate medical

from religious texts did not appear until the end of China’s early medieval period (220–589 CE). This project identifies an array of actors and communities who actively competed on medico-religious grounds during this time, and concentrates on specific well-documented or significant moments. Different formative forces emerged—personal illness, salvific aspirations, sectarian competition, the state, and epidemic and political upheaval—to which actors responded with plans and strategies. Knowledge in this analysis is treated as a processual engagement with and means to navigate the world, one that actively structures relations to objects, communities, and events.

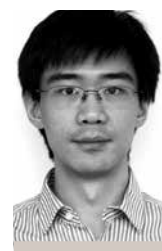


From the supplement to Lei Gong’s *Guide to the Preparation of Drugs* (Buyi Lei Gong paozhi bianlan 補遺雷公炮製便覽); Wellcome Images.

One aspect of this project, pharmacological lore, examines the ways in which the material properties of drugs changed as they migrated across different epistemic, geographic, social, and linguistic domains. Records from early medieval China describe a diverse range of actors who intersected in the drug trade: pickers, sellers, doctors, Buddhists, and Daoists. Each adapted and adopted drugs with different plans and agendas. This project explores the limits and opportunities of existing academic resources for identifying how these actors interacted with, represented, and understood drugs and drug lore. This approach differs from traditional genealogical-developmental models of drug history in China by identifying innovative critical methodologies hand in hand with developing new digital tools for exploring these questions.

CHEN Kaijun (Postdoctoral Fellow, MPIWG)

Interaction and Divergence of Ceramic Technology



CHEN Kaijun

Detail of “Decorating Round Ware and Vases in Foreign Enamel.” The seventeenth of 20 twenty leaves of paintings and 20 twenty pieces of calligraphy in *Illustrated Manual of Porcelain Production*; reproduced in *Chinese Art from the Ching Wan Society Collection*. (Taipei: Chang Foundation, 1998).

Drawing on research carried out during a curatorial assistantship at the Frick Collection and on other fieldwork in Asia and Europe, this project investigates how cultural encounters affected heterogeneous modes of knowledge production in the zone of contact in the local society by engaging with porcelain objects and treatises written by specialists in China and Europe. In this context, the zone of contact signifies a realm of collaboration where protagonists exchanged empirical information as well as methodology. The first task has been to reconstruct the zone of technological contact between Jingdezhen and Meissen, two major specialists in the ceramic industry at opposite ends of Eurasia at the beginning of the eighteenth century.

An examination of the tools related to production—porcelain pieces, archival records, and textual oeuvres attributed to three ceramic specialists, Lang Tingji (1662–

1715), Johann Höroldt (1696–1775), and D’Entrecolles (1664–1741)—uncovers how technological knowledge and artistic styles were indirectly transmitted or reinvented through the mediation of export wares, tools of design, and textual descriptions. One result of this approach is a new perspective on the bannermen’s technocratic approach to knowledge in local society and their interaction with Jesuits in the global context. Another approach, tracking the protagonists’ collaborative engagement with wine, demonstrates how the specialists exchanged and textualized knowledge when they operated inside a very different social agenda and within distinct epistemological traditions. This project challenges conventional narratives of influence and reception in Eurasian intercultural studies with a historiography of mediation and international emulation.



Alina-Sandra Cucu

Alina-Sandra Cucu (Postdoctoral Fellow, MPIWG)

Hidden Reserves of Productivity in Socialist Planning: From Historical Consciousness to Science and Expertise

Focusing on the transformations of central planning in Romania as a historically specific form of “modern technopolitics,” this project uses archival material from the Romanian government, from several schools of industrial management, and from various factories in Cluj (a town in northwestern Romania) to analyze how the making of “the plan” put in motion a set of practices which made possible—but also hindered—politics of knowledge, anticipation, and calculation that were articulated around the simultaneous pursuit of economic growth and social emancipation. This investigation breaks down the very notion of a top-down “centrally planned economy” through an in-depth exploration of “planning” and “centralization” as processes and relations that were continuously negotiated on the ground by local state agents,

factory managers, and workers.

More specifically, a new field of expertise and new mechanisms of knowledge production around the notion of “productive hidden reserves” are traced as they emerged in the mid-1960s. The project examines how this notion was redefined as the domain of experts, as part of a systematic endeavor to replace the early socialist reliance on workers’ voluntary self-trans-



formation and practical knowledge with contemporary Western methods of industrial management. This historical transition of Romanian industrialism from local and embodied knowledge to a professionalized field of expertise with universalistic aspirations opens a broad space for questioning the nature of socialist economies as modern objects of governance and governmentality. It also offers glimpses into the redefinition of the worker from the subject of a political project to an object of policy and scientific analysis.

“Fenster im Staatsrat 1” by SpreeTom; own work. (licensed under CC BY-SA 3.0 de via Wikimedia Commons).

Victoria Lee (Postdoctoral Fellow, MPIWG)

The Arts of the Microbial World: Biosynthetic Technologies in Twentieth-Century Japan

Methods of microbial biosynthesis were ubiquitous in Japan, from miso-making in the kitchen, soy-sauce mold starters, and vitamins, to monosodium glutamate and statins in which Japan led globally as an innovator and which scientists called “gifts from microorganisms.” This project explores how scientists and skilled workers sought to use and emulate microbes’ natural processes for making new forms and products of life. In brewing houses and in the food, fine chemical, and pharmaceutical industries across the country, scientists and skilled workers came to study microbial life and to tinker with life as fermentation phenomena.

How did an approach to life as fermentation expand in scope beyond small-scale and traditional industries to a multitude of scientific and industrial fields, from the turn of the twentieth century to the 1960s? This project examines the significance of material and intellectual continuities with premodern Japan. The distinctive fermentation-based view of life suggests how salient the question of cultural difference remains in twentieth-century science and technology. Further, the project reconstructs how fermentation scientists managed the problem of scale, as they aimed to enhance or repress specific micro-processes in cells for the purpose of recalibrating more extensive agricultural, industrial, and nutritional ecologies in society. These larger ecologies ranged from microbes’ different chemical products in a sake barrel or alcohol tank, to vitamins in the national dietary, agricultural, and industrial landscape, to the shares of different companies in the MSG market. How did scientists draw out the possibilities of what microbes as living things could do? This project traces how such broader debates on environmental management had an impact on material culture at the level of food, resources, and medicine in Japan.



Victoria Lee



Brewing starter product label, 1920s. Akita Konno Shōten records.



TINN Honghong

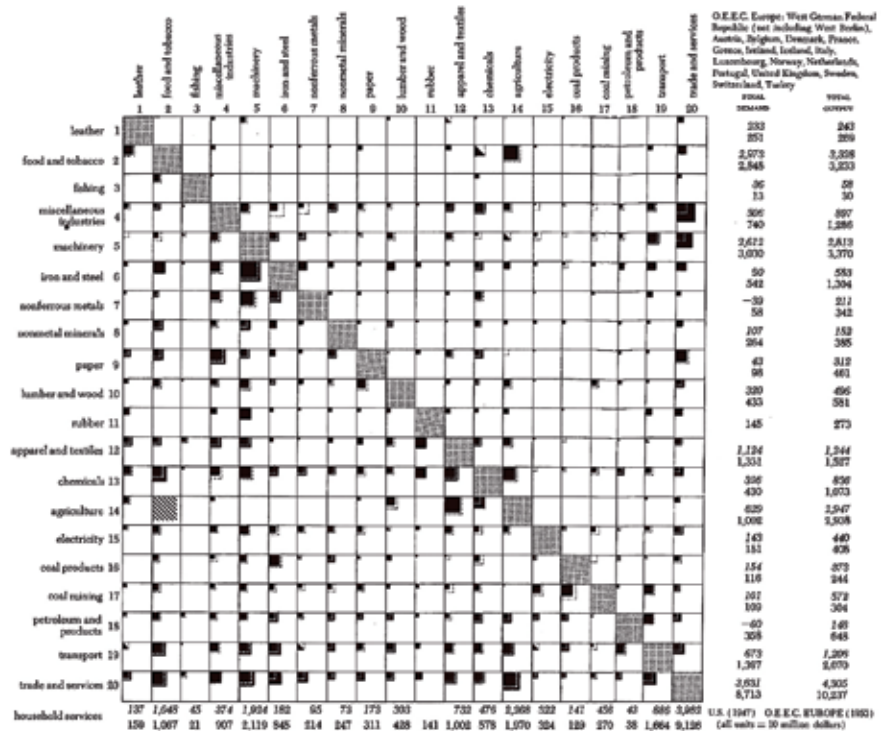
TINN Honghong (Postdoctoral Fellow, MPIWG)

Planning the Mathematization of an Economy: Leontief’s Inter-industry Input–Output Analysis and its Global Circulation

Starting in the 1960s, input–output analysis became a widely accepted method used by regional and national economists and bureaucrats to predict the effects of a change in one industry on other industries. First developed by Wassily Leontief (1906–1999), a German-educated ethnic Russian economist who taught at Harvard University from 1930 to 1975, it provided its users with a set of mathematized, quantitative, and seemingly “scientific” concepts of inter-industry economic engineering. This project examines the history of inter-industry input–output analysis as a theory, practice, and technology that has been used to intervene in state economies since the mid-twentieth century.

The knowledge and skills that made input–output analysis work can be shown through a close examination of how economists viewed, managed, and experimented with economic data to develop and stabilize theories, practices, and technologies used to implement the input–output analysis. The initial research investigates how Leontief selected the scope and scale of the economic data to be included in his analysis, and how this selection related to the doable numerical operations that could be performed by human beings and calculating devices of his time. The investigation is then pursued in its international context by examining how various countries reconceptualized and adjusted local economic data to facilitate their use of this theory after the 1950s. By examining the processes that underpinned the mathematization of an economy through input–output analysis, this project reveals the underlying historical tensions and contingencies that shaped the visualization, representation, and understanding of economic activities around the world.

Wassily Leontief’s comparison of the developed economies of the United States (from 1947, black squares and roman numbers) and of western Europe (from 1953, open squares and italic numbers). See Wassily Leontief, *Input–Output Economics* (Oxford, UK: Oxford University Press, 1966), pp. 50–51.



External Scientific Member

The Learned Practices of Canonical Texts

Glenn W. Most

Much of my research activity during the years 2013–2014 was dedicated to a research project involving the cross-cultural comparison of philological procedures in a variety of canonical textual traditions (Greek, Latin, Hebrew, Coptic, Mesopotamian, Ottoman, Sanskrit, Chinese). The creation of canons of written texts—religious, literary, philosophical, scientific—is a feature of numerous literate cultures from ancient times to the present. Such canons may crystallize cultural identities, confes-

Table of Contents

- Anthony Grafton and Glenn W. Most, *Introduction*
- Guy Burak, *Reliable Books: Islamic Law, Canonization and Manuscripts in the Ottoman Empire (Sixteenth to Eighteenth Centuries)*
- Ineke Sluiter, *Obscurity*
- Glenn W. Most, *Allegoresis and Etymology*
- Paolo Visigalli, *Classifying the Rigveda on the Basis of Ritual Usage: The Deity-of-the-Formula System*
- Christopher Minkowski, *Maryādām Ullāṅghya: The Boundaries of Interpretation in Early Modern India*
- Robert Kaster, *Making Sense of Suetonius in the Twelfth Century*
- Lianbin Dai, *From Philology to Philosophy: Zhu Xi as a Reader-Annotator*
- Aaron Tugendhaft, *Gods on Clay: Ancient Near Eastern Scholarly Practices and the History of Religions*
- Ronny Vollandt, *An Unknown Medieval Coptic Hebraism? On a Momentous Junction of Jewish and Coptic Biblical Studies*
- Megan McNamee, *Picturing as Practice: Placing a Square above a Square in the Central Middle Ages*
- Filippomaria Pontani, *Inimitable Sources: Canonical Texts and Rhetorical Theory in the Greek, Latin, Arabic and Hebrew Traditions*
- András Németh, *Excerpts versus Fragments: Deconstructions and Reconstitutions of the Excerpta Constantiniana*
- Anthony Grafton and Joanna Weinberg, *Johann Buxtorf Makes a Notebook*
- Paola Molino, *World Bibliographies: Libraries and the Reorganization of Knowledge in Late Renaissance Europe*

sional orthodoxies, school curricula, standards of taste and refinement, and/or the qualifications of ruling elites. They also give rise to learned textual practices, some of them quite technical, to stabilize, reproduce, store, access, format, correct, and interpret the canon. In ancient Chinese and ancient Greek, in medieval Arabic and medieval Latin, in Sanskrit and in Persian, in the modern Euro-



Giuseppe Arcimboldo, *The Librarian* (ca. 1560), Skokloster Castle, Sweden.

pean vernaculars since the Renaissance (to name only these), highly trained scholars have developed, cultivated, and transmitted the textual practices of their respective canons. Building on recent work on the origins and cultural significance of canons, and following the example of historians of science and scholarship who have examined scientific practices such as collecting, measuring, and note-taking, the project investigates the distinctive practices that make texts objects of systematic inquiry. Among the scholarly practices, the project's focus is on textual establishment and criticism; exegesis and commentary; lexicography; methods of excerpting, storage, and retrieval of texts; and libraries and their uses.

The project began as a workshop in January 2010 and developed into a Working Group at the MPIWG during July and August of 2012 under the direction of Anthony T. Grafton and myself, which was funded by Department II of the MPIWG. All participants of this Working Group summered for six weeks at the institute to turn our chapters into a more unified book. Together with Grafton, I spent much time discussing and revising the contributions that arose from this Working Group. The volume entitled *Canonical Texts and Editorial Practices: A Global Comparative Approach* was accepted for publication by Cambridge University Press, and we submitted the copy-edited manuscript to them in the spring of 2015; the volume is due to appear at the end of calendar year 2015. → p.77

Jan Brueghel the Elder, *The Forge of Vulcan*,
1606, oil on copper, 10.7 x 10.7 cm.
Privatsammlung Rheinland, courtesy of
Eckart Lingenauber, Monaco.



Max Planck Research Group

Art and Knowledge in Premodern Europe

RESEARCH GROUP LEADER *Sven Dupré* (2011–2016)
ended August 2015

Introduction

Established in 2011, the research group explores how artisans invented and appropriated knowledge, conceived and categorized knowledge, and transmitted and circulated knowledge in the visual and decorative arts. Some central questions with which the research group members have been concerned include: Was artisanal knowledge distinguished from other types of knowledge, and if so, what kind of knowledge did artisans themselves consider within their remit? How did the epistemic requirements for artisans change between 1350 and 1750? Was this connected to the training and education of artisans? By focusing on the epistemic dimensions of the production and consumption of the arts the research group readdresses a long-standing question in the history of science concerning the role of the arts in the emergence of early modern science. The group investigates the transformation of the artisanal workshop with its changing patterns of circulation, exchange, and transmission of knowledge in the early modern period. In 2014 the Working Group “Laboratories of Art” was successfully concluded. Out of this work on alchemy and the arts emerged a new cluster of projects on materials, investigating why and how an artist’s materials and techniques became an object of study for chymists, natural historians, physicians, mathematicians, and natural philosophers in the early modern period. This project cluster was supported by collaborations with several museums (including the Victoria and Albert Museum and the Rijksmuseum) and research groups in technical art history. It laid the foundations for the ERC Consolidator Grant, awarded to the research group director in March 2015, for the project ‘Technique in the Arts: Concepts, Practices, Expertise, 1500–1950.’ Other Working Groups on color worlds and practices of perspective have moved to the stage of publication after several meetings in 2013 and 2014. Another focus is the idea of “trading zones,” understood as spaces of exchange between artisanal and scholarly cultures. The research group is concerned both with the contexts and conditions of the emergence of these trading zones and with the common languages invented in these spaces. The investigation of “trading zones” connects to broader questions about the creation of knowledge societies in the early modern globalizing world.

Project

Alchemy and the Arts

Working Group: Laboratories of Art

Sven Dupré, Dedo von Kerssenbrock-Krosigk, Lawrence Principe

This Working Group scrutinized epistemic exchanges between producers of the arts of fire and alchemists. It resulted in the exhibition *Art and Alchemy: The Mystery of Transformation*, which was shown at the Museum Kunstpalast in Düsseldorf between April and August of 2014. The book *Laboratories of Art* (edited by Sven Dupré; Springer, 2014) was another outcome of the group's collaboration. As its point of departure, this book pursued the following question: What can the evolution of the laboratory, and its shifting relation to the artisanal workshop, tell us about epistemic exchanges between the arts and alchemy? In the fifteenth and sixteenth centuries, the term *laboratorium* uniquely referred to workplaces in which “chemical” operations were performed: smelting, combustion, distillation, dissolution, and precipitation. Before the emergence of mercantilist states, Renaissance courts were the most important agents in establishing laboratories. Such court projects often took inspiration from the two earliest examples of spaces in which alchemy and the decorative arts encountered each other, at the Medici court in Florence. Two essays in this volume deal with these Florentine workplaces: Fanny Kieffer discusses the Uffizi, and Marco Beretta the Casino San Marco. Renaissance courts established spaces where artisanal workshops and laboratories came together, facilitating the circulation of materials, people, and knowledge between the worlds of craft (today's decorative arts) and alchemy.

Exhibition *Art and Alchemy*, 2014, section on “the arts of fire.” Stiftung Museum Kunstpalast, Düsseldorf; photo: Geerd Jacobs.





The practice of alchemy touched on medicine and chemical manufacture—including the chemical production of medicines, porcelain, dyes, precious metals, and other substances. The term also implies the knowledge that such processes entailed. In this sense, there was an overlap between alchemy and “art technologies”—the materials and techniques used to create art, and knowledge of these materials and techniques. Matteo Martelli shows that a historical process of selection, appropriation, and differentiation began at a relatively early stage, and resulted in a more limited definition of alchemy that was primarily focused on the making of gold and silver. As early as 300 AD, a distinction was made between a limited definition of alchemy as metallic transmutation and a more expansive definition that included knowledge concerning production and various artisanal practices. Nevertheless, the scope of a recipe collection such as the *Mappae clavicula*, compiled between the ninth and the twelfth centuries, is as broad as that of the Stockholm and Leiden Papyri despite those earlier attempts to limit alchemy to metallic transmutation. Sylvie Neven demonstrates that alchemical and art technological recipes shared a concern with the same materials and artisanal processes. Andrea Bernardoni argues that for Vannoccio Biringuccio, these artisans were the true experts on matter, materials, and material transformation and that artisanal “chemical” operations were the key to natural knowledge. Rejecting transmutational alchemy as “false” and the alchemists who practiced it as fraudulent, Biringuccio carved out a space for true alchemy to be recognized as one of the arts of fire. His *Pyrotechnia* is part of a historical process during which the epistemic value of artisanal practices shifted. The sermons of Johannes Mathesius, a Lutheran preacher in St. Joachimsthal, the center of an important mining district, likewise played a role here. Henrike Haug analyzes Mathesius’s sermons to reveal conceptions of the origin and formation of ores for which Mathesius drew equally on natural philosophy and alchemy and on the artisanal knowledge of local miners and goldsmiths.

Exhibition *Art and Alchemy*, 2014, the “alchemical laboratory.” Stiftung Museum Kunstpalast, Düsseldorf; photo: Geerd Jacobs.

There is a long tradition of experimentation in the practice of alchemy, and the boundaries between alchemy and art technologies were admittedly quite fluid from the very beginnings of alchemical practice in antiquity. In the sixteenth and seventeenth centuries, artisans became more deeply involved in alchemical pursuits, with some crafts coming to rely on the chemical expertise offered by scholars who had trained as alchemists. Above all, texts and books, products and symbols of scholarly culture, played an increasingly important role in laboratories and workshops. In these workplaces a sort of hybrid figure was at work, with one foot in artisanal culture and the other in scholarly culture. Such practitioners were impossible to categorize in the mutually exclusive roles of the scholar or the craftsman. Certain types of crafts—glassmaking, gold- and silversmithing, and porcelain production—seem to have been particularly prone to exchanges between artisanal and scholarly alchemical cultures. By the seventeenth century the expertise of some glassmakers, silver- and goldsmiths, and producers of porcelain was just as grounded in the worlds of alchemical and bookish learning as it was in hands-on work in the laboratory. Lawrence Principe and Morgan Wesley discuss silversmithing and porcelain production respectively, as two examples of such arts. The book suggests that this shift in workshop culture facilitated the epistemic exchanges between alchemists and producers of the decorative arts.



Anke Timmermann

Anke Timmermann (Postdoctoral Fellow, MPIWG)

Experimental Imagery: An Investigation of Fifteenth-Century Alchemical Expression

This project investigates alchemical art and symbols as written in manuscripts as part of the expression of alchemy, of late medieval written culture, and of the emergence of vernacular craft practices. It examines the fifteenth century as a key period in the development of alchemical terminology both in linguistic terms (especially the introduction of the vernacular) and in the expansion of symbols and imagery. How did alchemical practitioners consolidate their beliefs about alchemical theory, and their experiences in the alchemical workshop, with these miscellaneous forms of expression? The identification of practice-derived forms of alchemical expression and the study of scribal choices form the heart of this project.



Erma Hermens

Erma Hermens (Visiting Scholar, University of Glasgow)

Italian Court Workshop Organisations as Established in the 1580s at the Medici (Florence) and the Della Rovere (Pesaro) Courts

This research project concerned the late sixteenth-century Medici and Della Rovere court workshops, where a range of artists, artisans, and alchemists were employed in workshops located at the court. The innovative organizational structure of these workshop clusters as artistic enterprises fostered a synergy of disciplines and skills, leading to technical innovation. The workshops are documented by extensive unpublished archive material in Florence and Bologna. Contemporary so-called Books of Secrets, comprising recipes ranging from preserves to alchemy and artistic techniques, provide an interesting context to this microcosm of the arts, crafts, and science, and offer fascinating written testimonies on artisanal practice.

Project

Early Modern Materials and Art Technologies

Following up on the work of *Alchemy and the Arts*, this project cluster investigates more broadly why and how artists' materials and techniques became an object of study for chymists, natural historians, physicians, mathematicians, and natural philosophers in the early modern period. In early modern cities, apothecaries supplied artists with the pigments and other materials from which their works and the objects they produced were made. Beyond their shared commercial interest in materials, chymists, natural historians, physicians, and natural philosophers developed an epistemic interest in artists' materials and techniques. As they became objects of study and investigation, artisanal techniques and materials were turned into art technologies. This project cluster is connected to current work on artisanal recipes, focusing on questions of collecting and the readership of recipes. The projects consider the art technologies of a variety of artisans, including jewelers, dyers, glassmakers, painters, and goldsmiths. They aim at fostering the understanding of the historical process by which the union of artisanal practices and learned practices involving materials and techniques took place before the institutionalization of mixed epistemic and productive practices in the eighteenth century.

Michael Bycroft (Postdoctoral Fellow, MPIWG)

Gems and the New Science

This project aimed to examine the role of gems in some parts of early modern science. It pays particular attention to the entanglement of the epistemic roles of gems and their aesthetic and commercial roles, to the interconnectedness of different branches of science when seen from the point of view of gems, and to the continuities in the



study of gems from approximately 1600 to 1800. It resulted in three main findings. First, French mineralogists continued to recognize the category of *pierres précieuses* well into the eighteenth century. Second, jewelers played an important role in the main conceptual shift in early modern classifications of precious stones, namely, the shift from classifications based on color to those based on hardness. The jewelers Benvenuto Cellini and Robert de Berquen were especially important in this



Michael Bycroft

Enameled gold pendant depicting a stork killing a snake, set with an emerald and rubies and hung with pearls, central Europe, ca. 1600. Copyright: Victoria and Albert Museum, London.

regard. Finally, the distinction between “oriental” and “occidental” gems became more pronounced in the sixteenth century than it had been in ancient and medieval times, and by the middle of the eighteenth century it was the main criterium of demarcation between gem varieties in some influential classification schemes. Following up on this project, the Working Group “Gems in Transit,” led by Michael Bycroft and Sven Dupré, in collaboration with the University of Warwick and the Victoria and Albert Museum, will take up its work in 2015.



Sylvie Neven

Sven Dupré, Marjolijn Bol, Sylvie Neven

Alum: A Material at the Crossroads of the Arts, Crafts, and Learned Inquiry

During medieval and premodern times, alum was used for a variety of purposes in artistic and craft contexts. Alum was one of the most important chemical compounds involved in the dyeing of textiles and the manufacture of organic lakes, and was used in painting and illuminating techniques. It acts as a siccative agent in the preparation of oils and varnishes. It was employed in the making of glues, in the coloration and the treatment of various supports (bones, parchment, paper, wax), in the manufacture of pigments, such as verdigris, and in the purification of ultramarine. Part of the international scientific coordination network “Exploitation of Mediterranean Alums in Europe” (CNRS), this project is writing the history of the use of alum in the arts, crafts, and learned inquiry. We consider the interconnectedness and dissemination of knowledge between the arts, crafts, and learned inquiry, and the various ways in which such distribution relied on commercial, cultural, and technological exchanges.

Andreas Ryff, *Münz- und Mineralienbuch*, 1594. Autograph in possession of the Basel University Library (A lambda II 46a).



Tina Asmussen (Postdoctoral Fellow, MPIWG)

Subterranean Economies: Material and Epistemic Cultures of the Mines in Early Modern Europe, 1490–1630

During the early modern period, mining was one of the most important sectors within the European economy, having a great effect not only on material culture but also on perceptions and validations of metallic ores in central European mining regions. Proceeding from the conflated notion of gold and silver, both as symbols of value and as generators of it, this project investigates the perceptions and transformations of value connected with the different aggregate conditions of metallic ores among sixteenth- and seventeenth-century elite, scholarly, and artisanal circles. This analytical focus on perceptions and transformations of value combines economic considerations with an attention to metallurgical practices and techniques such as smelting, assaying, alloying, and even transmuting minerals and metals. Geographically, the analysis is directed at the duchies of Saxony, Braunschweig, and the territories of Further Austria.



Tina Asmussen

Marjolijn Bol (Visiting Scholar, University of Amsterdam)

Golden Wood and Panels of Porphyry: Appraising and Examining the Art of Ersatz in Pre-Modern Times

In their efforts to have their artworks assume the appearance of the work of the goldsmith, or have the works resemble otherwise desirable materials, medieval craftsmen left no technique unexplored. Precious metal was imitated by gilding wood or copper; gemstones and enamel were counterfeited with pastes, glass, and glowing oil glazes; marble was evoked on walls with various stucco techniques; and porphyry stone was imitated with oil paint on the backs of panel paintings. This list can be extended with countless other examples, all showing a similar interest in *Ersatz*—the practice by which one material is made to imitate the visual properties of another. This research project studies a pivotal moment in the history of *Ersatz*, raising questions about the social and economic implications of the history of imitation: Who bought these *Ersatz* objects? Why were they purchased? And how were they valued?



Marjolijn Bol

Jenny Boulboulé (Visiting Scholar, VU Amsterdam University)

Modeling, Casting, Conserving and Experimenting: Different Uses of Wax in Early Modern Artisanal and Anatomical Practices (1500–1700)

My research concentrated on different uses of wax in artisanal, medical, and natural philosophical practices, such as sixteenth-century life castings, the anatomical waxes made by the Italian abbot Gaetano Zumbo (1656–1701), and the innovative technique of wax injections, greatly improved by anatomists such as Frederik Ruysch (1638–1731), in the seventeenth century. One of the project's main goals was to explore the potential of a more technical-material approach to the analysis of premodern uses of wax and the analysis of anatomical waxes, and to integrate findings from conservation science with research on knowledge transmission and circulation. My research on early modern uses of wax resonates with a renewed interest in three-dimensional modeling and materiality and with recent scholarship on the role of crafts and artisanal knowledge in the rise of “new science.”



Jenny Boulboulé



Anita Guerrini

Anita Guerrini (Visiting Scholar, Oregon State University)

The Skeleton as Object and Artefact, 1500–1750

The human skeleton has taken on multiple meanings in history: medical, scientific, symbolic, religious. These meanings shifted over time and place; and as anatomical study rose to prominence in early modern Europe, they continued to coexist. Skeletons, moreover, were crafted objects prepared from dead human bodies. Between the sixteenth and the mid-eighteenth centuries, a critical juncture in the history of anatomy, the skeleton became a scientific object while retaining long-held connotations as symbols of death and as relics. These symbolic roles continued to be evident in illustrations of skeletons, whether in anatomical textbooks and atlases or in manuals for artists. In this period, the physical skeleton became a prized commodity among men of science. Practices and techniques evolved in the seventeenth century as the skeleton became increasingly essential to anatomical instruction, and the construction of a skeleton became as much an art as a science, with attention paid to aesthetic values such as whiteness and smoothness as well as to anatomical accuracy. This project examines the role of artists and aesthetics in this process of construction and display.



Ivory *transi* figure in an openwork box, Cologne, ca. 1520. Gothic Ivories Project at the Courtauld Institute of Art, London.



Lucia Dacome

Lucia Dacome (Visiting Scholar, University of Toronto)

Malleable Anatomies: Bodies, Models, and Material Culture in Eighteenth-Century Italy

This project considers the early stages of the practice of anatomical modeling and the role of anatomical artifacts and specimens in the contexts of the models of nature that were produced in the Italian peninsula in the eighteenth century. In particular, it reconstructs the sociocultural settings in which anatomical modeling was developed as a reliable source of medical knowledge, and examines how anatomical models came to be at the center of a composite world of social interaction in which medical discourse, religious practices, antiquarian, artisanal, and artistic cultures, and Grand Tour display were brought together. In order to reconstruct the “social life” of anatomical models, it further examines the multiple instances of agency, mediation, and negotiation that contributed to the transformation of a local practice such as wax modeling into a source of medical knowledge.

Jack Hartnell (Postdoctoral Fellow, Courtauld Institute of Art, London)

Knife and Saw: Dichotomies of Design and Knowledge (c. 1400–1600)

As a joint fellow with the Victoria and Albert Museum, I focused my research on two types of object from the world of late medieval and early Renaissance medical science: the knife and the saw. Considered since Hippocrates to be a direct extension of the surgeon's hands and fingers, surgical instruments such as knives and saws represent a body of objects whose long history is deeply intertwined and directly engaged with scientific medical knowledge. In the sparse scholarship and literature on such early surgical instruments, they are normally mentioned only as precursors to the worlds of John Hunter and Joseph Lister, at the beginning of volumes dedicated to later periods of medicine. My research instead sought to acknowledge these early objects from an art-historical perspective, considering their decoration, design, and manufacture as visual reflections of late medieval and Renaissance medical knowledge.



Jack Hartnell

Amputation Saw, early sixteenth century (Science Museum, no. A241432). Image courtesy of Wellcome Library, London.

Yvonne Elet (Postdoctoral Fellow, Vassar College, New York)

Materiality and Metamorphosis: Stucco in the Architecture and Decoration of Early Modern Europe

This project conceptualizes stucco as a central element of visual culture in early modern Europe. Overturning views of stucco as a marginal, cheap fiction of marble, this study positions stucco as early modern “new media”: a protean, shape-shifting substance that enabled new forms. This modest lime-and-stone mixture was reconceptualized as a chic new material; used by painters, sculptors, and architects, stucco defied conventional divisions of scholarship by medium, and it further functioned as a reflexive meta-material. The project spans the fifteenth to the seventeenth centuries with a focus on Bramante and Raphael, whose brilliant technical and conceptual reformulation launched an international vogue and introduced stucco into elite cultural discourse. An analysis of how this metamorphic material engaged ideas from natural philosophy, alchemy, and theology provides a new understanding of its formative role in early modern culture, and a striking illustration of how art and technology developed in a dialectical relationship with science and philosophy.



Yvonne Elet

Marieke Hendriksen (Postdoctoral Fellow, Rijksuniversiteit Groningen)

Networks and Knowledge of Glass in the Dutch Republic, 1650–1795

Glass in the early modern period was a boundary object, made and used by hybrid experts: it was used widely for utensils and optical aids, in architecture, furniture, scientific instruments, anatomy, and for decorative artworks ranging from stained glass windows to colored mezzotints, fake gems, and ornamental glasses. The production of glass was rooted in a variety of epistemic fields such as knowledge of materials and techniques, natural history, alchemy, and optics. In the past decade, significant work



Marieke Hendriksen

Stained Glass Window 18 in the Sint-Janskerk, Gouda, the Netherlands: "The question from John the Baptist to Jesus."

has been carried out on the history of optics, microscopy, and luxury glass. Yet the production and circulation of stained and colored glass has received little research attention so far. This project focuses on the impending disappearance of the knowledge, techniques, and facilities for the production of stained glass in the Dutch Republic between 1650 and 1795, and on efforts to ensure their maintenance and revival. It will serve as a case study in my current research on the recycling and re-appropriation of alchemical ideas and techniques in new theories and practices.



Anna Schönemann

Anna Schönemann (Visiting Scholar, Staatliche Akademie der Bildenden Künste, Stuttgart)

The Technique of Oil-Resin Varnish Preparation in Prussia in the Eighteenth Century

This project focused on the study of the technology of oil-resin varnishes, the so-called European lacquers, which saw particularly high levels of preparation in the eighteenth century. This type of varnish was developed over a long period of time and offered a particularly sophisticated treatment for works of art. The historical interest in lacquer work can be traced back originally to the attraction of decorative arts from East Asia, and is associated with the beginnings of imports from the region, mostly of porcelain. The strong interest in Europe in Asian works of art led to an increase in the import of objects in the Chinese and Japanese style, and in the manufacturing of copies and imitations. In the Rococo age, new developments in the lacquering of works of art emerged. Inspired by splendid Asian artworks with their high gloss, a European style emerged. Rather than imitate colorful Asian lacquers, the Europeans prepared transparent varnishes.



Koen Vermeir

Koen Vermeir (Visiting Scholar, Centre National de la Recherche Scientifique, Paris)

Religion, Technology, and the Arts in the Early Modern Period

This project studies the intersection of religious, technical, and artistic knowledge in the early seventeenth century. To this effect, I have studied the religious embedding of early modern theaters of machines, treatises on mechanics and archival sources that detail the use of various forms of machinery. In particular, I finalized work on the automata described by John Wilkins in his *Mathematical Magick*, paying special attention to Wilkins's religious background. I also continued work on the machines and apparatus used in early modern religious festivities. In particular, I researched the artifices, ornamentation, and machinery employed at the canonization festivities of St. Ignatius and St. Xavier in 1622 in the southern Netherlands. A cohort of artists and artisans created special effects aimed at overwhelming the spectators.

Project

Written Transmission in the Arts

This project studies the role of written transmission (recipes, *Kunstbüchlein*, treatises) in the circulation of knowledge in the early modern artisanal workshop and beyond.



Screenshot of ColourConText
"Sources" page.

ColourConText: A Database of Recipes on Colour Practice and Knowledge

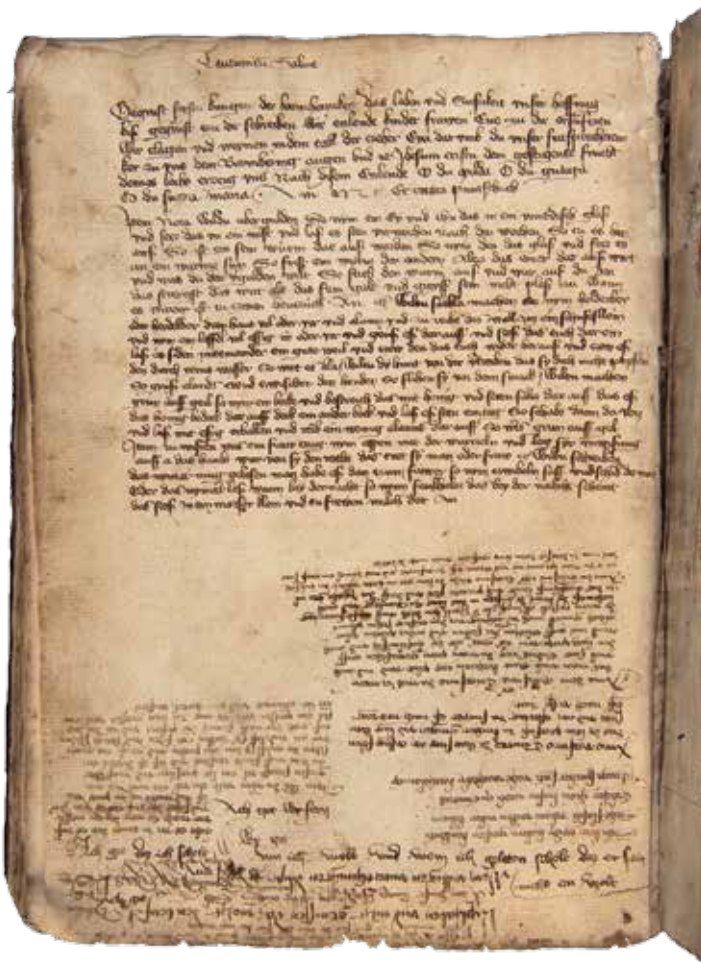
Sylvie Neven, Sven Dupré, Dirk Wintergrün, Doris Oltrogge

In 2014 the ColourConText database was published online on the MPIWG website. It facilitates the consultation and exploitation of a large corpus of recipe collections. The core data consist of medieval and early modern manuscripts and printed books from across Europe. The database also enables access to digital images of these sources via → p. 240

European Cultural Heritage Online (ECHO), or through digital collections made available by external institutes. The database also makes the content of the recipe collections accessible at the level of the individual recipes. To date, more than 6,500 recipes—some consisting of only a few lines, others covering several folios—have been transcribed.

The database serves as an important tool in several areas of research. The recipes are defined through the use of keywords arranged in different thesauri (related to the artistic technique, the technical process, and the main ingredients involved in the recipe process). Such subject classification enables queries regarding specific recipes, methods, or materials. The database also includes a complete list of the ingredients and substances mentioned in the recipes (in the Glossary section). Aimed at evaluating the circulation of the knowledge of materials and substances used by artisans and shared with other communities (such as apothecaries and physicians) with an epistemic interest in pigments and coloring material, the database also includes information on the ownership and readership of collections of recipes.

Augsburg, Universitätsbibliothek,
Cod.I.3.2.13, 83v.tif



Jaya Remond (Postdoctoral Fellow, MPIWG)

Kunst, Fantasia and Ingenium: Printed Artists' Manuals and the Shaping of Artistic Education in Northern Europe

This project studies the role of the written transmission of artistic knowledge through printed books in the early modern artist's workshop and beyond. It investigates the relation of artists' manuals from the German Renaissance with concepts of imagination (*Fantasia*) and invention (*ingenium, erfinden*), particularly in connection with the artist's creative process, the manuals' role in the mechanisms of art-making, and the growth of a personal style. Furthermore, the project aims to provide a thorough definition of the notion of Kunst (*or ars*) in the early modern period, and disentangle its complex web of semantic layers that encompass practical skills, technical dexterity, and rational knowledge. To this end, my project inscribes artists' manuals in a wider European context, beyond the borders of German-speaking regions, and takes into account pamphlets from other cultural and linguistic spaces. It will resituate these publications within the context of the booming technical literature of the time, which covered fields as varied as mining and cookery. This comparative study will shed light on how artists and craftsmen envisioned and classified artistic knowledge, whether they differentiated it from other categories of knowledge, be it hands-on know-how or theoretical learning.



Jaya Remond

Barbara Tramelli (Predoctoral Fellow, Freie Universität Berlin)

Inside Lomazzo: Appropriation and Transmission of Pictorial Knowledge in Sixteenth-Century Milan

This research takes as a case study the life and achievements of the artist and writer on art Giovanni Paolo Lomazzo, in order to understand the ways in which artists appropriated knowledge in Milan at the end of the sixteenth century. It starts from and focuses on the artist's writings, investigating in which context these writings were produced, the types of theoretical and practical knowledge that they conveyed to artists, and how painters in the second half of the sixteenth century shared this knowledge among themselves. Painter, writer, and academician, Lomazzo reflects the tendency of sixteenth-century artists to consider practical and theoretical knowledge both complementary and necessary for painters, and his activities as a member and promoter of the Accademia de la Val di Blenio testify to his ambition to gain a reputation beyond that of a painter. The versatility of his knowledge is reflected in his theoretical writings (especially but not only in the *Trattato dell'Arte della Pittura*, published in 1584), in which the author addresses the principal aspects of painting, namely, proportion, movement, color, light, and perspective, categorizing them hierarchically and interconnecting them in order to constitute what he defines as "the science of painting." My project focuses on the context in which these writings were undertaken and on the terminology that Lomazzo used in order to systematize his knowledge on the principal aspects of painting, as the language used in the book reveals much about the ways in which painters integrated their practical knowledge into theoretical knowledge.



Barbara Tramelli

Project

Spaces of Exchange of Objects and Knowledge

This project cluster investigates the transformation of the artisanal workshop, with its changing patterns in the circulation, exchange, and transmission of knowledge in the early modern period. “Trading zones” emerged in the fifteenth and sixteenth centuries. In these spaces, exchanges between artisanal cultures (characterized by learning-by-doing) and scholarly cultures (characterized by learning-by-reading) took place. This project examines the contexts and conditions of the emergence of these trading zones as well as the common languages and objects of exchange invented in these spaces. One of these trading zones is the house of the Portuguese merchant-banker Emmanuel Ximenez, who was active in the early seventeenth century. Ximenez’s natural possessions are the subject of work by Sven Dupré and Christine Göttler. Other spaces include the patent office, the printing shop, and the *album amicorum*. One particular focus is on how early modern artisanal and courtly collections functioned as sites for the production of art and knowledge.



Marius Buning

Marius Buning (Postdoctoral Fellow, MPIWG)

Privileged Knowledge: The Politics of Print in the Early Dutch Republic

This project examines the relation between printing privileges and the development of knowledge production in the Dutch Republic, around the years 1581–1621. In particular, it pursues the question of how a state in the making sought to define the notion of “useful knowledge.” There are two strands in the implementation of this project. The first is to develop a digital archive of printing privileges granted in the seventeenth-century Dutch Republic. The second strand of research differs in its methodology: on the basis of state papers and legal archives, it highlights a number of case studies that provide better insight into the question of how knowledge was shared among authors, artists, the state, and the general public. Instead of taking notions such as “authorship” and “usefulness” for granted, the project explores how the law drove the social construction of these norms.



Abraham Bosse, *Tractaet in wat manieren men op root koper snijden ofte etzen zal*, Jacob van Meurs, Amsterdam, 1662.

Marlise Rijks (Predoctoral Fellow, Ghent University); funded by Fonds Wetenschappelijk Onderzoek, Vlaanderen

Artisanal Collections in Seventeenth-Century Antwerp

This project investigates the culture of collecting among artists and artisans in early seventeenth-century Antwerp. In recent years, extensive research has been done on the culture of collecting in relation to artistic and scientific developments in early modern Europe. Most of the existing research focuses either on art collections in relation to the art market and connoisseurship or on the role of scholarly collections in relation to global trade networks and new scientific knowledge. Specific research on the collections of artisans is strikingly absent (except for research on the collections of Rubens and Rembrandt). In this project, four groups of Antwerp artists and artisans are central. First, gold- and silversmiths; second, apothecaries and grocers; third, publishers and engravers; and fourth, painters and those dealing in art.



Marlise Rijks

Susan Maxwell (Visiting Scholar, University of Wisconsin)

Natural History and History Painting in Rubens's Animals

The Wittelsbach dukes play an important role in the history of collecting and patronage. Albrecht V founded the *Kunstkammer* between 1563 and 1567, as well as the Antiquarium in 1569 and the Bayerische Staatsbibliothek (as the Hofbibliothek) in 1558. The first theoretical treatise on collecting practices, *Inscriptiones vel Tituli Amplissimi*, written by Samuel Quiccheberg and dedicated to Duke Albrecht V in 1565, depicts the *Kunstkammer* as a virtual cosmos that not only visually represents the ruler's universal reach, but also manifests his control over all aspects of his realm by allowing for interactive study. For the Wittelsbach dynasty, collecting and display were important components of statecraft. The *Kunstkammer* was no longer an element of Maximilian's collecting practice, but *Kunstkammer* theories shaped ducal identity and political interaction among early modern rulers, making the *Kunstkammer* a crucial element in both the development of the natural sciences and the birth of the absolutist state. This project situates the four hunt paintings, commissioned by Maximilian I of Bavaria from Peter Paul Rubens, in the context of collecting and patronage practices and also examines the role of the natural sciences in Rubens's studio practice and the formation of his artistic theories.



Susan Maxwell

Claudia Swan (Visiting Scholar, Northwestern University, Illinois)

Knowledge Networks in Early Modern Holland: The Case of Ernst Brinck (1582–1649)

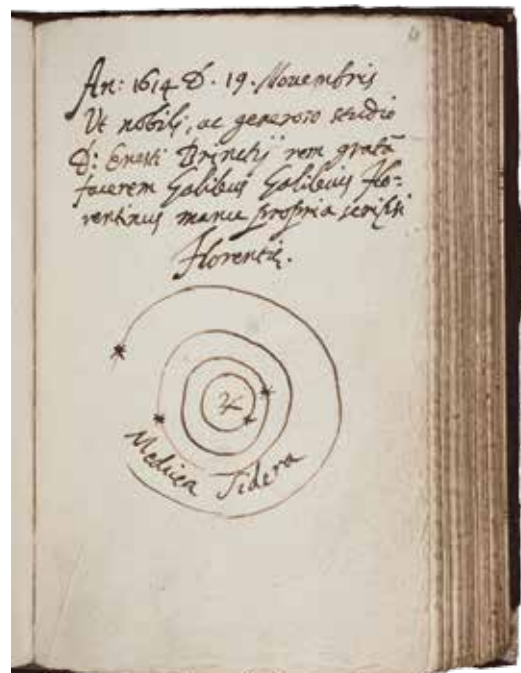
This project deals with the literary remains of Dutchman Ernst Brinck (1582–1649) and focuses on preserving and activating the exceptional annotations, inscriptions, lists, and commentaries contained in his surviving *Adversaria* (nearly fifty notebooks, never previously published or studied in detail) and three *Alba amicorum*. The project comprises a conventional published component and a digital component. In the exceptionally well-preserved three volumes of signatures and inscriptions in the Koninklijke Bibliotheek in The Hague, Brinck collected signatures from contemporary



Claudia Swan

Ernst Brinck, *Album amicorum*, Royal Library, The Hague (shelf number 135 K 4), folio 63.

luminaries as well as examples of as many as two hundred languages. Brinck also amassed curiosities and antiquities, a substantial library, and an expansive garden in the course of serving as diplomatic agent and mayor of the city of Harderwijk. Brinck's endeavors—as agent, collector, social networker, civic representative, and author—make him a key figure in the networks of knowledge pertaining to his interests and experience in early seventeenth-century Europe.



Cristiano Zanetti

Cristiano Zanetti (Visiting Scholar, Medici Archive Project, Florence); funded by DAAD)

Renaissance Planetary Horology

The main focus of this research project is Renaissance planetary horology. The narrative of the scientific revolution rests on three major buttresses: a new astronomy, a new empirical method, and a new mathematical abstraction for explaining a mechanical world. Renaissance clockmaking, and in particular planetary clockmaking, encompassed these three areas and challenged both the best university-trained mathematicians and the best “superior-craftsmen.” Planetary horology was the field in which representatives of the best artisanal knowledge and the most refined scholars came together and experimented in the mechanical reification of the Ptolemaic system of the world. Planetary clocks were the most complex and expensive mechanical objects of Renaissance courts: their design and construction required several years of work by highly specialized craftsmen and mathematicians, and only powerful patrons could fund such enterprises. The history of planetary clockmaking is a narrative of how princely powers competed, and how the construction of machines that today are nearly forgotten broke down the old epistemological boundaries at court.

Other short-term fellows

Celine Camps, Daniel Margócsy, and Valentina Sebastiani.

Project

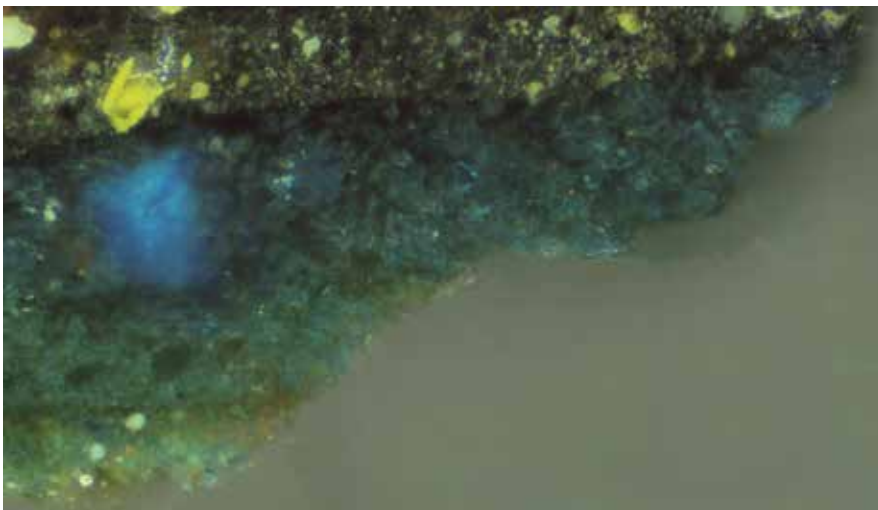
Artisanal Practices and Knowledge of Light, Color, and Perspective

Working Group: Early Modern Color Worlds

Tawrin Baker, Sven Dupré, Sachiko Kusakawa, Karin Leonhard

In recent years, color has become the focus of scholarly discussion in the interactions between art, craft, science, and technology. Although this discussion has drawn in scholars from various disciplines, the interactions between categories of art, craft, science, and technology, unreflectively defined according to modern disciplines, have not been helpful in understanding color in the early modern period. What we are missing is an investigation into the rich variety of color worlds and practices—engagements with materials, productions, ordering, and conceptualizations of color—between approximately 1550 and 1650. Though often lumped together as “pre-Newtonian,” these diverse practices deserve proper historical analyses on their own terms, without the subtle distortions introduced by teleological narratives. The aim of the Working Group is to bring out the diversity of color worlds. We decided to focus on this particular timeframe (around 1600) because in this period various color worlds appear to have intersected and cross-fertilized. A further aim of the Working Group is to test this thesis by investigating the modes and obstacles of transmission between color worlds.

“Color world” is the central category of analysis in the volume to be issued by the Working Group. Color worlds consist of practices, concepts, and objects. Working Group members are particularly interested in how practices, concepts, and objects



Hans Holbein the Elder, *Graue Passion*, “Agony in the Garden,” around 1495, Staatsgalerie Stuttgart, cross section of a paint sample in visible light.

interact within and across color worlds. They examine a variety of engagements with color as “practices” on the basis of materials (including wood, pigment, minerals, gems, manuscripts, books, prints) and products (such as gunpowder, miniatures, theories, books), shaped by notions of skill and expertise, and guided by intended audiences, consumers, and patrons. The following practices are discussed: painting (Barbara Berrie), cosmetics (Romana Filzmoser), miniature painting and limning (Karin Leonhard), natural history (Anna Marie Roos), goldsmithing (Andrew Morrall), and the making of fireworks (Simon Werrett). The focus is especially on the creation of languages and objects to communicate across color worlds, or indeed when and why this fails to happen. Scrutinizing new color languages and boundary objects in between color worlds, the volume’s individual chapters document the intersections of color worlds as well as make the obstacles in crossing boundaries between color worlds visible. The issue of communication or noncommunication between different color worlds is central in the contributions of Tawrin Baker (on Robert Boyle and crafts), Fokko Jan Dijksterhuis (on optical theorizing and color practices), Doris Oltrogge (on mining and the natural history of Georg Agricola), and Valentina Pugliano (Aldrovandi’s natural history and painting).



Amy Buono

Amy Buono (Visiting Scholar, Southern Methodist University, Texas)

Chromatic Variations: Early Modern Practices of Color

This project examined the development and transmission of color-altering technologies in the early modern world. It examined Amerindian featherwork produced in South America in both pre-Columbian and colonial contexts, looking specifically to material techniques of dyeing (especially with *caesalpinia echinata* or “brazilwood” dye baths) and biologically altering the color of feathers (especially by means of a technique called *tapirage*). A study of the artistic techniques of indigenous color alteration is crucial to understanding the sociocultural contexts of these objects in their places of origin, as well as reconstructing their reception in early modern Europe, in particular among natural philosophers such as Ulisse Aldrovandi (1522–1605) and other scientists and patrons of the arts. This study aimed to combine a material analysis of feathered artifacts available only within key ethnographic collections across Europe—including the Ethnologisches Museum in Berlin—with archival traces of modern anthropological expeditions that describe artistic practices associated with a diverse range of indigenous plumists in Brazil and Guyana.



Allison Ksiazkiewicz

Allison Ksiazkiewicz (Visiting Scholar, University of Cambridge)

Color and Aesthetics in Eighteenth-Century Mineralogy

This project examined the mineral collections of three individuals—Sir Charles Greville (1749–1809), Sir John St Aubyn (1758–1839), and Sir Abraham Hume (1749–1838)—as a case study for considering the ways in which aesthetics informed the classification and interpretation of mineralogical and geological specimens, as well as how aesthetic sensibilities circulated and affected the transmission of knowledge. Each gentleman was an influential figure in artistic and scientific communities, and all commissioned the mineralogist and French émigré Comte de Bournon (1751–

1825) to catalog their respective mineral cabinets. In particular, the project examined how the material nature of the earth's structure, as observed and expressed by natural historians and philosophers through shape, color, and general physicality, informed Bournon's classification. Definitions of "natural" and "artificial" as a mode of categorizing and investigating the order of nature played a central role in this research.

Karin Leonhard (Research Scholar, MPIWG)

Colors in Nature and Color in Art: Color Does Matter

This project investigated the relationship between color understood as a mixture in bodies ("real color") and color understood as a mixture in transparent media ("apparent color")—a distinction characteristic of color theories in the early modern period. From 1600 onward, a growing number of ideas were expressed in which the ontological distinction between the real and the apparent colors was blurred or completely called into question. In his rather influential *Treatise of Bodies*, for example, Sir Kenelm Digby compared the optical mixing of the colored light from a prism to the mixing techniques of painters. In saying so, he referred to the glazing techniques of, for example, Peter Paul Rubens and Anthony van Dyck when comparing the spectrum to the middling colors in painting. The relationship between Digby, Rubens, and Van Dyck formed part of my research into seventeenth-century color theories.

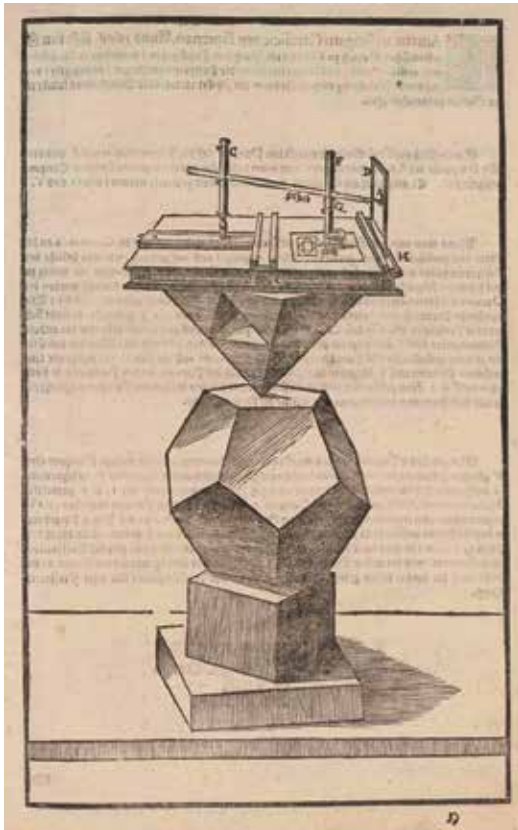


Karin Leonhard

Working Group: The Practices of Perspective and Renaissance Cultures of Optics

Sven Dupré, Jeanne Peiffer

This Working Group addresses the production and circulation of optical knowledge in workshop and design practices of the visual and decorative arts and (garden) architecture between the fourteenth and seventeenth centuries. Topics embraced include the practical optical knowledge produced in the context of artists' workshops as well as artists' appropriation and use of the science of optics, which included questions of psychology, physiology, anatomy, physics, and mathematics, for the production of art and architecture, including gardens. We discuss the material practices of artists (as diverse as gardeners and goldsmiths) in imitating and representing the effects of light, creating the illusion of space and the shaping of landscape (from the use of paper and other instruments, on real sites, to experimentation with the optical qualities of pigments and binding media). Other views throw light on artists' readings of texts on optics and their possible use in the context of the workshop. The Working Group takes into account the polysemy of perspectives associated with the practice of perspective. This approach brings out the variety of uses and different meanings of *perspectiva*—during the period between 1300 and 1700 and across different sites of artists' appropriations of optical knowledge. By situating artists' optical knowledge in workshop and design practices, we are attentive to a variety of constructions that create the illusion of space, and pay as much attention to other types of optical knowledge as to the geometry of perspective.



Engraving from Paul Pfintzing, *Ein schöner kurtzer Extract der Geometriae unnd Perspectivae*, Nuremberg, Valentin Fuhrmann, 1599, fig. 11.

The Working Group volume is divided into three sections. The first section discusses sites of optical and perspectival practices. Among the sites discussed are the university and the church (A. Mark Smith), the mathematical instrument workshop (Samuel Gessner), the jeweler's shop (Marjolijn Bol), the urban piazza (Marvin Trachtenberg), the garden (Juliet Odgers), and the anatomy theater (Tawrin Baker). This section aims to highlight the widespread optical literacy of the period as well as the site-dependent meanings of *perspectiva*. Section 2 deals with writing as one of the most important practices of *perspectiva*. The focus is on textual carriers and vehicles of the circulation of *perspectiva*, and on how they enable site-dependent meanings of *perspectiva* to travel. Dominique Raynaud discusses translation, Elahéh Kheirandish texts of natural philosophy and astronomy; Sven Dupré considers books of secrets, Jeanne Peiffer the *Kunstabchlein*, and Jose Calvo-Lopez an architect's notebook. Section 3 considers drawing, constructing, and painting as another set of important practices of *perspectiva*

Working Group members contributing to this section of the volume take the visual problems that painters, draughtsmen, and gardeners face as their point of departure and bring out the tensions between codifications of *perspectiva* and practice (Filippo Camerota, Pietro Roccasacca, J. V. Field, Paul Hills, Georges Farhat).



Philippe Hamou

Philippe Hamou (Visiting Scholar, Université Paris Ouest Nanterre La Défense); funded by CNRS

The Human Sensorium: Optical Images, Cerebral Pictures and Sensory Ideas in the Age of Newton

Kepler's discovery of retinal pictures and Descartes's account of nervous transmission and cerebral picture formation set the stage for early modern discussions of visual perception and sensory ideas. Not only is visual perception an effect of the physical pictures painted in the head, but also, as suggested in Kepler's famous *dictum ut pictura, ita visio*, it was thought that the content of our perception is strictly constrained by the content of those pictures. Are sensory "ideas" these very material pictures, painted and "sensed" in the space of the brain called the "sensorium," or do we need another account, construing ideas either as intellectual beings, mental items of some sort, or as acts of perception directed toward the external object itself, triggered by motions in the brain? This study shows how this debate on sensation and ideas was shaped and guided by contemporary developments in optics and discussions of visual experience.

Albrecht Heeffner (Visiting Scholar, Ghent University); funded by Science Foundation Flanders

Extracting Knowledge from Optical Artifacts: Mydorge's Experiments

Claude Mydorge (1585–1647) was a remarkable figure closely linked to the intellectual circle around Mersenne and Descartes. The extant sources that give us information about his optical experiments include the book *Récréation mathématique* (RM), first published in 1624. The intention of this project was to look in detail at these neglected sources in order to reconstruct a picture of how hands-on experience with optical artifacts can lead to knowledge not readily available through the mathematical approach in geometrical optics. Nine optical experiments concerning colored glass, cut glass, lenses, the camera obscura, and concave spherical and parabolic mirrors were identified. This result fitted into a larger research project aiming to determine the kind of knowledge that is embedded (often tacitly) in material artifacts and contrivances, known from practical mathematics, and in the practices dealing with these objects.



Albrecht Heeffner

Stephanie Leitch (Visiting Scholar, Florida State University)

The Art of Observation in the Early Modern Print

Historians of science have charted the roughly contemporaneous rise of several genres that advocated for the firsthand investigation of the world, whereas art historians have endeavored to establish the socially constructed nature of vision. Together, their work has provoked intriguing questions about the function of pictorial evidence in the making of early modern knowledge. Yet with a few notable exceptions, this work has taken surprisingly little note of how vision was activated by printed illustration; my study undertakes to repair this gap. The goal of this project is to write the role of prints into early modern epistemological gestures, especially in the understudied areas of physiognomy and cosmography, and to bring nuance to their role in more broadly treated media such as broadsheets and natural history.



Stephanie Leitch

Pietro Roccasecca (Visiting Scholar, Académie des Beaux Arts de Rome)

Alhacen Volgare's Theory of Vision

De li aspecti (Codex Vat. Lat. 4595) is an Italian translation of *De aspectibus*, which is a Latin translation of Ibn al-Haytam's *Kitab al-Manazir*. Alhacen's *De aspectibus* appeared in Europe in the thirteenth century. The Vatican manuscript is mainly of interest because it might have been one of the sources that led to the appropriation of optical theories by Tuscan painters and sculptors of the fifteenth century. In his *Third Commentary*, Lorenzo Ghiberti transcribed long abstracts of a vernacular translation of *De aspectibus*, proving that Florentine artists of the mid-fifteenth century were interested in Alhacen's theory of vision. One aim of the project is a transcription of *De li aspecti* for the [Perspectiva+] website in collaboration with the Bibliotheca Hertziana in Rome.



Pietro Roccasecca

Colloquia, Conferences, and Workshops

- **Conference** “Laboratories of Art,” Max Planck Institute for the History of Science, Berlin, March 7–8, 2013
- **Conference** “Perspective as Practice,” Working Group meeting, Centre Alexandre-Koyré, Paris, September 10–11, 2013
- **International Workshop** “Alum: A Material at the Crossroads of Arts, Crafts, and Learned Inquiry,” Max Planck Institute for the History of Science, Berlin, October 11, 2013
- **International Workshop** “Early Modern Colour Practices, 1450–1650,” Max Planck Institute for the History of Science, Berlin, September 20–21, 2013; March 21–22, 2014; October 31–November 1, 2014
- **International Workshop** “Reading How-To: The Uses and Users of Artisanal Recipes,” Max Planck Institute for the History of Science, Berlin, co-organized in collaboration with Elaine Leong and Doris Oltrogge, September 19–20, 2014
- **Technical Art History Talks;** Max Planck Institute for the History of Science and the Freie Universität Berlin, in collaboration with the University of Glasgow (Erma Hermens), October 27, 2014–January 19, 2015

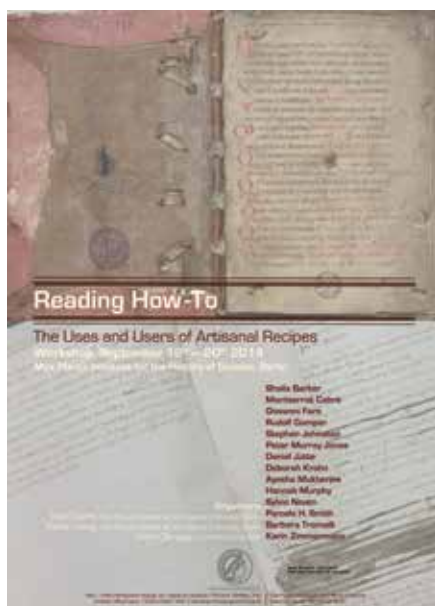
Colloquium Series 2013

- **Manuscripts and Prints—Exchange, Use and Reading of Recipe Texts in Early Modern Times,** Monday, 28 January 2013, *Doris Oltrogge* (Cologne Institute for Conservation Sciences)
- **Does Saint-Peter’s Dome need a Mathematic Assessment (1743)?** Monday, 18 February 2013, *Pascal Dubourg Glatigny* (Centre Alexandre Koyré, Paris)
- **Science and Statecraft in Rubens’ Munich Hunt Paintings,** Monday, 4 March 2013, *Susan Maxwell* (MPIWG, University of Wisconsin-Oshkosh)
- **The Technology of European Lacquer: Origin and Influences of the Prussian Art,** Monday, 29 April 2013, *Anna Schönemann* (MPIWG, Staatliche Akademie der Bildenden Künste, Stuttgart)
- **Chromatic Variations: Early Modern Practices of Color,** Monday, 27 May 2013, *Amy Buono* (MPIWG, Southern Methodist University, Dallas)
- **Artists’ Scholarly Expertise for the Making of Bestsellers in 16th-century Basel,** Monday, 24 June 2013, *Valentina Sebastiani* (MPIWG, Fondazione Bruno Kessler (FBK), Trento)
- **Signs of Change: Symbols and Illustrations in Late Medieval Alchemical Manuscripts,** Monday, 2 September 2013, *Anke Timmermann* (MPIWG)
- **Art, Value, Common Knowledge, and Natural History: The Adversaria of Ernst Brinck (1582–1649),** Monday, 14 October 2013, *Claudia Swan* (MPIWG, Northwestern University, Illinois)
- **“Whether this Art Owes More to Nature, or Nature to this Art”: Visualizing the Body in Eighteenth-Century Italy,** Monday, 18 November 2013, *Lucia Dacome* (MPIWG, University of Toronto)

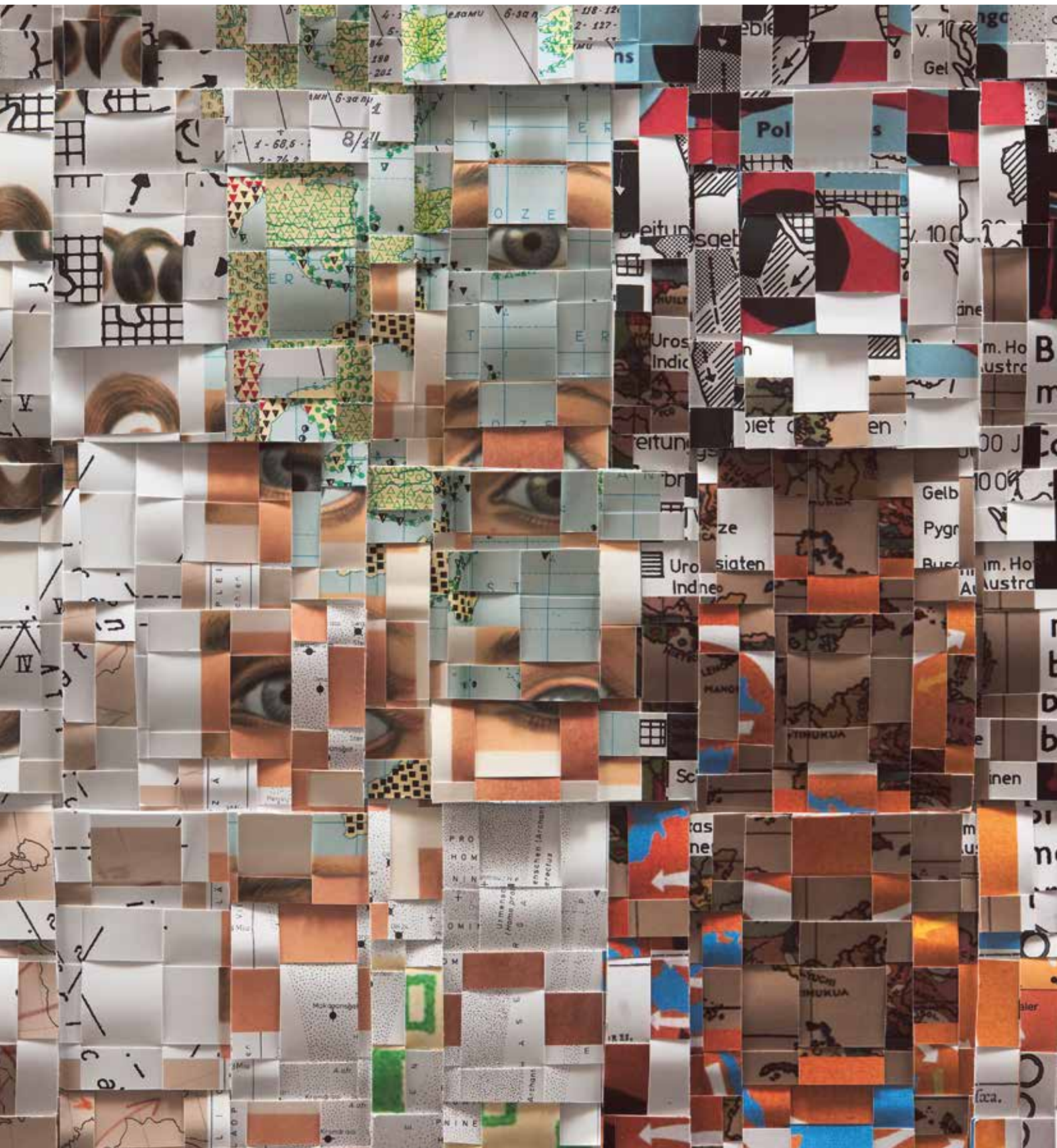
- **Leonardo's Liquid Bodies**, Monday, 16 December 2013, *Frank Fehrenbach* (Universität Hamburg)

Colloquium Series 2014

- **Commercial Visions: The Business of Curiosities in the Dutch Golden Age**, 13 January 2014, *Daniel Margócsy* (MPIWG, Hunter College, New York)
- **Visual Acuity and the Physiognomer's Art of Observation**, 3 February 2014, *Stephanie Leitch* (MPIWG, Florida State University, Tallahassee)
- **The Mariani Treatise, Court Workshops and Books of Secrets in Late Sixteenth-Century Italy: A Synergy of Art and Science**, 31 March 2014, *Erma Hermens* (MPIWG, University of Glasgow)
- **Which Stones are Precious? Classification and Counterfeit in Early Mineralogy**, 14 April 2014, *Michael Bycroft* (MPIWG)
- **Modeling, Experimenting, Conserving; Different Uses of Wax in Early Modern Anatomy**, 5 May 2014, *Jenny Boulboulé* (MPIWG, VU University Amsterdam)
- **Giuseppe Salviati's Libro del Suoni: Painting and Knowledge in Late Renaissance Venice**, 23 June 2014, *Mattia Bis* (MPIWG, Washington DC)
- **The Secret of Stucco in Early Modern Italy**, 29 September 2014, *Yvonne Elet* (MPIWG, Vassar College, NY)
- **The Whiteness of Bones: Techniques and Aesthetics of the Skeleton, 1500–1800**, 20 October 2014, *Anita Guerrini* (MPIWG, Oregon State University)
- **Preserving and Recycling Knowledge: Coloured Glass in the Netherlands, 1650–1800**, 10 November 2014, *Marieke Hendriksen* (MPIWG, Rijksuniversiteit Groningen)
- **Knives, Saws and Hands. Dichotomies of Surgical Design and Knowledge (ca. 1400–1600)**, 1 December 2014, *Jack Hartnell* (MPIWG/V&A, The Courtauld Institute of Art, London)



Katrin von Lehmann (artist in residence),
World Citizen. © Katrin von Lehmann.
Reproduced with permission of the artist
(2015). Katrin von Lehmann, *Blick auf
Vielfalt 3-3*, photograph, perforation,
180 x 120 x 8 cm, 2013; Photo: Bernd Hiepe.



Max Planck Research Group

Twentieth-Century Histories of Knowledge about Human Variation

RESEARCH GROUP LEADER *Veronika Lipphardt* (2009–2016)
ended June 2015

Introduction

Human variation has been both an epistemic object and an epistemic tool in twentieth-century life sciences. Taking this double role seriously, the members of this research group have demonstrated how thoroughly embedded human variation has been in multiple research strands throughout the twentieth century. Considering a wide range of geographical and political contexts, of disciplines, research designs, and actors, the group's research shows that difference markers, numerical data, and categorizations were not just scientific products. Rather, because their performativity rested on broadly accepted sociocultural notions of difference and identity, they enjoyed the trust of actors in many domains.

Since 2013, the research group has further expanded its topics, activities, and networks. Veronika Lipphardt is completing her book manuscript on the role of bio-historical narratives and notions of isolation in population genetics. Jenny Bangham, whose dissertation won the Marc-Auguste Pictet Prize (2014), is completing a book manuscript on blood group markers in human genetics and has developed new research interests, most notably, the invisible labor that enables the human sciences. Samuël Coghe, a historian of colonial demography, continues the group's long-standing interest in the history of research into human variation in colonial contexts. Lara Keuck works on the historical intersection of disease classifications with other difference classifications. Sarah Blacker focuses on contemporary personalized medicine. As a general trend, in this last phase of the project many of the group's research projects and activities have tended to look to the late twentieth century and beyond; accordingly, our connections to scholars of science and technology studies have become even stronger over the past two years.

Three collections have resulted from the group's work: Jenny Bangham and Soraya de Chadarevian have co-edited a special issue of *Studies in the History and Philosophy of Biological and Biomedical Sciences*, entitled "Heredity and the Study of Human Populations After 1945." Veronika Lipphardt and Sandra Widmer are co-editing a volume to be published by Berghahn entitled "Health and Difference: Rendering Human Variation in Colonial Engagements." Together with Marianne Sommer Veronika Lipphardt is editing a special issue of *History of the Human Sciences*, entitled "Visibility Matters: Rendering Human Origins and Variation in Space and Time."

Individual Projects



Veronika Lipphardt

Veronika Lipphardt (Research Group Leader and Professor, Freie Universität Berlin) **Narratives of Isolation – Patterns of Diversity**

The issue of isolation runs like a red line through studies of human variation in the twentieth century. Asking how racial, or genetic, differences have emerged over time, most scientists take for granted the assumption that the reproductive isolation of human groups played a crucial role, be it by geographical or social barriers. Accordingly, one task that scientists often had to fulfill was to provide a narrative: a story that would recount the history of a closed group and how that group had come to be isolated. This project takes these narrations as a starting point and traces them through research designs, research processes, and representations of research results. It shows that in population genetics, these narratives inevitably structured certain aspects of the scientists' work, most notably, the sampling of individuals as representative of a population, but also basic assumptions about their reproductive isolation in the past and present. Not surprisingly, then, the groups that fascinated population geneticists most were those that in past centuries had been migrant, marginalized, and persecuted. As a consequence, assumptions about the social relationships maintained by those populations were always implicated in the research designs of human population genetics.

"Lines of genetic communication in the world." This image denies the possibility of a meaningful temporalization of human variation, and also the possibility of setting up phylogenetic trees for humans.
Source: Frederick S. Hulse, "Race As an Evolutionary Episode," *American Anthropologist* 64(5) (1962): pp. 929–945, here: Fig. 4, "Lines of genetic communication in the world."



Recently the project has focused on the many sources of isolation narratives: as demonstrated in various case studies, geneticists did not generate the isolation narratives themselves. Instead, they sought out external sources to provide reliable information: historians, ethnographers, linguists, and other scholars; but also myths and oral traditions, or insider informants. Hence, interdisciplinary collaborations and collaborations with laypeople provided an important influx of information into the genetic research design. The project regards this mutual exchange of narratives, their social reverberations, and the political implications to be an important area for future work. Beyond this project, Veronika Lipphardt has worked on the historicity of growth and how debates about economic growth touch on widely accepted narratives of progress and success. In 2015, Veronika Lipphardt will take up a professorship at the University College Freiburg. Hence, the research group is coming to an end earlier than expected.

Jenny Bangham (Postdoctoral Fellow, Research Scholar, MPIWG)

Blood Groups and the Rise of Human Genetics

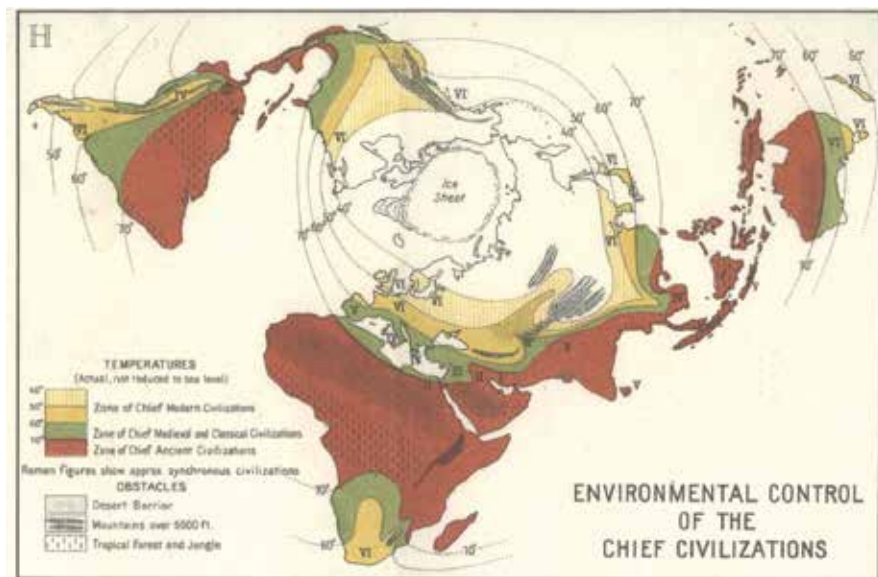
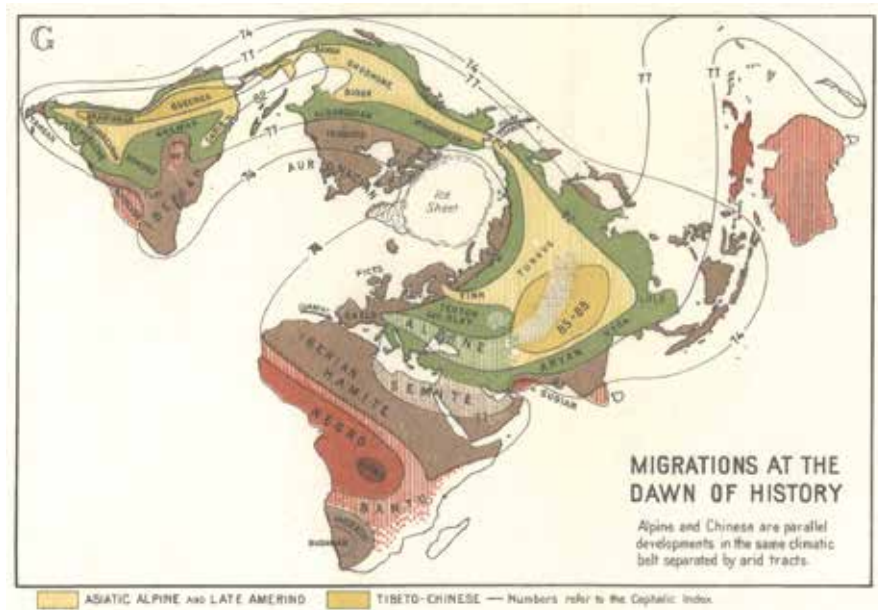
Genetics today is expected to produce direct and credible knowledge about risks of disease, responses to drugs, and family relationships, as well as credible historical narratives about our ancestors and their land. This project examines how the powerful authority of genetics over human life and its past was achieved in the mid-twentieth century, when research on human heredity was re-orientated around blood groups, the first sharply defined human genetic traits. As blood transfusion services expanded, blood groups were made to articulate racial, disease, and familial identity, and came to be seen as powerful markers of inheritance. This project uses blood groups to interrogate the bureaucracies, epistemological commitments, practices, politics, and places that made humans “genetic,” and genetics relevant to human life. A full book manuscript will be reviewed in January 2016.

The book deals with the decades between 1930 and 1960, when blood groups were transformed from immunological curiosities to the consummate genetic traits. After the First World War, the rising significance of blood groups in transfusion medicine led to the proliferation of studies of their distributions in different racial, religious, and national populations, and their promotion by researchers deeply committed to eugenics. During the Second World War, as mass blood donation became crucial to national defense, blood groups became indispensable tools for the rapidly expanding transfusion services, which in turn supported efforts to make human heredity research into an “exact” genetic science. After 1945, against the backdrop of the intensifying Cold War, scientists and politicians configured blood-group genetics as the proper methodology for a politically neutral race science. As human genetics emerged in the 1950s as an established discipline with its own associations and journals, blood groups were its consummate trait, seen as capable of offering precise knowledge about human history, ancestry, and race.

Blood groups were therefore politically charged objects, and agents in the early history of human genetics. They are also productive historical devices. Flexible enough to serve multiple interests in different local settings, and stable enough to promote exchange between communities, blood groups traveled extensively and so lend themselves to an analysis of the relationships between various forms of (bio)medical research and practice. Following assistants, clerks, scientists, nurses, and would-be subjects as they traded blood, test results, money, medical advice, and serological expertise, the project highlights how blood-group collections at home and in colonial settings were produced and structured by social, professional, and political relationships, by historical and geographical identities, and by notions of kinship and belonging. This work can be found in the edited volume *Human Heredity in the Twentieth Century*, and in the journals *British Journal for the History of Science*, *Studies in the History and Philosophy of the Biological and Biomedical Sciences*, and (forthcoming) *History of the Human Sciences*.



Jenny Bangham



British geographer-anthropologist Griffith Taylor argued that the principal human differences were caused by changes in climate during the Pleistocene age. A series of color maps aimed to connect histories of migration and environmental change with physical, cultural, and linguistic differences. © American Geographical Society. Reproduced with the permission of the Executive Director of the AGS (2015). Source: Griffith Taylor, "The Evolution and Distribution of Race, Culture, and Language," *Geographical Review* 11 (1921): 54–119.

Samuël Coghe (Postdoctoral Fellow, MPIWG)

Medical Demography in Colonial Central Africa: Measuring and Negotiating Health, Reproduction and Difference, 1918–1945

This project examines the role of medical doctors in the production and circulation of demographic knowledge and ideas about human variation in colonial Central Africa, most notably the Belgian Congo, Portuguese Angola, and French Equatorial Africa. By framing and explaining differences in fertility, (infant) mortality, or sex ratios in terms of race or ethnicity, medical doctors participated in entrenching—and sometimes also reshaping—ideas about human difference. After the First World War, demographic studies became an integral part of new “native” health programs established by colonial powers in Central Africa. Driven by anxieties about depopulation and influenced by ideas of social medicine, leading medical doctors viewed demographic data as indispensable for designing and monitoring these health interventions. As “field demographers,” doctors gathered data and elaborated a range of studies on population dynamics in Central Africa, which remained unequalled until the professionalization of colonial demography after the Second World War.

In this project, Samuël Coghe analyzes the research questions and methods that guided these demographic studies and the impact that they made on colonial debates and population policies. Unlike territorial administrators, who were mainly interested in enumerating able-bodied men for the sake of labor recruitment and tax collection, medical doctors wanted to study the dynamics of the entire population. In addition to calculating mortality statistics, they were increasingly interested in grasping the reproduction of populations through indices such as sex ratios, age distribution, and fertility and infant mortality rates. Accordingly, their methods included not only registration techniques and periodical censuses, but also oral interviews with African women. The resulting demographic data, however, were often far from accurate, partly due to Africans’ strategies of avoidance and resistance. Although doctors were mostly aware of this shortcoming in their data, they nevertheless used the data to make bold claims about the demographic regime of the populations they were studying and about the interventions that were needed to counter depopulation.

From this work, two papers have been accepted for publication in *Health and Difference: Rendering Human Variation in Colonial Engagements* (edited by Veronika Lipphardt and Alexandra Widmer, published by Berghahn) and, together with Alexandra Widmer, in *Twentieth-Century Population Thinking: A Critical Reader in Primary Sources* (edited by the Population Knowledge Network, published by Routledge), respectively.



Samuël Coghe

REGISTO NOSOGRÁFICO				
DOENÇAS da 1.ª inf.ª	da 2.ª infância	da juventude	do estado adulto	Obs.
Tratamentos	Tratamentos	Tratamentos	Tratamentos	Obs.
Vacinações	Revacinações	Revacinações	Revacinações	Obs.
Falecido em _____			de N.º _____	

Medical and demographic registry card, from the Health Services in Angola, late 1920s. Source: João Camoesas, “Sobre a organização da Assistência Médica Indígena,” *Boletim da Assistência Médica aos Indígenas e da Luta contra a Moléstia do Sono* 3, 2 (1929), pp. 140–155.



Sarah Blacker

Sarah Blacker (Predoctoral Fellow, University of Alberta, Canada)

Genetic and Epidemiological Constructions of Variation in Aboriginal Populations of Canada, 1933–2013

The idea of reliably quantifying biological variation and developing systems through which to clearly define populations by type became a central preoccupation of the Canadian state during the twentieth century. The economic stakes of this project were high. As a settler-colonial state with obligations to its Indigenous peoples to fulfill, as well as a welfare state committed to equitably distributing resources (particularly, in this context, health care), the production of precise knowledge about differential vulnerability to disease was of particular economic importance to the state. This project considers how human biological variation was conceptualized and measured in the second half of the twentieth century in Canada, and how state policy and public health campaigns in Canada in the same period were informed by knowledge produced by three landmark biological studies concerning the relationship between race and disease susceptibility—specifically, the concept of “rare diseases” and the development of “race-targeted” medicine.

Between 1942 and 1952, a nutrition study run by the Canadian government involved at least 1,300 nonconsenting Indigenous children living at Residential Schools located across Canada. The nutrition studies were pitched as an attempt to understand vast discrepancies in health between Indigenous and non-Indigenous communities, including an infant mortality rate eight times higher (and a crude mortality rate five times higher) in Indigenous communities than in Canada as a whole. The stated aim of the study was to identify a particular form of variation in Indigenous commu-

nities that could contribute to an understanding of the high rates of mortality and preventable disease. Though scientists and physicians who visited Residential Schools noted that these statistics could be at least partially explained by the prevalence of hunger and malnutrition in these institutions, the study continued to pursue the hypothesis of “exceptional” Indigenous forms of gene regulation as the primary mechanism of causation. This project considers the questions and methods informing this study in relation to other biological variation research that used Indigenous subjects in the same period, with special attention paid to the ways in which the data produced by these studies were rendered material through government policy-making during the mid-twentieth century.



“Nurse Desrochers checking a girl’s throat while other children wait in line, Frobisher Bay (Iqaluit) Federal Hostel, Nunavut, 1959.” © Government of Canada. Reproduced with the permission of the Minister of Public Works and Government Services Canada (2015). Source: Library and Archives Canada/Department of Health fonds/e002504641.

Publications resulting from this research work can be found in *TOPIA: Canadian Journal of Cultural Studies and English Studies in Canada*, as well as in the forthcoming edited volume *History of Medicine and Its Audiences* (Pickering & Chatto).

Guest Program

Selected Project Descriptions

Soraya de Chadarevian (Visiting Scholar, University of California, Los Angeles, USA; Institute for Society and Genetics)

Heredity and the Study of Human Populations

In the post–World War II era, the set of techniques developed to visualize human chromosomes raised particularly high hopes for advancing the study of human heredity. In the eyes of its promoters, it was to provide insights into such diverse fields as radiation biology, cancer research, toxicology, pediatrics, sex research, infertility, aging, criminology, anthropology, and evolution. By following human chromosomes and the techniques and images that came packaged with them, this project aims to reconstruct where human heredity and genetic knowledge were embraced, debated, and rejected.

One notable aspect is that many of the chromosome studies were population-based. An epidemiological direction was aimed at correlating changes in chromosome structures with various factors, ranging from disease symptoms to the effect of mutagens. Another orientation was aimed at studying the genetic structure or “racial variation” of human populations. As it turned out, chromosome analysis, or karyotyping, was not necessarily the most successful tool for the study of human diversity. The research projects articulated around the new tool nonetheless provide a useful point of entry to examine the intersection of the study of heredity and a broad concern with human populations in the post–World War II era. By focusing on the population studies undertaken with the new chromosome techniques, the project highlights the continuing role of concerns and opportunities with respect to nuclear radiation; the collection of large databases; and the role of international organizations such as the World Health Organization in shaping research agendas and carving out a space for human heredity in the postwar era. During this research visit, Soraya de Chadarevian collaborated with Jenny Bangham to edit a special issue of *Studies in the History and Philosophy of Biological and Biomedical Sciences* (2014) entitled “Heredity and the Study of Human Populations after 1945.”



Soraya de
Chadarevian

Marianne Sommer (Visiting Scholar, Universität Luzern, Switzerland)

History Within: The Science, Culture, and Politics of Bones, Organisms, and Molecules

As part of Marianne Sommer’s long-term work on historical aspects of the human origin sciences—which inevitably includes issues of diversity—this book project deals with the history of knowledge of human evolution in the twentieth century (in the sense of *Wissensgeschichte*). From 2011 until 2013, the Lipphardt research group collaborated with Sommer’s research group (the projects “History Within” and “Collecting Humanity,” funded by the Swiss National Science Foundation) in several in-house workshops, and co-organized the international conference “Visibility Matters:



Marianne Sommer

Rendering Human Origins and Variation in Space and Time” at the Universität Luzern (2013). While in Berlin, Sommer spent time with Veronika Lipphardt putting together the special issue resulting from this workshop, for the journal *History of the Human Sciences*.

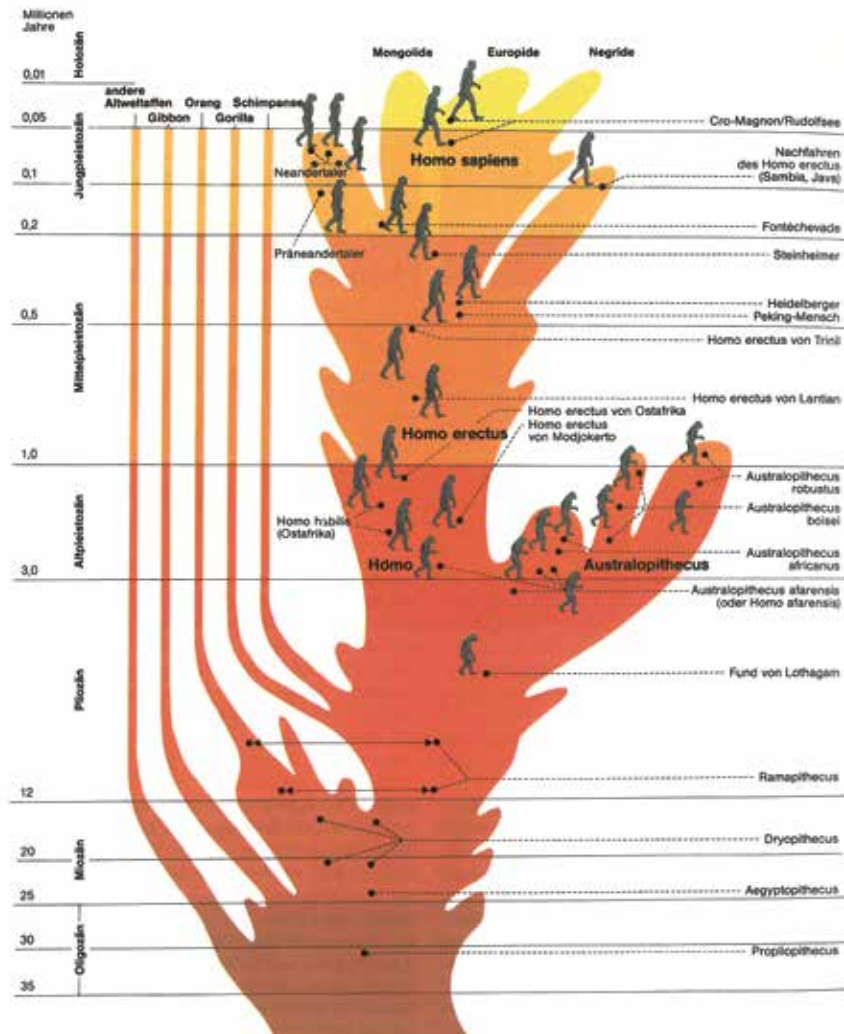


Figure showing a family tree of primates, with *Homo sapiens* extending beyond the apes and radiating into three races.
 © J. B. Metzler'sche Verlagsbuchhandlung und Carl Ernst Poeschel Verlag GmbH, Stuttgart. Reproduced with the permission of the Head of Rights and Licenses (2015).
 Source: J. B. Metzler, *Linder Biologie: Lehrbuch für die Oberstufe* (Stuttgart: J. B. Metzlersche Verlagsbuchhandlung, 19th ed., 1983), p. 428.

Lara Keuck (Research Scholar, MPIWG)

Epistemologies of Heritable-Disease Classifications in the Mid-Twentieth Century

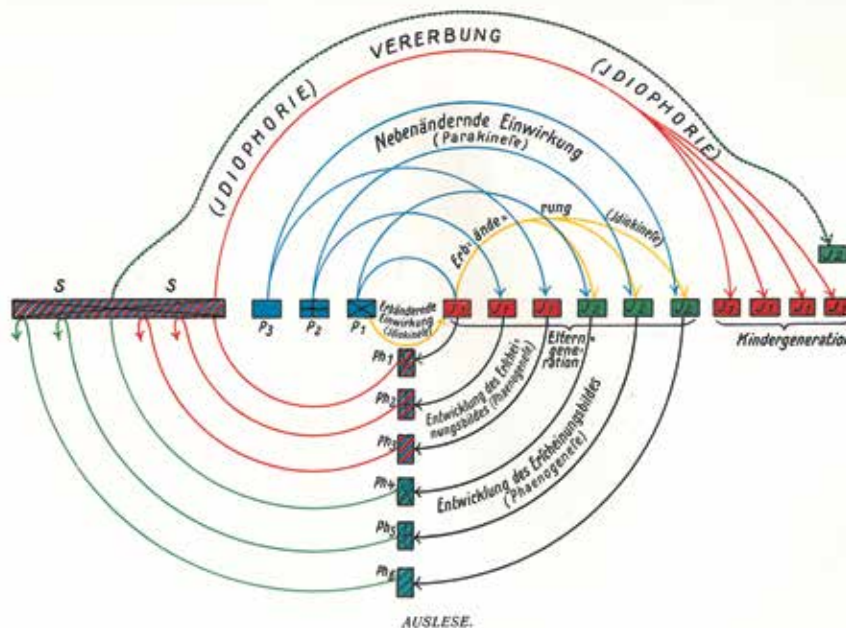
This project considers how genetic researchers reconfigured disease categories. It examines human genetic research in the 1980s, when familial forms of, for instance, Huntington’s and Alzheimer’s disease were linked to molecular genetic markers. Lara Keuck—who is also a member of Sabine Arnaud’s research group—traces how the researchers’ field and experimental work relied on a particular understanding of human variation as object and tool in the study of medically relevant, molecular genetic differences.

In collaboration with Jenny Bangham, Lara Keuck is studying an important landmark in the genealogy of this understanding of human variation in the 1950s, when human genetics was being consolidated as a scientific field and heredity was decisively shaping disease categories. Together they are analyzing practices of presenting and negotiating potentially medically relevant variation between individuals or populations as deployed by researchers studying human genetics in Britain. The collaborative project focuses on the postwar work of leading human geneticist Lionel Penrose, head of the Galton Laboratory at University College London, editor of the journal *Annals of Human Genetics*, and former head of research at the Eastern Counties Mental Institution. The project makes use of his archived papers, and in particular his major work *The Biology of Mental Defect* (1949).

Central to this project is the relationship between the construction of “cases,” “populations,” and “diseases,” and the practices through which doctors and researchers moved from one to the other. The project is also a study of the dynamics of authority between diagnostic medical work and the production of generalized knowledge about heredity in the mid-twentieth century.



Lara Keuck



Schematic depicting the process of evolution within two generations. The lines represent processes of inheritance: hereditary information is transferred from one generation to the next and, on the way, is altered through mutation and selection. The “children generation” (*Kindergeneration*) is depicted as having less hereditary variation than the “parental generation” (*Elterngeneration*), due to selection. Source: Walter Scheidt, *Allgemeine Rassenkunde. Als Einführung in das Studium der Menschenrassen* (Munich: J. F. Lehmanns, 1925), Table XII.



Yuriditzi
Pascacio-Montijo

Yuriditzi Pascacio-Montijo (Postdoctoral Fellow, MPIWG)

The Biological Categorization of El Indígena Mexicano During the First Half of the Twentieth Century

The Mexican Revolution (1910) opened up a space for reflection on the status of the Mexican Indians, and transformed them into figures that would justify the political agendas and reshape the model people of the new nation. This shift repositioned the Indian from the sick criminal—in terms of nineteenth-century Porfirian medicolegal anthropology—to the civilized Indígena of postrevolutionary anthropology. This project focuses on the book *La Población del Valle de Teotihuacán (Teotihuacan Valley Population)*, presenting the pragmatic research project developed by prominent anthropologist Manuel Gamio, published in 1922. Gamio argued that Indigenous people were not primitive or inferior to other human races, and he encouraged racial mixing or *mestizaje*. From his holistic anthropological perspective, Gamio was particularly interested in the psychological qualities present in the people within specific rural localities. In his book he outlined the conditions of a possible Indian subjectivity as one of the main hallmarks of his approach.

Pascacio-Montijo shows that Gamio's self-styled "integral anthropology" does not fit within the dominant narrative of the history of anthropology in the early twentieth century. Moreover, she argues that rather than being exceptional, as existing histories claim, Gamio's ideas about *mestizaje*, or racial mixing, were rather common. Likewise, within the context of Gamio's eugenics and the management of undesirable people, this project considers how the Indigenous was classified as a broader category, namely, the "peasant," which locates the research within transnational and trans-colonial networks.



Jenny Reardon

Jenny Reardon (Visiting Scholar, University of California, Santa Cruz, USA; Science and Justice Research Centre)

The Postgenomic Condition: Ethics, Justice, Knowledge after the Genome

During the late 1980s, genomics emerged as the shining star of the life sciences. With promises to unlock the "code of life," it became a powerful emblem of broader cultural, political, and economic investments in the biological study of life. With the Human Genome Project (HGP) in full swing, the field retained the spotlight into the new millennium. However, soon after completion of the HGP in 2003, genomics came under pressure to prove its practical relevance. In the time following the Human Genome Project—the postgenomic era—many began to ask: Now that we have the sequence of the human genome, what is its value? While assembling the three billion nucleotides of the human genome into machine-readable form was a tremendous scientific and technical feat, it left unanswered the fundamental question: What does the sequence mean? In the decade following the Human Genome Project, this turn to the question of meaning—the question of the uses, significance, and values of the human genome sequence—marks what Reardon calls the postgenomic condition. Her book provides an account of this decade on the basis of in-depth and sustained fieldwork at many of the main sites where leaders in genomics sought to transform the field from cause célèbre to a valuable part of human lives. In so doing, it offers a window not only on efforts to constitute value in human genomics, but on broader

struggles to reconstitute value—and the trust and authority needed to sustain it—in the wake of widespread distrust of dominant institutions and the worldwide financial crisis.

Rohan Deb Roy (Postdoctoral Fellow, MPIWG; Berlin Center for the History of Knowledge)

Imperial Insects: Entomology and Empire in British India

Rohan Deb Roy's book project *Imperial Insects* combines insights from histories of British Empire and world history, histories of science and medicine, and animal studies. Examining the history of the emergence and persistence of the discipline of medical entomology in South Asia and the wider colonial world in the nineteenth and early twentieth centuries, it reveals the extent to which nineteenth-century imperialisms reshaped the category of "insects," and how the figure of insects in turn informed the contours of colonial history. More broadly, the project argues that the categories human and nonhuman were reconstituted by the constant traffic of ideas and interests between the interconnected imperial worlds of laboratory medicine, colonial governance, natural history, commerce, and vernacular print.

Rohan Deb Roy organized a reading group on global history in the summer of 2014, and has co-organized two conferences: "Unusual Lives: Historicizing Life as a Problem of Knowledge" in Berlin in November 2014, and "Bodies, Objects, and Knowledge from the Age of Empires: Global Histories and Beyond" in New Delhi in December 2014. He is finishing a book manuscript tentatively entitled "Malarial Subjects: Medicine, Nonhumans and Empire in British India, 1820–1909." Other publications include a special issue edited and introduced by him on the theme "Nonhuman Empires" in *Comparative Studies of South Asia, Africa and the Middle East*, and a book chapter in the edited volume *Oxford World History of Empires*. He is also co-editing the collection of essays *Locating the Medical: Essays in South Asia*, which has been submitted to Oxford University Press. He is the book reviews editor of the journal *South Asian History and Culture*.



Rohan Deb Roy

Yulia Egorova (Visiting Scholar, University of Durham, UK)

Population Genetics and the History of Human Migrations

Yulia Egorova's project focused on case studies of population genetic research aimed at reconstructing the history of Jewish communities and of the formation of the caste system, and considered the broader conceptual implications of the ways in which genetics and genomics have been used in historical research. More specifically, drawing on two ethnographic examples derived from Egorova's fieldwork in India, the project explored in what ways tests aimed at assessing "genetic differences" between populations can be viewed as either enabling or disempowering for individuals, communities, or nations subjected to such tests. The first case study discussed a response to DNA research demonstrated by the leaders of the Jewish Bene Ephraim community of Andhra Pradesh, a Dalit group that in the late 1980s declared its descent from the Lost Tribes of Israel. The second focused on the Indian Genome Variation Consortium, a research network established in India in 2003 with the aim of mapping the



Yulia Egorova

country’s human genetic diversity. Building upon Barbara Prainsack and Victor Toom’s theoretical concept of situated dis/empowerment, Egorova suggests that in both case studies empowering and disempowering elements of DNA testing appeared to co-constitute and co-produce each other, as they both reinforced reductionist accounts of human sociality and served as rhetorical tools for social and political liberation.

At the MPIWG, Yulia Egorova completed a paper entitled “The Substance That Empowers? DNA in South Asia,” which was published in *Contemporary South Asia* in August 2013, and the article “New Genetics and Race,” which will appear in the *International Encyclopedia of the Social and Behavioral Sciences* in 2015.



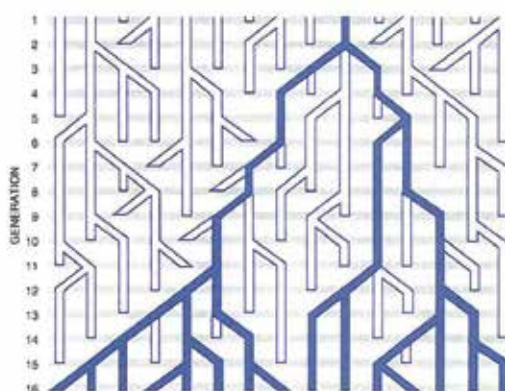
Adam Hochman

Adam Hochman (Predoctoral Fellow, University of Sydney, Australia)

Beyond Biological Naturalism and Social Constructionism about Race: An Interactive Constructionist Approach to Racialisation

The debate between biological naturalists, social constructionists, and antirealists about race takes place against a backdrop of broad agreement about the scientific findings on human biological diversity. For the most part, the debate is not about the facts of human diversity, but about how to interpret those facts. Recent racial interpretations of human biological diversity rely on definitions of race that are too weak to revive race as a legitimate category of biological classification. Social constructionists offer an alternative kind of racial realism, based on a social definition of “race.” In this project, Adam Hochman argues that these contending definitions lead to a distorted history of the concept, and limit the ways in which our racial categories might actually be constructed. Yet human biological diversity (which is not properly described as “racial”) and social factors do play important roles in the construction of racial categories. We should replace racial ontology, this project suggests, with the process ontology of racialization. Hochman argues that racialization is the product of the ongoing interaction between a number of factors: social, cultural, historical, biological, lingual, religious, geographic, psychological, political, and so on. Hochman calls this view “interactive constructionism”: the products of this process, he argues, are racialized groups, not races. Races are not real, whereas racialized groups are. Hochman suggests that we should be antirealists about race, and interactive constructionists about racialized groups.

Schematic demonstrating how a “Universal Maternal Ancestor” can be found for all members of any population. The example traces the lineages of fifteen females in a stable population. In each generation, some maternal lineages proliferate and others become extinct, and eventually, by chance, one maternal lineage replaces all the others. © Laurie Grace. Reproduced with the permission of Laurie Grace (2015). Source: A. C. Wilson and R. Cann, “The Recent African Genesis of Humans,” *Scientific American*, April 1992: 22–27, 25.



Alexandra Widmer (Research Scholar, MPIWG)

Scandalous Subjects: Island Lives and Demographic Anxieties from Race to Development in Melanesia

This project examines how scientific experts produced and used knowledge of human variation in research on the growth and decline of human populations. In the first three decades of the twentieth century, researchers described changes in human population size in debates about racial and cultural adaptations in evolution. Postwar demographers, tasked with improving societies through economic development, revived “demographic transition theory” and saw suboptimal population size as the result of problematic traditions. This project expands the historiography of human variation to include demographic practices. By analyzing population debates and colonial administration in culturally diverse Melanesia, this project also highlights the centrality of colonial and postcolonial conditions entangled in the scientific study of diverse human populations.

One focus of this project has been to track both research on the human sex-ratio from the early twentieth century to the postwar era and the colonial administration of reproduction in the New Hebrides. Sex-ratio debates are relevant to the historiography of race in science for what they reveal about the spectrum of factors that scientists took into account in order to understand human difference. The differential survival rate of the sexes at different points in an individual life cycle was attributed to heritable, cultural, or social factors leading to population growth or decline. Unlike characteristics such as skin color, hair texture, or eye color, which could be reduced to heritable or apparently racial traits, sex ratios were methodologically related to both cultural and biological aspects that marked populations as distinct. This epistemic nexus underpinned colonial interventions to reform kinship at a population level in the New Hebrides by means of their policy to reduce the “bride price” to combat the low fertility causing depopulation. In overlapping administrative and epistemic registers, concerns about reproduction and sex ratios reveal the historical relationship between sexual selection, sex, and race as well as kinship and race. The work from this project was published, among other places, in the journal *Science, Technology, and Human Values*. Alexandra Widmer also co-organized a workshop with Veronika Lipphardt in 2012. The results will be published in a co-edited volume tentatively entitled “Health and Difference: Rendering Human Variation in Colonial Engagements” (Berghahn Books), as part of the series *Studies of the Biosocial Society*.



Alexandra Widmer

Ricardo Santos (Visiting Scholar, Oswaldo Cruz Foundation, and Department of Anthropology, National Museum, Rio de Janeiro, Brazil)

“Why did they die?”: A Historical and Anthropological Contextualization of the Debates on the Causes of High Mortality in Amazonian Indigenous Populations from the 1950s to 1980s

Francis Black was a leading virologist and immunologist on the faculty at Yale University from the 1950s to the early 2000s. One of the main scientists involved in World Health Organization measles vaccine trials in the 1950s and 1960s, which took place in different parts of the world, Black also carried out highly influential immunologic and genetic research among indigenous populations in the Amazon region from the



Ricardo Santos

1960s to the 1990s. One topic that Black addressed was the role that genetic-evolutionary processes played in the high mortality rates of indigenous peoples after their contact with Western societies. The project aims to contextualize Black's research in Brazil and ascertain how it relates to global research on the biological diversity of indigenous populations in the second half of the twentieth century. Black's research was conducted during a period when Brazil and other South American countries were under military dictatorships; this project explores the political implications of Black's work as it relates to human rights in South America. In 2013, Santos spent five months working at the MPIWG on this research project, sponsored by the Coordination for the Improvement of Higher Education Personnel (CAPES) of the Brazilian Ministry of Education and by the Brazilian National Council for Scientific and Technological Development (CNPq). Work during this visit contributed to publications in the journals *American Anthropologist*, *Biosocieties*, and *Social Studies of Science*.



Jon Røyne
Kyllingstad

Jon Røyne Kyllingstad (Visiting Scholar, Norwegian Museum of Science and Technology)

Racial Typology and Genetic Research, and Constructions of Biological Difference between Sami and Non-Sami Scandinavians (1945–2012)

This project examines how biological differences between Sami and non-Sami Scandinavians were constructed within physical-anthropological and genetic research from the interwar years until recently. It explores how shifting scientific conceptualizations of ethnic groups have been influenced by—and have shaped—cultural and political discourses on ethnicity. It also explores the degree of continuity or discontinuity between the racial typologies of “old” physical anthropology and the conceptualizations of human biological difference in present-day research on human genetic variation. It is part of the overall project “From Racial Typology to DNA Sequencing: ‘Race’ and ‘Ethnicity’ and the Science of Human Genetic Variation 1945–2012,” led by Kyllingstad and funded by the Norwegian Research Council. During his three-month stay at the Institute, Kyllingstad organized a one-day workshop about this project along with philosopher Hallvard Fossheim and geneticist Erika Hagelberg. Kyllingstad also carried out research on the physical-anthropological and population genetic research on the Swedish Sami undertaken by the Swedish State Institute of Race Biology in the 1930s, 1940s, and 1950s. Preliminary results of this research were presented at the annual conference of the British Society for the History of Science (July 3–6, 2014), with a paper entitled “Scandinavia and the International Scientific Controversies on Race 1930–1960.”



Mihai Surdu

Mihai Surdu (Postdoctoral Fellow, University of Bucharest, Romania)

Bound by the Genes: The So-Called Roma (Gypsies) Isolate and Its “Indian Connection” at the Narrative Crossroads of Genetics and Social Sciences

The first population genetic study on Roma appeared as early as 1921, only two years after the publication of the very first sero-anthropological study connecting the distribution of blood groups with racial variation. Since then, genetic literature about Roma has increased to around two hundred studies (considerably reinvigorated after

1990), inscribing Roma as an epistemic object in the extant literature on human variation. The project shows that up to this day, both human population genetics and medical genetics are concerned with the Indian connection of Roma, their supposed endogamy and single ancestry from a distant past, and their subsequent migrations. The circulation of bio-historical narratives, classificatory practices, and sampling strategies connected (and still connects) various domains, such as social sciences, genetics, policy-making, and Romani movement activism, all of which are invested in the shaping and stabilizing of Roma “groupness.”

The study maps the interdisciplinary dynamics driving this knowledge co-production. It also provides an assessment of ethical and social implications resulting from the categorization of Roma as a homogenous group. Surdu focuses on how making up samples and selecting genetic markers enacted technologies of difference and reinforced division lines between Roma and non-Roma. The study analyzes assumptions and narratives about Roma imported from the social sciences, and assesses strategies employed in genetic sampling. It demonstrates how scientific inquiries and political activism, both targeting Roma in Europe, have recently led to a significant reification of Roma ethnicity.

Geertje Mak (Visiting Scholar, Radboud Universiteit Nijmegen, The Netherlands)

Different Forms: Anthropometry in Three Different Dutch Practices Around 1900

The starting point for this project was entries on three different administrative forms used for the notation of anthropometric measurements: the first from a Dutch exploratory expedition in Dutch New Guinea in 1909, the second from the instructions for prison guards for measuring their inmates (from 1896 until the 1950s), and the third from the archives of a state reformatory for girls, where the girls underwent extensive medical examination and measurement during the initial observation period (between 1906 and 1950). These filled-in forms were analyzed as an infrastructure pivotal in the anthropometric project of linking (authentic, personal, and categorical) identities to bodily features. Mak used comparison as well as moments of design, discussion, and problems in order to be able to *notice* this infrastructure or “paper technology” at all.

For one, forms organized, disciplined, and standardized measurements in the field. However, in practice a tension can be identified between the (scientific) urge to find “new” data or “better” ways to measure variation, and the discipline necessary to create “communitarian objectivity.” Moreover, *between* disciplines standardization was completely lacking. Second, at the time, loose forms were innovative in how they related actual measurements to data-filing systems. These different forms of filing could be linked to forms of identity: as “a pile” for statistic elaboration, as part of a personal dossier (linking bodily features to character and biography), and in a systematic distribution system allowing for authentication of individual identity. The research was conducted in collaboration with predoctoral research fellow Saskia Bultman (Radboud Universiteit Nijmegen, The Netherlands). An article based on their work has been submitted to the journal *Isis*.



Geertje Mak

Workshops

Visibility Matters: Rendering Human Origins and Variation in Space and Time

April 25–27, 2013, Universität Luzern, Switzerland

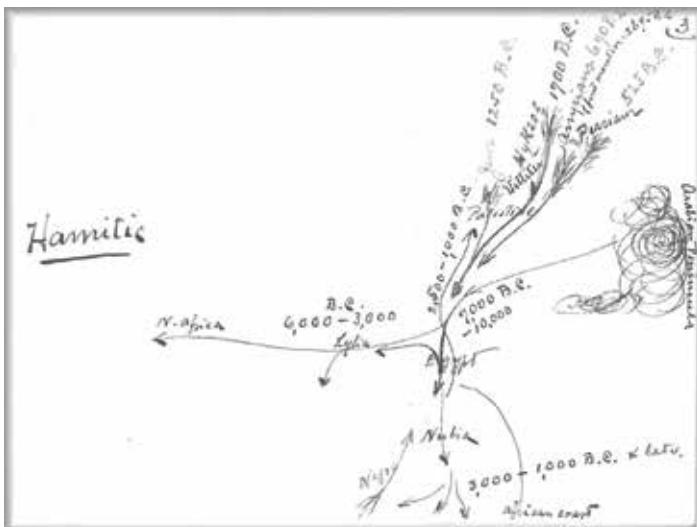
ORGANIZERS *Veronika Lipphardt* (MPIWG), *Marianne Sommer* (Universität Luzern, Switzerland), *Staffan Müller-Wille* (University of Exeter, UK), *Susanne Bauer* (Goethe University Frankfurt am Main, Germany)

Visual displays of contemporary human diversity and reconstructions of prehistoric humans are not mere illustrations of what is already textually explained. They constitute arguments in and of themselves, shaping debates in particular ways. Photographs, anthropological exhibitions, phylogenetic trees, and dioramas can serve as sites for these strategies of persuasion by images. At the same time, a different kind of imagery of human variation and human origins has largely escaped scholarly attention: diagrammatic representations that integrate textual and pictorial elements. These convey messages about how and when diversity emerged, and thus implicitly or explicitly make statements about who “we” and “they” are. Diagrams such as certain phylogenetic trees, distribution and migration maps, statistical tables, and graphs were integral to fields such as anthropometry, ethnology, and eugenics, because they generated synoptic presentations of singular observations and measurements, which often brought about surprising effects. These visualizations circulate in various scientific fields; medical, demographic, and biological disciplines; and in wider public arenas and popular media.

As this workshop showed, the serial and spatial arrangement of those diagrams may render particular temporal or social relations visible, whereas others recede into the background. Strategies of diagrammatic representation typically employ a series of textual, symbolic, and pictorial elements. Such strategies may include specific forms of subjectification; the serialization, spatialization, and temporalization of data; the storage of standardized data-sets; and staging techniques of protagonists, events, and

processes. The contributions to this workshop uncovered the social and epistemic dimensions of diagrammatic representations, and point to the importance of analyzing processes of production and circulation. A selection of papers will be published as a special issue of the journal *History of the Human Sciences*.

Draft map of human migrations by Ales Hrdlička, entitled “Hamitic” (no date). © National Anthropological Archives, Smithsonian. Reproduced with the permission of Anthropological Archives (2015). Source: Ales Hrdlička Papers (Box 138, “Whites”) National Anthropological Archives, Smithsonian Institution.



Participants

- *Mari-Tere Alvarez* (University of Southern California, USA)
- *Jenny Bangham* (Cambridge University, UK / MPIWG)
- *Crispin Barker* (Universität Luzern; University of California, Berkeley, USA)
- *Susanne Bauer* (Goethe University Frankfurt am Main, Germany)
- *Pierre-Louis Blanchard* (Universität Luzern, Switzerland)
- *Maddalena Cataldi* (EHESS, Paris, France)
- *Kathrin Friedrich* (Academy of Media Arts, Cologne, Germany)
- *Elaine Gan* (University of California, Santa Cruz, USA)
- *Ben Garcia* (University of California, Berkeley, USA)
- *Valentin Groebner* (Universität Luzern, Switzerland)
- *Ana Gross* (University of Warwick, UK)
- *Michael Hagner* (ETH Zürich, Switzerland)
- *Dehlia Hannah* (Columbia University, New York, USA)
- *Liv Hausken* (University of Oslo, Norway)
- *Oliver Hochadel* (University of Barcelona; Universität Luzern, Switzerland)
- *Veronika Lipphardt* (MPIWG)
- *Chris Manias* (University of Manchester, UK)
- *Staffan Müller-Wille* (University of Exeter, UK)
- *Marianne Sommer* (Universität Luzern, Switzerland)
- *Amir Teicher* (Tel Aviv University, Israel)
- *Diliria Valeeva* (Higher School of Economics, Moscow, Russia)

Growth Without Alternatives? Narratives of Growth in History Cultures, Knowledge Cultures, and Economic Thought

November 6–7, 2014, MPIWG

ORGANIZERS *Martin Lücke* (Freie Universität Berlin, Germany), *Veronika Lipphardt*, (MPIWG) *Birger Priddat* (Universität Witten/Herdecke, Germany)

This workshop is the first fruit of a rich and beneficial collaboration between Freie Universität Berlin scholars and Lipphardt's research group. Taking the cooperation between the Freie Universität Berlin and the MPIWG as an inspiring framework for collaborative work, Veronika Lipphardt and Martin Lücke developed this project at the intersection between theory of history and history of knowledge. A proposal for funding for a three-year research group is pending.

From surveying current debates on how to address global economic crises, growth alone appears to be capable of solving societal and economic problems. The dictum "prosperity through growth" dominates the rhetoric and actions of political decision-makers. The belief that there is no alternative to economic growth appears to be deeply rooted in Western societies; and of course in economics, growth is a fundamental axiom. Although more critical voices are becoming audible, they do not yet pose a fundamental challenge to the broader consensus on growth. This project examines how the desire to achieve continuous growth became such a powerful meta-narrative. Under what conditions was this guiding principle established as being self-evident

and irrefutable? How is this knowledge embedded in our contemporary historiographic culture, as well as in other discursive realms? And how does it thereby influence our expectations about the future? The organizers proceed from the assumptions that growth, by virtue of its inherently temporal dimension, must be narrated; that the individual and collective meanings attributed to growth are based on implicit or explicit understandings of history; and that stories about growth are an integral part of every historiographic culture. In other words, the magic formula of steady growth derives its power from the fact that it is embedded in our historical experiences of time as a socially relevant factor.

This workshop examined narratives of growth in the second half of the twentieth century in discursive fields as diverse as economics, international organizations, biomedicine, literature, history cultures, ecology, museums, and marketing. It made visible the heterogeneity of growth narratives and, from that standpoint, questioned the rather one-dimensional understanding of growth in current politics. Participants also eagerly discussed the question of whether a change in narrative traditions with respect to growth could be encouraged, how, and to what effect.

Participants

- *Clemens Albrecht* (Universität Koblenz-Landau, Germany)
- *Wolf Dieter Enkelmann* (Institut für Wirtschaftsgestaltung, Munich, Germany)
- *Axel Hüntelmann* (Universität Mainz, Germany); *Christine Künzel* (Universität Hamburg, Germany)
- *Oliver Kuttner* (Leibniz Universität Hannover, Germany)
- *Veronika Lipphardt* (MPIWG)
- *Martin Lücke* (Freie Universität Berlin, Germany)
- *Birger Priddat* (Universität Witten/Herdecke, Germany)
- *Matthias Schmelzer* (Universität Genf, Switzerland)
- *Rolf Peter Sieferle* (Universität St. Gallen, Switzerland)
- *Ute Tellmann* (Universität Hamburg, Germany)
- *Harald Welzer* (Kulturwissenschaftliches Institut Essen, Germany)

Contemporary Genetics and Uses of Historical Narrative

April 5, 2013, MPIWG

This informal one-day workshop organized by Jenny Bangham discussed the ways in which present-day geneticists produce and use historical narratives in their work, and specifically the question of how historians of science might productively engage with geneticists on these issues.

Participants

- *Jörg Feuchter* (University of Durham, UK)
- *Yulia Egorova* (University of Durham, UK)
- *Veronika Lipphardt* (University of Durham, UK)
- *Ernesto Schwartz Marín* (University of Durham, UK)
- *Soraya de Chadarevian* (University of California, Los Angeles, USA).

From Racial Typology to DNA Sequencing: “Race” and “Ethnicity” and the Science of Human Genetic Diversity, 1945–2012

January 28, 2014, MPIWG

This one-day workshop was co-organized by our guest fellow Jon Røyne Kyllingstad (Norwegian Museum of Science and Technology) and Veronika Lipphardt. The workshop outlined and discussed a new research project funded by the Norwegian Research Council, directed by Kyllingstad, Hallvard Fossheim, and Erika Hagelberg. For more information, see Kyllingstad’s section in this report. Talks were given by Kyllingstad, Fossheim, and Hagelberg.

Colloquium Series

- **Chromosome Surveys of Human Populations: Between Epidemiology and Anthropology**, April 18, 2013, *Soraya de Chadarevian* (University of California, Los Angeles),
- **Epidemic Risks: Places, Religions, and Races in the Construction of International Public Health**, May 23, 2013, *João Rangel de Almeida* (Postdoctoral Fellow)
- **Gamio’s Indigenismo and the Discovery of the Indian Mind: The Biological Categorization of el indígena Mexicano in the First Half of the Twentieth Century**, June 6, 2013, *Yuriditzi Pascacio-Montijo* (Postdoctoral Fellow)
- **The Toad Kisser and the Bear’s Lair: The Cold Case of Paul Kammerer’s Midwife Toad Revisited**, June 20, 2013, *Klaus Taschwer* (Journalist-in-Residence, Der Standard)
- **From Colonial to International Nutritional Standards: The Episteme of Human Variation and the Biopolitics of Difference (1932–1951)**, August 28, 2013, *Maria Letitia Galluzzi Bizzo* (Federal University of Rio de Janeiro)
- **What Is ‘Indigenous Health’ in Venezuela? An Anthropological (Mis)understanding**, August 29, 2013, *Johanna Gonçalves Martín* (University of Cambridge)
- **Pharmacogenomics, Color/Race and Human Population Genetic Diversity: A View from Brazil** (co-authored by Glauca Oliveira da Silva, Universidade Federal Fluminense, Rio de Janeiro), August 30, 2013, *Ricardo Ventura Santos* (Oswaldo Cruz Foundation and National Museum, Rio de Janeiro)
- **‘First Encounters’: Anthropological Field Work in ‘Mixed Race’ Aboriginal Communities in Australia, 1940–1965**, November 26, 2013, *Kathryn Ticehurst* (University of Sydney)
- **Making Human Difference Genetic in the 1950s**, November 28, 2013: *Jenny Bangham* (MPIWG)
- **Indigenous Biospecimens and the Cryopolitics of Frozen Life**, April 8, 2014, *Emma Kowal* (University of Melbourne),

- **The Greenberg Controversy: Studying Language and Prehistory in the Americas**, April 23, 2014, *Judith Kaplan* (MPIWG)
- **Doomed to Die: Endangered Races, Science, and Modern Settler Colonialism**, April 24, 2014, *Sadiya Qureshi* (University of Birmingham, UK)
- **Regulating Susceptibilities: Helen MacMurchy and the Canadian Public Health Movement in the Interwar Years**, June 24, 2014, *Sarah Blacker* (Predoctoral Fellow)
- **‘Dance As the Measure of Man’: Alan Lomax, Choreometrics, and the World Geography of Movement**, June 5, 2014, *Whitney Laemmli* (MPIWG; University of Pennsylvania)
- **‘Fossil Man’ Conquers America: The American Museum of Natural History and the Rise of a Mass Culture of Deep Time**, June 6, 2014, *Marianne Sommer* (Universität Luzern)
- **Nonhuman Empires**, September 3, 2014, *Rohan Deb Roy* (MPIWG)
- **From Anatomical Collection to National Museum, ca. 1895: Or How Women’s Pelvises and Skulls Began to Speak the Language of Mexican National History**, November 4, 2014, *Laura Cházaro* (Professor, Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional, Mexico)
- **Medical Demography in Interwar Angola: Measuring and Negotiating Health, Reproduction and Difference**, November 5, 2014, *Samuël Coghe* (MPIWG)

Group Members

Short-Term Pre- and Postdoctoral Fellows

- *Saskia Bultman* (Radboud University, Nijmegen, The Netherlands): Fabricating Delinquent Girls: Knowledge Techniques in the Dutch State Reformatory for Girls, 1858–1975
- *Björn Felder* (Georg-August-Universität Göttingen, Germany): Soviet Racial Science: A Scientific Sonderweg? Professionalization and Europeanization of Anthropology in Russia between 1900 and 1930
- *Jörg Feuchter* (Humboldt-Universität zu Berlin, Germany): Genetic History: A Challenge to Medieval Studies
- *Johanna Gonçalves Martín* (University of Cambridge, UK): Paths of Health: Gender and Reproductive Medicine Articulations Amongst Yanomami People and Doctors in Venezuela
- *Anne Katrine Kleberg Hansen* (University of Copenhagen, Denmark): Fatness and Human Variation
- *Giuditta Parolini* (University of Bologna, Italy): Statistics and Computing in Agriculture and Biology in Britain, 1920s–1960s
- *João Rangel de Almeida* (University of Edinburgh, UK): Empires of Health and the Epidemic Governance of the Modern World

- *Peter Rohrbacher* (Universität Wien, Austria): The Change in the Concepts of Human Diversity in Africa in the Twentieth Century
- *Rohan Deb Roy* (Berlin Center for the History of Knowledge, Germany): Imperial Insects: British Empire, Knowledge Networks and the Making of Medical Entomology, 1790–1910
- *Bernhard Schär* (ETH Zürich, Switzerland): Tropical Love, Basel Naturalists, Dutch Imperialists and the “Discovery” of Celebes Around 1900
- *Kathryn Ticehurst* (University of Sydney, Australia): Hybridity and Aboriginal Identity: Changing Understandings of Aboriginality from the 1940s to the 1960s

Short-Term Visiting Scholars

- *Cristiana Bastos* (Universidade de Lisboa, Portugal): Early Twentieth-Century Developments of Socio-anthropological Knowledge about Migrant Communities in North America
- *Soraya de Chadarevian* (UCLA, USA): Heredity Under the Microscope: The Study of Human Chromosomes, 1950s to 1970s
- *Laura Cházaro García* (UNAM, Mexico): Circulation of Knowledge and Medical Instruments: Political Measures on Population and Races
- *Yulia Egorova* (Durham University, UK): DNA, Religion and History: Case Studies from South Asia and Genetic Research on Jewish Populations
- *Eran Elhaik* (University of Sheffield, UK): Bio-historical Narratives in Genetic Analysis of the Jewish People in the Genomic Era
- *Maria Leticia Galluzzi Bizzo* (Federal University of Rio de Janeiro, Brazil): From Colonial to International Nutritional Standards: The Episteme of Human Variation and the Biopolitics of Difference (1932–1951)
- *Erika Hagelberg* (University of Oslo, Norway): Human Molecular Genetics in Forensic Identification and Human Evolution, and Its Relation to Identity (1990–2012)
- *Maria E. Kronfeldner* (Universität Bielefeld, Germany): The Politics of Human Nature
- *Susanne Lettow* (Freie Universität Berlin, Germany): Genealogy and Belonging: Concepts of Reproduction, Gender and Race in German Philosophies of Nature 1775–1830
- *Petra Overath* (Germany): Spaces of Demographies: Census and Colonial Statistics in the British Empire (1930s to 1950s)
- *Helga Satzinger* (University College London, UK): Anti-racist Human Genetics After 1945—Another Case of “Science Is Politics by Other Means”?
- *Ernesto Schwartz Marín* (UK): The Ethno-racial and National Boundaries of Population Genetics in Mexico and Colombia: A Note on the Malleability of Categories in the Face of (Almost) Infinite Difference
- *Edna María Suárez Díaz* (UNAM, Mexico): Cultural Anthropology Meets Biological Markers: The Study of Mexican Indigenous Populations in the 1960s
- *Klaus Taschwer* (Der Standard, Austria): The Toad Kisser and the Bear’s Lair: The Cold Case of Paul Kammerer’s Midwife Toad Revisited

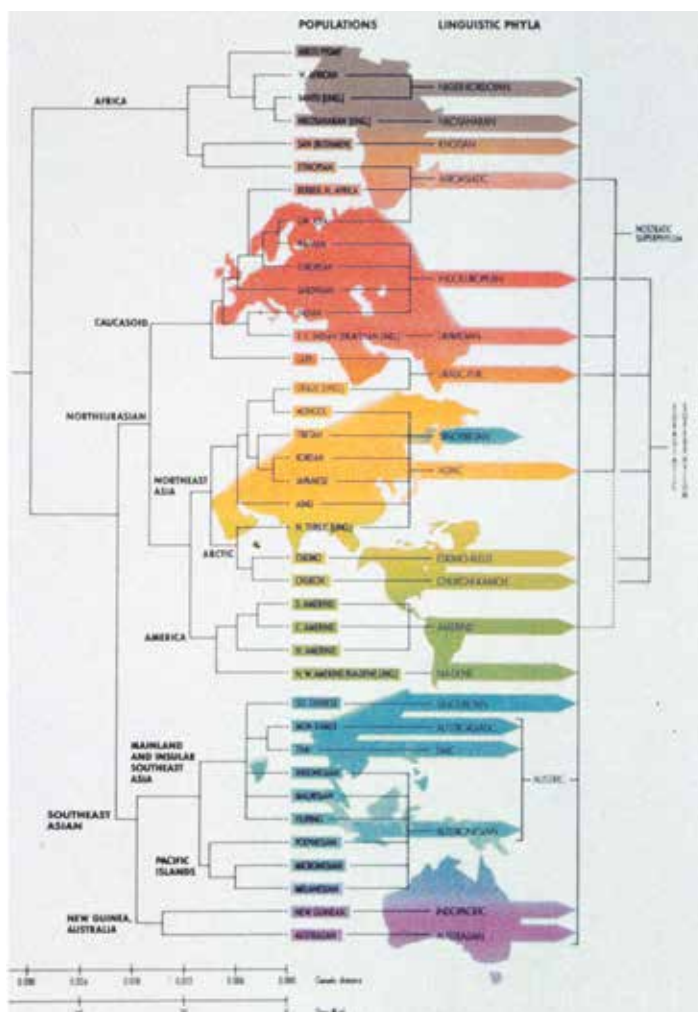
- *Ricardo Ventura Santos* (Escola Nacional de Saúde Pública, Fundação Oswaldo Cruz, Rio de Janeiro, Brazil): Cold War Science and Human Biological Diversity Studies on Indigenous Populations
- *Bettina Wählig* (Technische Universität Braunschweig, Germany): Precarious Identities: Poison and Poisoning in Science and Film
- *Daniel J. Walther* (Wartburg College, USA): Sex, Gender, and German Colonialism: Physicians' Perceptions of Indigenous Women and Colonial Policies
- *Martin Winterhalder* (Ruhr-Universität-Bochum, Germany): Brain Research and the Possibility of an Autonomous Subject in the Early Twentieth Century

Artists-in-Residence

Melanie Mohren and *Bernhard Herboldt* (Stuttgart, Germany): Research on “Der Apparat” and “Die Institution”

Katrin von Lehmann (Berlin, Germany): Human Diversity

Schematic entitled “Populations and Linguistic Phyla” visually depicting the correlation between a genetic tree and language families and superfamilies.
 © Princeton University Press. Reproduced with the permission of the Copyright Clearance Centre (2015). Source: L. L. Cavalli-Sforza, P. Menozzi, and A. Piazza, *The History and Geography of Human Genes* (Princeton, NJ: Princeton University Press, 1994), p. 552.



View of rooms dedicated to the 'fighting of disease' in the modern period. (Dresden: Internationale Hygiene Ausstellung, 1911). Courtesy of the Wellcome Library, London



Der Doppelraum: „Krankheitsbekämpfung“ in der „Neuzeit“.

Schrank mit alten Desinfektionsapparaten, Holzstoß, Arzt in Pestschutzkleidung.
Links Bett aus dem alten Hotel Dieu Paris (ca. 1760) für 2–4 Kranke.

Max Planck Research Group

The Construction of Norms in 17th- to 19th-Century Europe and the United States

RESEARCH GROUP LEADER *Sabine Arnaud* (2010–2016)
extended until October 2016

Introduction

This research group examines the construction of norms regarding the human, and focuses on the making of medical knowledge in Europe and the United States between 1700 and the First World War. The novelty of the approach is to examine medical categories and norms about normalcy and the abnormal within a broader field of the history of knowledge. We look at medical knowledge as a field of forces that goes far beyond curing pathologies, enhancing capacities, or lengthening life. We seek to demonstrate how medical knowledge has shaped our understanding of the human condition and—in interplay with other fields of knowledge—has strategically developed norms about the human with respect to human interaction with society and humanity as a species.

Our methodology has two main features. The first is the role of language in the invention, enunciation, and diffusion of knowledge. We contend that language is not merely a transparent expression of scientific questions and answers but the very means of articulating thoughts, and thus an active force in the making of knowledge through particular functions: distinguishing, naming, classifying, defining, comparing, narrating, judging, ascribing, stigmatizing, and so forth. These functions produce specific linguistic acts, notably medical case histories, diagnoses, prognoses, and nosologies.

The second consideration is the emergence of distinct fields of knowledge that contribute to the role and impact of medicalization, from lay knowledge, to the human and social sciences, to scientific expertise. Our claim is that medical knowledge proceeds as the differentiation of expertise into a series of disciplines; it results not merely from the development of one or several specialties but also from the ways in which these fields of knowledge (scientific or not) interrelate, stake claims, adopt results, or deny each other's validity. Whether acknowledged or not, these relationships between fields of knowledge shape and reshape the contours of medicine, its role, its possibilities, its goals, its aspirations, and its very definition. In the context of the research group, the types of knowledge involved are philosophy, literature, deaf activism, law, pedagogy, sociolinguistics, psychiatry, experimental psychology, pathological anatomy, and otology.

In pursuit of these methodologies, over the past two years the group has brought in scholars from Australia, Britain, Canada, France, Germany, India, Italy, South Africa, Switzerland, and the United States. The group is structured in five thematic clusters.

Cluster 1

Encounters between Medicine, Literature, Philosophy, and their Circulation in Public Debates



Sabine Arnaud

Sabine Arnaud (Research Group Leader)

Inventing the Abnormal in Nineteenth-Century France and Italy: The Deaf, an Exemplary Case

Sabine Arnaud's research investigates the ways in which deafness has been conceptualized as a problem across several disciplines in nineteenth-century France and Italy. Rather than the history of a concept's use, Arnaud seeks to create a map of a field, or more precisely a battlefield, with different stakes, voices, and conceptualizations of mankind leading different agents to take up stances on the issue. The large corpus on deafness has led Arnaud to take up three main inquiries in her work. The first is the role of language in conceptions of citizenship, through trial reporting and legal texts, and in conceptions of deaf people as a category of the human, through Jean-Baptiste Puybonnieux's associations of deafness with skin color in 1850s French colonialism. Second, Arnaud examines the emergence of contradictory relationships between pedagogical and medical approaches to deaf pupils. Third, she works on the development of therapeutic hygiene for the deaf and the evolution in perceptions of deaf people from "almost ordinary" beings, in early nineteenth-century terminology, to "abnormal" beings in the last decade of the nineteenth century. The claim to expertise involved a shift from teachers at the start of the nineteenth century, to psychiatrists over the course of the century, to educators, anthropometrists, criminologists, hygienists, and experimental psychologists in the century's last decade.

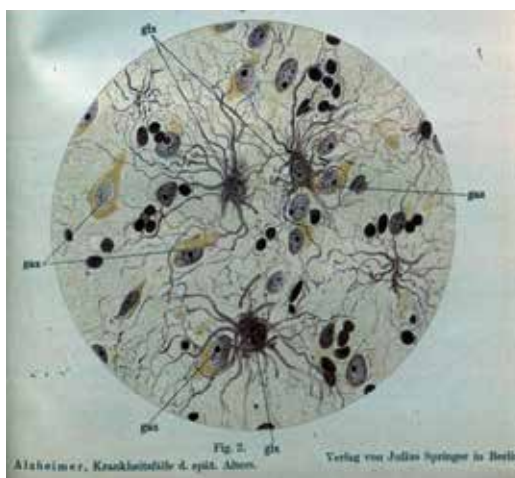
Lara Keuck (Research Scholar, MPIWG/Humboldt-Universität zu Berlin)

The Crafting of a Clinical Picture: Alzheimer’s Disease in Kraepelin’s Psychiatry

Lara Keuck studies the history of research on Alzheimer’s disease from an epistemological point of view. She looks at how characteristics and classifications of diseases have been theorized, transformed, and aligned with practices of diagnosing patients and identifying and modeling diseases. Her project “The Crafting of a Clinical Picture” focuses on the very establishment of the medical category of Alzheimer’s disease in German academic psychiatry in the early twentieth century, when norms about the normal and the abnormal were put to the fore in various medicine-affiliated sciences. The project examines the science of pathological anatomy as psychiatrist-neuropathologist Aloys Alzheimer practiced it, and as psychiatrist-nosologist Emil Kraepelin acknowledged it within his influential classification of mental disorders. It follows the writing practices from patient file to case report and textbook classification. It draws on a variety of largely unpublished medical documents from German clinics in which Alzheimer and Kraepelin practiced, in order to reconstruct how diagnosing and classifying worked in practice and how practical challenges and theoretical considerations of studying “diseased” minds and brains were negotiated. The project revisits the ways in which the involved researcher-doctors anticipated problems of drawing boundaries between the normal and the pathological or between different forms of pathologies and how they attributed these problems to the variability, vulnerability, or resistance of human beings, dead or alive.



Lara Keuck



Drawing from Aloys Alzheimer’s 1911 publication on diseases of old age, representing the microscopic image of gliacells (glz) and plaques (P) in Alzheimer’s disease; from *Zeitschrift für die gesamte Neurologie und Psychiatrie* 4: pp. 356–385.

Sean Dyde (Postdoctoral Fellow, MPIWG)

Hysteria, Spontaneous Generation, and Lizards

Sean Dyde’s research examines a curious medical case study from the early nineteenth-century German lands. After suffering abdominal pains for over a decade, a woman from Hesse claimed to have removed the source of her ailment: a three-inch-long lizard. Sean Dyde examines the various resources that contemporaries turned to in their attempts to explain this incident: Jacob Fidelis Ackermann’s physiology postulating the unity of Creation, physicians’ discussions about the nature of disease and hysteria, gynecologists on femininity, and folk-healers on the existence of a spirit animal whose distress causes disease. In so doing, his research aims to contribute to new ways of writing the history of disease, incorporating the insights of social constructionism into intellectual history: disease categories such as hysteria are regarded



Sean Dyde

A votive picture from 1769 depicting a female sufferer praying to St. Anne and the Virgin Mary for a cure. The frog on the left represents her ailment, which could be reproductive problems or infertility, internal pain, or, more literally, a frog within her body or an unset “spirit animal.”
 © Bayerisches Nationalmuseum München. Inv.-Nr. Kr V 244 Votivgemälde: Kniende Frau in Tracht vor hl. Anna und junger heiliger Maria.



more as handmade tools to be used and discarded rather than as eternal Platonic forms moving in constellation.

Thus, ideas such as hysteria have their own life and death; they judge and are judged. In other words, they have a normative value. Moreover, through examining such cases into the present, Dyde’s research also investigates notions of credibility, narrative forms, and rhetorical tropes and their role in distinguishing normal from abnormal, truth from rumor.



Debolina Dey

Debolina Dey (Predoctoral Fellow, University of Delhi)

Contagion in the Cultural Imagination of Victorian England

Debolina Dey’s dissertation examines the politics of the sanitary reform movement in England between 1830 and 1860, that is, in a time when the debate surrounding the etiology of conditions such as cholera was unsettled. She scrutinizes how “contagion” was transformed from a noun into the adjective “contagious,” thereby pathologizing certain groups of population, especially the poor, as being diseased. The thesis shows how norms of cleanliness were constructed through a conjunction of scientific and literary rhetoric, where the material and the metaphorical became equally important tools in the construction of sanitary knowledge and a legitimizing tool for various political and cultural claims in mid-Victorian England. Her dissertation examines how “scientificity” rather than “science” became a means of arguing for new legal reforms within the context of three legal acts: the New Poor Law, the Public Health Act, and the Contagious Diseases Acts.

During her residency at the MPIWG, Debolina Dey completed two chapters of her dissertation. One chapter examines how codes of hygiene were normalized and disseminated in England by middle-class women, especially among working-class laborers after the establishment of the Public Health Act. The other chapter traces different genres—mainly the novel and the committee report—that bore different implications of “contagion” through their particular expressive resources.

“Monster Soup Commonly Called Thames Water,” around 1828; copyright: The British Museum.



Anne Harrington (Visiting Scholar, Harvard University)

Mental Disorder and Biological Norms

Over the course of July 2014, Professor Anne Harrington worked with the Arnaud group on the project “Construction of Norms.” Her work focused on the ways in which the biological turn in late twentieth-century psychiatry was profoundly catalyzed by a rebellion against old cultural norms about normalcy and abnormalcy. Harrington argues that the biological revolution was a promissory revolution rather than a substantive one. People embraced a belief in the biological basis of mental illness not because of any revolutionary developments in brain science, genetics, or even pharmaceuticals, but because the old models seemed to be failing them. They fled to the brain because it seemed to exculpate families that had previously felt blamed for their children’s disorders. They fled to the brain because they hoped it would destigmatize mental illness by turning it into a matter of “chemistry” rather than “character.” They fled to the brain because the brain promised to reaffirm psychiatry’s rhetorical identity as a medical specialty.

During her time at the MPIWG, Professor Harrington completed an article connected to this larger theme, “Mother Love and Mental Illness: An Emotional History.” This article will appear in a themed issue of *Osiris*, on emotions in history.



Anne Harrington

Cluster 2

Medicalization at the Intersection of the History of Psychology and the History of Education

Claudia Stein (Visiting Scholar, University of Warwick)

The Spectacle of Hygiene: Capitalism, Visual Culture and Medicine in Britain and Germany, 1880s–1930s

Over several short residencies Claudia Stein continued to work on her book project on the spectacle of hygiene (jointly written with Roger Cooter). Her research focused on a chapter that deals with the commercial advertisement of hygienic products, the politics of modern consumer capitalism, and the commercialization of civic space in Germany around 1900. The chapter argues that the idea of a normative hygienic body that slowly emerged toward the end of the nineteenth century was closely related to the rise of bacteriology and its fundamental reconceptualization of the human body, as well as to the role of consumer capitalism (e.g., the role of the “hygienic entrepreneur” in Germany’s rising pharmaceutical industry) and the increasing significance of the relatively new science of psychology as an important means of selling hygienic products to the new middling classes. The role of psychology-driven commercial ad-



Claudia Stein

Poster (around 1900): "Öffentliches chemisches Laboratorium, Institut für Mikroskopie, Dr. Klebs & Dr. Schwalm," Plakatsammlung Staatsarchiv München.

vertising in modern capitalistic culture played a significant, if so far underestimated, role in the making of the normative hygienic body. Together with Arnaud, Stein also conceptualized one part of a large international network proposal, in which they will investigate the history of health as a human right since the eighteenth century.



Claire Shaw

Claire Shaw (Visiting Scholar, University of Bristol)

Revolutionizing Deafness: Russian Visions of the Deaf Self across 1917

The revolutions of 1917 fundamentally changed how the nature and norms of selfhood were understood in Russia. Marxist ideologies of self and society represented a radical break with tradition, producing new and revolutionary discourses of the individual. During her residency at the MPIWG, Claire Shaw traced the impact of these changes in relation to the Soviet deaf community, considering how frameworks of the ideal self—the “New Soviet Person”—that emerged in the early revolutionary years interacted with notions of sensory lack and linguistic disability. No longer a “tragedy” to be solved by science, disability was now understood as an obstacle to be overcome through social reform and individual effort. These new frameworks challenged certain fundamental criteria of the “normal” as defined by European specialists in the nineteenth century, such as the role played by spoken language in the development of rational thought. At the same time, this new version of deaf identity raised its own questions relating to the role of sign language, the level of deaf integration into the hearing world, and the capacity of disabled selves to truly overcome their “defect.” As such, Shaw’s work seeks to uncover how the “normal” was constructed in the Soviet context, and how physical “defect” complicated dominant narratives of human perfectibility.

Cluster 3

Legal History, History of Criminology, and History of Psychiatry

Silvia Chiletta (Postdoctoral Fellow, Centre Alexandre Koyré)

False Pregnancies and Hysteria: Constructing the Science of Pregnancy in Nineteenth-Century France

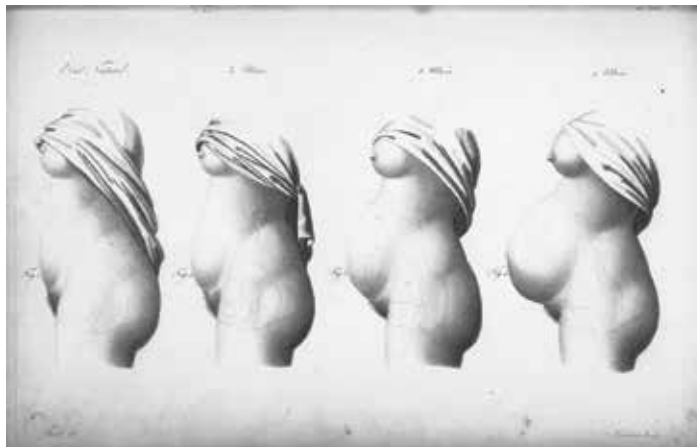
The topic of “false pregnancies”—various physical states and sets of symptoms that seem to indicate a real pregnancy even when the womb contains no fetus—has been addressed by physicians since the early modern period. In French medical debates, a new kind of “false pregnancy” emerged at the beginning of the nineteenth century: the so-called nervous pregnancy (*grossesse nerveuse*), which is produced by the influence of the womb’s functions on the nervous system and thus connected with hysteria.

Silvia Chiletta’s research focuses on how this phenomenon was observed and classified by physicians in the first half of the century. She analyzes how the construction of this medical category had been shaped by delineating differences and similarities between nervous pregnancy and real, or “normal,” pregnancy, as well as between nervous pregnancy and other forms of false pregnancy.

Furthermore, the project examines the contribution of legal medicine in the controversy over the etiology of *grossesse nerveuse*, namely, the relationship between female sexual activity or desires and this kind of pathology. In this regard, Silvia Chiletta explores how legal concerns and cultural norms about reproduction and sexuality contribute to the construction and the definition of this medical category.



Silvia Chiletta



“Histoire de la grossesse” in Jacques Pierre Maygrier, *Nouvelles démonstrations d'accouchements* (Paris: Béchét, 1822). Copyright: BIU Santé (Paris).

Short-Term Postdoctoral Fellows

Raluca Enescu (MPIWG), Anja Werner (MPIWG)

Cluster 4

History of Material Culture, History of Technology, History of Psychiatric Institutions



Jaipreet Virdi-Dhesi

Jaipreet Virdi-Dhesi (Predoctoral Fellow, University of Toronto)

Cotton Wool vs. Vulcanized Rubber: Expertise and the Artificial Tympanum Controversy

This project investigated the nineteenth-century “medicalization” of deafness through British aural surgeons’ quest to devise a technological “cure” for hearing loss in order to establish their field’s surgical legitimacy and secure their authority. Focusing on the development of the artificial tympanum, a prosthetic device inserted into the ear canal in order to amplify hearing in cases of eardrum perforation, this project examined how debates over materials reflected particular theories of sound conduction and an understanding of the anatomy of the ear. James Yearsley’s (1805–1869) 1848 version of the artificial eardrum, constructed of a cotton-wool pellet affixed with a silver wire stem, embodied knowledge of the ear as derived from clinical studies, whereas Joseph Toynbee’s (1815–1866) vulcanized rubber/silver disc “artificial membrana tympani” relied on knowledge interactions between pathological investigations and anatomical manipulation. Despite arguments over ownership, intention, and expertise, both surgeons insisted that the artificial tympanum should be prescribed only to patients with eardrum perforation, rather than be used as a “catch-all” cure for hearing loss. Moreover, they insisted that patients should eventually learn how to apply the device themselves; patients were not only more dexterous than the aural surgeon, but more capable of adjusting for proper fit. Deaf users thus played a pivotal role as shapers, adaptors, and manipulators of these technologies, creating standards of hearing “normalcy” that were governed by amplified sound while wearing the device.



Rory du Plessis

Rory du Plessis (Predoctoral Fellow, University of Pretoria)

The Principles and Priorities of Dr. T. D. Greenlees, Medical Superintendent of the Grahamstown Lunatic Asylum, 1890–1907

Rory du Plessis’s research project investigates the Grahamstown Lunatic Asylum, South Africa, under the medical superintendence of Dr. Thomas Duncan Greenlees, from 1890 to 1907. An exploration of the significant role played by the medical superintendents of lunatic asylums provides an opportunity to enrich understanding and appreciation of the varieties of asylum culture. By investigating the tenure of a superintendent, Rory du Plessis highlights how an individual constructed an asylum to embody a set of goals and principles. The asylum’s annual reports are the principal historical source in exploring Greenlees’s priorities and primary interests. Although diverse in range and scope, Greenlees’s priorities are intimately connected to, and indicative of, the tenets of moral therapy. The theory and practice of moral therapy provided an internationally disseminated norm for the care of asylum patients. Ac-

cordingly, the research project also closely examines how Greenlees's therapeutics and asylum management were influenced by the practice of moral therapy within Europe and the United States.

Short-Term Visiting Scholar

Mara Mills (New York University, funded by DAAD)

Cluster 5

History of Linguistics, Philosophy of Language, and Forms of Life

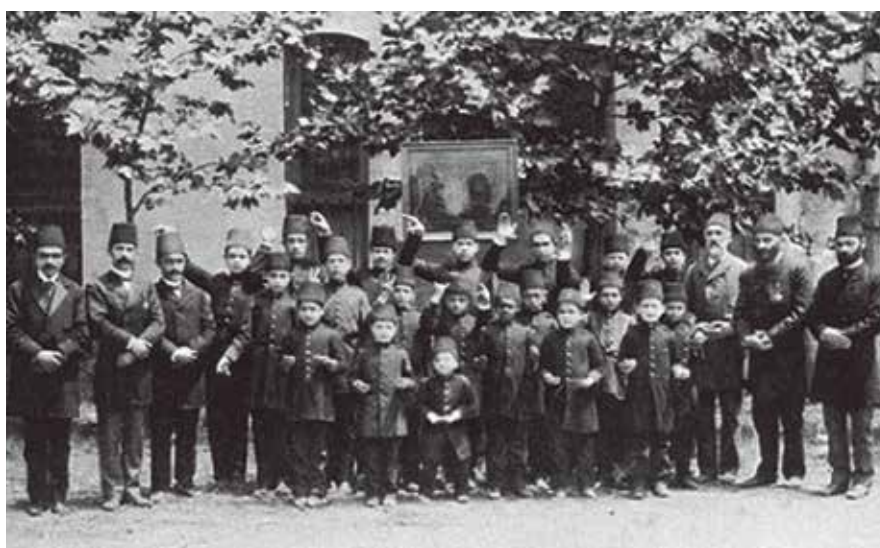
Myriam Klapi (Predoctoral Fellow, MPIWG)

Inventing and Disseminating Greek Sign Language

Myriam Klapi investigates the roots of Greek Sign Language. Her dissertation thesis focuses on Greek Sign Language from the eighteenth to the twentieth century. It examines how norms about Greek Sign Language and deaf people were constructed by hegemonic discourses within Greece's sociopolitical, religious, educational, and legal settings. To this end, the project draws from three research areas. First, Klapi pursues archival research in order to reconstruct the potential historical influence of the Ottoman Empire and Ottoman Sign Language on Greek Sign Language. This aspect includes, for instance, following the impact of educational and legal policies on



Myriam Klapi



The first students of the school for the deaf in Istanbul (1889). Copyright: Abdullah Frères (1888-1893).

ΕΦΗΜΕΡΙΣ ΤΩΝ ΠΑΙΔΩΝ
ΙΟΥΝΙΟΣ, 1870

Τὰ πρόσημα κατ' ἄρθρα ἀριθμῶν κατὰ τὸ σῆμα μὴ τὰς φωνητικὰς ἢ ἀκουστικὰς χαρακτῆρας κατὰ μικρὰς ὄρας παρὰ τὸν τῆς μαθητικῆς, ἕως τὸ ἐξῆς ἢ ἄλλο τῶν λατινικῶν χαρακτῆρων.

Ὁ ἀρχαῖος Παλαιός τις ἀριθμὸς τῶν ἀριθμῶν θ. φ. χ. ε. ἀπὸ τὸ 1254 π. χ. Ὁ δὲ Συναγωγὴς ἀριθμῶν τὸ Γ. φ. χ. α., ἀπὸ τὸ 480 π. Χ. Πῶς τὸ α εἰσῆχθη δὲν εἶναι γνωστὸν.

Τὸ ἑλληνικὸν ἀριθμικὸν συνίσταται μέχρι τοῦ 395 ἐν 16 γραμματίσιν· οὗτοι δὲ εἰσῆχθη τὸ ἰσχυρὸν ἀριθμικόν, ὅπου εἶναι 24 χαρακτῆρες.

Ἡ Ἑλληνικὴ γλῶσσα	ἔχει	27	πρόσημα
• Συναγωγὴ	•	27	•
• Ρωσικὴ	•	41	•
• Λατινικὴ	•	22	•
• Ἑβραϊκὴ	•	24	•
• Ἑβραϊκὴ	•	22	•
• Ἀραβικὴ	•	28	•
• Περσικὴ	•	32	•
• Τουρκικὴ	•	33	•
• Συναγωγικὴ	•	50	•
καὶ ἡ Κινεζικὴ	•	240	•

Ἡ Ἀγγλικὴ γλῶσσα ἔχει 26 πρόσημα

• Γαλλικὴ	•	23
• Γερμανικὴ	•	25
• Ἰταλικὴ	•	29

ΑΛΦΑΒΗΤΟΝ ΤΩΝ ΚΩΦΑΛΩΝ.

Ὁ προκείμενος πίναξ περιέχει τὸ ἀλφάβητον διὰ τοὺς κωφάλλους. Ὁ γνωρίζων αὐτὸν κατὰ μέρος ἀναγιγνωσκὶ καὶ κωφάλλοι δὲν ἀπορροῦν νὰ ἀναγνώσῃ αὐτὸν ἐκ σημείων. Ὅταν πρὸς ἀνάγκην αὐτῶν ἀκούσθαι τὸν φθόγγον ἡκούσθαι τὸν ἀπὸ τοῦ ὀνόματος ἀναγινώσκοντος, τὸ ἑκάστου ὡς φαίνεται κατασκευάζονται ἐκ τοῦ ἐπιπέδου σχηματισμοῦ τῶν ἁπλοῦν καὶ τῶν γινώσκων. Τὸ ἀλφάβητον τοῦτο χρησιμοποιεῖται εἰς τὸ νὰ συνεννοηθῶσιν ὅταν ἀκούσονται ἀκούσθαι ἄλλων, ἢ καὶ παρὰ τῶν, καὶ προεῖναι ὡς βοηθῆσαι εἰς τὴν ἐπιμάθησιν τοῦ κοινῶς ἀλφάβητου, τὸ ὅστις καὶ ματαχρῆμαίονται ὅταν γινώσκον ἡκούσθαι ἢ ἀκούσθαι. Εἰσῆχθη νὰ ληρῆθῃ πρόνοια καὶ διὰ τοὺς ἄλλους κωφάλλους.

A	B	Γ	Δ	E
Z	H	Θ	I	K
Λ	M	N	Ξ	O
Π	P	Σ	T	Υ
Φ	X	Ψ	Ω	Α
Β	ΚΑΛΩΣ	ΚΑΚΩΣ		

ΓΝΩΣΙΣ, ΠΙΣΤΙΣ, ΠΡΑΞΙΣ.

Φιλότητις τις μήτηρ ἔσχε κατὰ μέρος μίαν κωφὴν τὴν θυγατέρα της καὶ φράσσα αὐτῇ, εἰς κατὰ πρόσημα τῶν. « Ἄλλο εἶμαι, — τίσον μου, νὰ γνωρίζῃ τις ἄλλο νὰ πιστεύῃ καὶ ἄλλο νὰ πράττει. »

Ἡ μήτηρ, ἐπὶ ὃ θεὸς βάλει τὸ πνεῦμα, καὶ πρῶτον νὰ τὴν πιστεύῃ, δεῖται εἶναι γνωρίζων εἰς τὴν ἄνοιαν ἑαυτῆς, ἀπορροῦν τὸ κακὸν καὶ τὸ καλόν. »

« Ἐπειτα πρῶτον νὰ φράσσῃ καὶ νὰ πράττει κατὰ τὴν γνώσιν καὶ πίστιν ταύτης. Πρῶτον νὰ συννοηθῆσιν ὅτι κατ' ὅσον τῆς ὄρας τῆς ἡμέρας, καὶ εἰς πάντα κωφισμένον ἄκουσθαι, ὃ θεὸς εἰς βάλει, ἡκούσθαι πρῶτον νὰ λέγῃ εἰς σκεπτόν, « Δὲν πρῶτον νὰ κωφισθῆσιν, τὸ ὅστις ἤθελε λυτῆσαι τοὺς ἄκουσθαι ἡκούσθαι ἀκούσθαι, ἀλλὰ νὰ προσπαθῶ νὰ τοὺς κώφους »

νὰ μνησθῶν πρὸς ἑαυτὴν, πρῶτον τὸ ἄλλομα τοῦ τῆς ἡμέρας. Ὁ ἴσους Χριστὸς θὰ εἰς βοηθῆσαι, ἀκούσθαι μου κώφου, δὲν τὸν παρακαλῆς, ὃ εἰ θεὸς θὰ δοχῆθῃ καὶ διὰ ἀκούσθαι τῆς ἀκούσθαι προσπαθῆσαι σου εἰς τὸ νὰ ἀκούσθαι τὸ ἄκουσθαι. Ἐάν μόνον γνωρίζῃς καὶ πιστεύῃς, ἀλλὰ δὲν πράττεις κατ' ἑαυτὸν τὰ ὅσα γνωρίζῃς καὶ πιστεύῃς, ἡ γνώσιν καὶ πίστιν σου δὲν ἀκούσθαι τίποτε.

— ΕΙΔΟΠΟΙΟΥΝΤΑΙ αἱ ἀπανταχοῦ τῆς Ἑλλάδος καὶ Τουρκίας συνάξεις, ἐπὶ τὰ ἄλλα γίνεται ἀπὸ τοῦ θεοῦ εἰς τὸ ταχέως γινώσκον. Τὸ πᾶν ἀναγινώσκον ἀναγινώσκον, ὅπου, ἐπὶ ὃ α. ἀκούσθαι εἰς διὰ ἀναγινώσκον τῆς ἡκούσθαι θύμῃ ἀναγινώσκον τὸ κακόν.

Ὁ Συντάκτης Μ. Δ. ΚΑΛΟΠΟΘΑΚΗΣ.

The Greek Sign Language alphabet from 1870, illustrated in the newspaper *Η εφημερίς των παιδων*, June 1870 (<http://www.elia.org.gr/>).

the development of Greek Sign Language. Second, she applies linguistic reconstruction theories and cross-linguistic lexical comparisons to study the structure of Greek Sign Language. She has built two sign language corpora in order to compare similarities among Greek and Turkish Signs. Third, she takes up a sociolinguistic perspective in examining language contact, language policies, and language attitudes. Klapi contributes to the history of linguistics by analysing the construction of socio-political norms and their influence on the structure and prestige of Greek Sign Language.

Short-Term Visiting Scholar

Sandra Laugier (Université Paris 1 Panthéon-Sorbonne)

Conferences, Workshops, and Seminars

Conferences

Rhetorical Practices in Medical Writings and Medical Imaginings in Seventeenth- to Nineteenth-Century Literature

February 6–7, 2014

Participants

- *Sabine Arnaud* (MPIWG)
- *Lucia Aschauer* (Ruhr-Universität Bochum)
- *Janet Beizer* (Harvard University Cambridge, Massachusetts)
- *Marie Guthmüller* (Ruhr-Universität Bochum)
- *Irmela Krüger-Fürhoff* (Freie Universität Berlin)
- *Peter M. Logan* (Temple University Philadelphia)
- *Catherine McClive* (Durham University)
- *Mauricio Menchero* (Universidad Nacional Autónoma de México)
- *Javier Moscoso* (Institute of History of the Spanish National Research Council (CSIC) México)
- *Philip Rieder* (University of Geneva)
- *Jörn Steigerwald* (Universität Paderborn)
- *David Shuttleton* (University of Glasgow)
- *Anne Vila* (University of Wisconsin-Madison)
- *Wayne Wild* (Berklee College of Music Boston, Massachusetts)

Language, Norms, and Forms of Life

May 22–23, 2014

Conference co-organized with Sandra Laugier, Université Paris 1 Panthéon-Sorbonne, in collaboration with the Centre Marc Bloch and the Humboldt-Universität zu Berlin

Participants

- *Sabine Arnaud* (MPIWG)
- *Jocelyn Benoist* (Université Paris 1 – Panthéon-Sorbonne)
- *Jean-François Braunstein* (Université Paris 1 – Panthéon-Sorbonne)
- *Alice Crary* (The New School for Social Research New York City)
- *Estelle Ferrarese* (Maison Interuniversitaire des Sciences de l'Homme – Alsace)
- *Marie Gaille* (CNRS Paris)
- *Rahel Jaeggi* (Humboldt-Universität zu Berlin)
- *Sandra Laugier* (Université Paris 1 – Panthéon-Sorbonne)
- *Paola Marrati* (Johns Hopkins University Baltimore, Maryland)
- *Albert Ogien* (CNRS Paris)
- *Claudia Stein* (University of Warwick)
- *Eva von Redeker* (Humboldt-Universität zu Berlin)

Workshops

Shaping Education and Setting the Boundaries of Knowledge in France, Britain, and Germany, 1750–1950

June 7, 2013

Participants

- *Sabine Arnaud* (MPIWG)
- *John Carson* (University of Michigan)
- *Kathryn M. Olesko* (Georgetown University)
- *Sophia Rosenfeld* (University of Virginia)

Perspectives on Deafness in Eighteenth- to Twentieth-Century France and Russia

December 13, 2013

Participants

- *Sabine Arnaud* (MPIWG)
- *Florence Encrevé* (Université Paris 8)
- *Claire Shaw* (University of Bristol)

Mental Troubles, Bodily Troubles, Medical Categories: What Kinds of Stories Can We Write?

July 14, 2014

Participants

- *Sabine Arnaud* (MPIWG)
- *John Carson* (University of Michigan)
- *Anne Harrington* (Harvard University)
- *Mary Terrall* (University of California, Los Angeles)

Seminars

History and the Politics of Life

April 10, 2014

Guest Lecture

Claudia Stein (University of Warwick); *Roger Cooter* (University College London)

What Is a Concept?

June 16, 2014

Guest Lecture

Jocelyn Benoist (Université Paris 1 Panthéon-Sorbonne)

The Vulnerability of the Ordinary: Austin and Performativity

June 16, 2014

Guest Lecture

Sandra Laugier (Université Paris 1 Panthéon-Sorbonne)

The Present of the Historian

October 24, 2014

Guest Lecture

François Hartog (Ecole des Hautes Etudes en Sciences Sociales, Paris)

Conference organized by
Sabine Arnaud
Max Planck Research Group
The Construction of Names
in 17th- to 19th- Century
Europe and the United States

February 6-7, 2014

Max Planck Institute
for the History of Science
Conference room
BohnenstraÙe 22
14195 Berlin, Germany

The event is free, but space is limited.
Please register sending an email to:
Birgitte von Mallinckrodt
bmallinckrodt@mpiwg-berlin.mpg.de

RHETORICAL PRACTICES IN MEDICAL WRITINGS AND MEDICAL IMAGININGS IN 17th- TO 19th-CENTURY LITERATURE

February 6-7, 2014
MPIWG - Berlin

Rhetorical Practices In Medical Writings and Medical Imaginings in 17th- to 19th-Century Literature

Conference organized by
Sabine Arnaud

This conference investigates the role of writing practices in the enunciation of medical knowledge and the use of medical knowledge and terms outside medical contexts. What is the epistemological role of figures and genres in the denotation and connotation of a medical category? How have cultural imaginings of pathology been constructed and displaced? How have the role of medicine, patients' expectations, and doctors' status changed in the process? Words provide a frame to see the body. They postulate a relationship of obscurity and transparency between the body's inside and its outside, and, like anatomical illustrations, present a clean and stylized body. Focusing on the writing of bodily disorders and sensibility in seventeenth- to nineteenth-century France, Spain, Scotland, England, and Germany, we will examine some of the strategies and articulations of that process.

Program

<p>6</p> <p>9:30 WELCOME</p> <p>Chair: Sean Dye</p> <p>10:00 Cathy McClive Melle Baudon's Letter on the Art of Dissection: an Unpublished Midwifery Treatise from 1671</p> <p>10:45 Lucia Aschauer The Rhetoric of Pregnancy and Birth: Obstetrical Case Studies in Eighteenth-Century France</p> <p>11:30 Mauricio Menchero The Circulation and Uses of Knowledge (and Ignorance), through Medical Books in New Spain (16th Century)</p> <p>12:15 Discussion</p> <p>12:30 LUNCH</p> <p>Chair: Irmeta Krüger-Finkeff</p> <p>13:30 Wayne Wild The Rhetorical Origins of a Modern Medical Ethic in Enlightenment Scotland</p> <p>14:15 David Shuttleton 'More Particular': Narrative Competence and the Limits of Medical Communication</p> <p>15:00 BREAK</p> <p>15:30 Sabine Arnaud Destinies of a Metaphor: Figuring What Cannot Be Defined in French Modern Medicine (1575-1820)</p> <p>16:15 Open discussion</p>	<p>7</p> <p>9:30 COFFEE</p> <p>Chair: Debilina Dey</p> <p>10:00 Anne Vila Imagining the Cataleptic in French Medicine and Literature, 1730-1840</p> <p>10:45 Javier Mascoso Morbid Jealousy: The Medicalization of Passions in the Early 19th Century</p> <p>11:30 Janet Reizer The Paper Father: Colette, Balzac, Pica, and the Poisoning of Reading</p> <p>12:15 Discussion</p> <p>12:30 LUNCH</p> <p>Chair: Lara Keuck</p> <p>13:30 Peter Logan Dickens and Delusion</p> <p>14:15 Marie Guthenöther Dreams as Symptom: Attempts to Integrate Dreams into Psychopathological Diagnoses in the 19th Century</p> <p>15:00 BREAK</p> <p>15:30 Open discussion</p>
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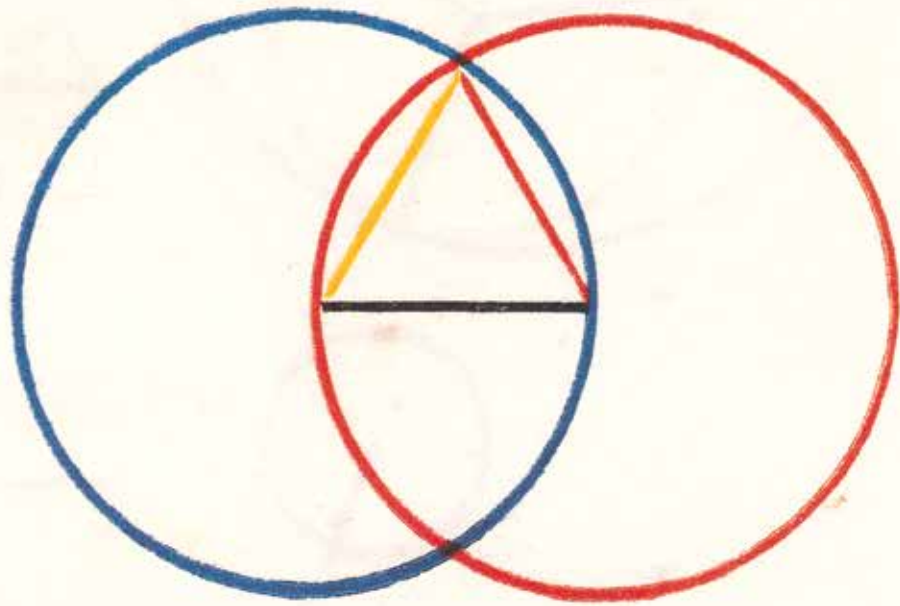
Oliver Byrne, *The First Six Books of The Elements of Euclid; in which coloured diagrams and symbols are used instead of letters for the greater ease of learners;* London: Pickering, 1847.

Euclid.




BOOK I.

PROPOSITION I. PROBLEM.

QUONIAM *IN* a given finite straight line (—) to describe an equilateral triangle.



Describe  and


 (postulate 3.); draw  and  (post. 1.).

then will  be equilateral.

For  =  (def. 15.);

and  =  (def. 15.),

∴  =  (axiom. 1.);

and therefore  is the equilateral triangle required.

Max Planck Research Group

Modern Geometry and the Concept of Space

RESEARCH GROUP LEADER *Vincenzo De Risi* (2010–2015)
extended until 2016

Introduction

The Max Planck research group “Modern Geometry and the Concept of Space” was established in January 2011 with the aim of investigating the transformation of ancient geometry into modern geometry, as read specifically through the transformation of the object of geometrical enquiry. Indeed, one of the central goals of our research group is to prove that the most important revolution in the history of this science occurred when the ancient geometry of *figures*—that is to say, the Euclidean mathematics of straight lines, triangles, circles, and polyhedrons—became the modern geometry of *space* and spatial structures. It should be noted, in fact, that whereas our modern conception of geometry leads us to describe and understand it, without hesitation, as the *science of space*, and we cannot even properly form the thought of geometry without referring to spatial structures (be they topological, projective, Riemannian, Euclidean, or non-Euclidean), in the ancient and early modern world spatial concepts were not part of the description or the practice of geometry. The whole of Euclid’s *Elements*, for one, contains no mention of space or spatial notions at all. The problem was therefore to understand how, when, and why the notion of space entered the realm of geometry, and how this new concept turned geometry on its head, transforming it from a science of figures into a science of structures, thus paving the way for modern mathematics.

This kind of investigation must by necessity range across several different topics, as the emergence of a geometry of space entailed, and was produced by, many different developments in the history of science and culture. The internal evolution of geometry surely played an important role, and a few spatial notions were indeed introduced into this science in order to answer specific technical problems that were raised by early modern mathematicians. Several applied mathematical sciences contributed to this transformation as well. The Renaissance theory of perspective, for instance, or the new cosmography and modern mechanics, produced a deep change in the way in which the proper object of geometry was looked at and thought about (just as these applied sciences were, in their turn, deeply affected by transformed geometrical ideas). An even greater role was played by metaphysics, and the development of the modern conception of space as a three-dimensional infinite extension was largely due to the working out of certain purely philosophical and theological problems, even

though such new ideas immediately acquired geometrical meaning. Putting all of these threads together is the main goal of the research group, with the aim of producing a consistent and encompassing picture of this important transformation in the history of science.

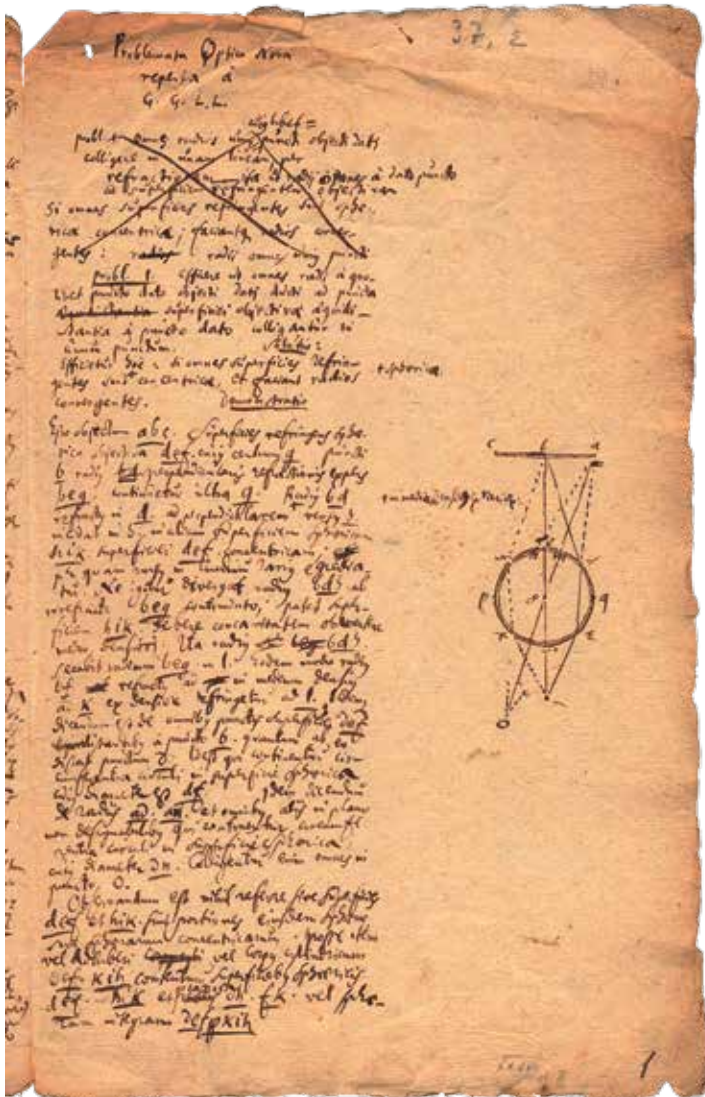
In 2013–2014, the research group concentrated its research on the few spatial features that were already present in classical Greek mathematics (from the theory of *data* contained in Euclid's work of this name, to Apollonius's theory of *loci*, to the use of motion in geometrical proofs), and followed the development of these notions through Late Antiquity and the Middle Ages right up to the Renaissance, when these hints acquired new weight and significance through contact with new epistemological ideas. Another important direction in the group's research was the study of the evolution of geometrical optics as a way of mathematizing spatial notions, and the modern epistemology of the theory of vision that was developed in the sixteenth, seventeenth, and eighteenth centuries. A further line of research consolidated the investigations of previous years regarding the pivotal role that Leibniz played in this revolution (as he was the first mathematician to explicitly conceive of a *geometry of space*), as well as his role in the first development of non-Euclidean geometry in the eighteenth century.

The research group organized a very successful colloquium series which hosted more than thirty different scholars presenting their research on modern geometry and the conception of space. The colloquium series was supplemented by a number of more general workshops, in which different researchers held debates and discussions bearing on the most important of the various historical periods concerned here; in particular, the group organized the workshops “Kant and the Euclidean Tradition” (April 2013, with Daniel Sutherland, Jeremy Heis, Erik Banks), “J. H. Lambert: Science and Epistemology” (April 2013, with Alison Laywine, Thomas Morel, Marteen Bullynck, Norbert Schappacher, Christophe Eckes, Paola Basso), “Finite Geometry, Indivisibles and Minima from the Middle Ages to the 18th Century” (May 2013, with Sander De Boer, Angelika Bönker-Vallon, Richard T. W. Arthur, Douglas Jesseph), and “Geometrical, Astronomical and Geographical Notions of Space in the Renaissance” (May 2014, with Matthias Schemmel, Henrique Leitão, Adam Mosley, Jean-Marc Besse, Anna De Pace, Michela Malpangotto).

The research group also established a close collaboration with the group of historians of mathematics working at the University of Paris 7, with whom it is currently organizing further workshops (one on Wallis's and Barrow's epistemology of geometry, to be held in Paris and Berlin in May–June 2015), and with the Max Planck Institute for Mathematics in the Sciences, in Leipzig, with which it co-organized an important conference on Leibniz and geometry (July 2014, with Eberhard Knobloch, Siegmund Probst, David Rabouin, Valérie Debuiche, Daniel Garber, Richard Arthur, Edward Slowik, Massimo Mugnai). Finally, the group continued a fruitful collaboration with the Scuola Normale Superiore in Pisa—a collaboration that gave rise to two further conferences, namely, “Geometry and Logic: The Shape of Mathematical Proofs from Antiquity to the Early Modern Age” (Pisa, June 2013, with Ken Saito, Monica Ugaglia,

Heike Sefrin-Weis, Orna Harari, Roshdi Rashed, Sabine Rommevaux, Paolo Freguglia, Paolo Mancosu, Massimo Mugnai, Alison Laywine, Andrew Arana, Victor Pambuccian, Claudio Bartocci) and “The Mechanization of Geometry from Antiquity to the Early Modern Age” (Berlin, June 2014, with Reviel Netz, Antoni Malet, Marco Panza, Daniel Garber, Richard Arthur, George Smith, Helmut Pulte, Michael Friedman, Matthias Schemmel, Angela Axworthy).

A few visiting fellows also joined the research group for extended periods: Gregor Schneider (Munich Center for Mathematical Philosophy) investigated Plato’s mathematical epistemology, and Luca Guzzardi (University of Pavia) worked on Roger Boscovich’s conceptions of space.



Gottfried Wilhelm von Leibniz, *Texts on Nature, Medical Science and Technics*.
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Individual Projects



Vincenzo De Risi

Vincenzo De Risi (Research Group Leader)

Historical Epistemology of Space and Geometry

Vincenzo De Risi is currently writing a book on the transformation of geometry from a science of figures into a science of space. This long monograph deals with the long-term development of geometry and geometrical epistemology from antiquity through to early modernity, discussing the main aspects of the spatial revolution in mathematics, such as the emergence of a theory of projections and the first developments of non-Euclidean geometry, as well as the philosophical views of several authors who

attempted to fashion a theory about the object of geometry and its relationship to space (Plato, Aristotle, Proclus, Patrizi, Descartes, Leibniz, Kant, and several others). In 2013–2014, De Risi edited a collection of essays on the same topic, *Mathematizing Space: The Objects of Geometry from Antiquity to the Early Modern Age*, which presents in print the results of a conference organized at the MPIWG in 2012. He also published papers on Francesco Patrizi's, Gottfried Leibniz's, and Immanuel Kant's mathematical epistemology. In addition to drafting his book on historical epistemology, De Risi worked on eighteenth-century sources of non-Euclidean geometry, and published



G. Saccheri, *Euclides ab omni naevo vindicatus*; Milano: Montani, 1733.
© Niedersächsische Staats- und Universitätsbibliothek Göttingen.

an English edition of Saccheri's *Euclides vindicatus* (1733) as well as a collection of manuscripts by Leibniz on the theory of parallels (1676–1715). His edition, with commentary, of Lambert's *Theorie der Parallellinien* (1766) will be appearing shortly (the three volumes are published by Birkhäuser). De Risi is also working on the development of geometrical axiomatics from antiquity to modern times, and has drafted a long essay discussing the development of those systems of principles in elementary geometry that were employed in the various editions of Euclid's *Elements*.



Angela Axworthy

Angela Axworthy (Postdoctoral Fellow, MPIWG)

The Ontological Status of Geometrical Objects in the Commentary on the Elements of Euclid of Jacques Peletier du Mans (1517–1582)

Angela Axworthy's research deals with Renaissance philosophy of mathematics. She has investigated the status of mathematics in the prefaces of sixteenth-century commentaries on Euclid's *Elements* and in the mathematical work of the Royal Lecturer Oronce Fine. The research she has carried out at the MPIWG aimed to examine the conceptions presented by Jacques Peletier du Mans, in his commentary on the *Elements*, regarding the nature and the mode of existence of geometrical objects. Axworthy's study of this commentary shows that, in Peletier's treatment of the notion of angle (which played a crucial role in the early modern controversy over the status of the angle of contact), he adhered to the distinction defined by the Neoplatonist Pro-

clus of a double mode of existence and level of knowledge of geometrical objects, imaginary and divine, demonstrative and non-demonstrative.

This research gave way to a more general study on the status and uses of motion in geometry according to sixteenth-century commentators on the *Elements*, in which Peletier occupied an important place, given his mechanical interpretation of Euclid's method of superposition, traditionally used to establish the congruence of geometrical figures.

Tawrin Baker (Predoctoral Fellow, Indiana University, Bloomington, USA)

Understanding Color, Surface, and Body in Seventeenth-Century Optics

Tawrin Baker's research centers on vision and color in the sixteenth and seventeenth centuries at the intersection of natural philosophy, anatomy, and mathematical optics. For this project he analyzed a number of seventeenth-century optical works and mapped the positions taken on approximately thirty issues related to vision and geometry. This map is an initial step toward a more comprehensive history of the transformations to visual theory in the early modern period, one that reaches beyond well-trod figures such as Kepler and Descartes. Issues examined include accounts of transparency and opacity, rarity and density, refraction and reflection; the relationship between color and light, and between color and surface; the real/apparent color distinction; the site of visual sensation; accounts of the motion of light and its connection to motion in geometry; and the status of optics as a science. Baker has just completed his PhD and is currently on the job market.



Tawrin Baker

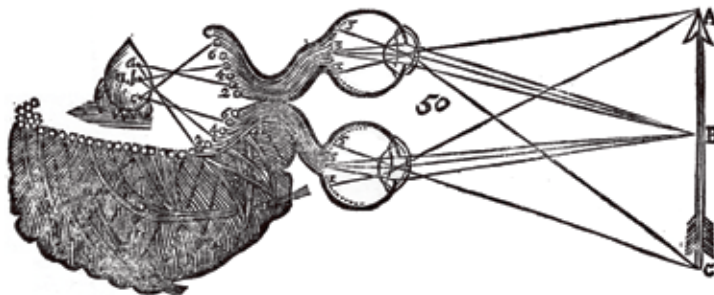
Davide Crippa (Pre- and Postdoctoral Fellow, Université Paris VII – Denis Diderot, France)

Leibniz's Early Study of Trochoids and the Redefinition of Geometricity

During his stay at the Institute, Davide Crippa developed a project already begun in the summer of 2012 and devoted to the theory of curves in early modern geometry. The latest stage of this research concerned Leibniz's reception of Descartes's ideas of exactness and geometricity. In particular, Crippa studied a group of manuscripts written by Leibniz between the end of 1674 and the beginning of 1675, some of which were published in Series VII of the Academy Edition, and some of which remain unpublished to this day. These manuscripts offer precious testimony to the varieties of ways in which Leibniz tried to overcome the demarcation between geometry and mechanics as it had been set by Descartes. He expended considerable effort in attempt-



Davide Crippa



R. Descartes, *Tractatus de homine*; Frankfurt: Frederick Knoch, 1692.

ing to discover the properties of a class of transcendental curves, namely, the trochoids (curves generated by the rolling of a given curve along a line, or along another curve). Whereas Descartes conceived of these curves as mechanical, in so far as they were generated by two independent motions, Leibniz was convinced of their geometrical nature. Leibniz's studies in curve construction also accompanied his first attempts to construct the infinitesimal calculus, and are therefore an important source for our understanding of the motivations, the technical components, and the problem which lay in the background of this latter undertaking.



Jacqueline Feke

Jacqueline Feke (Postdoctoral Fellow, University of Chicago, USA/ MPIWG)
Philosophy and Rhetoric of Ancient Greek Mathematicians



A printed map from the fifteenth century depicting Ptolemy's description of the *Ecumene* (1482, Johannes Schnitzer, engraver); Wikimedia Commons.

Jacqueline Feke dedicated her time at the MPIWG to two projects. The first, in collaboration with Nathan Sidoli of Waseda University, examines Ptolemy's argument for uniform circular motion in the *Almagest*. It responds to two common misconceptions: (a) that Ptolemy's justification for using uniform circular motion to account for the apparently irregular movements of the so-called wandering stars—the sun, moon, and five planets—follows from an adherence to Aristotle's philosophy, and (b) that Ptolemy's use of the equant in his models for the five planets is inconsistent with his adherence to uniform circular motion. Feke and Sidoli's research presents a new account of Ptolemy's justification, which disambiguates the relation of Ptolemy's philosophy to Aristotle's, and argues that the equant is consistent with uniform circular motion as Ptolemy defines it. At the same time, Feke completed two chapters of her book manuscript on Ptolemy's philosophy. At the time of the fellowship, Feke was a Harper-Schmidt Fellow and Collegiate Assistant Professor at the University of Chicago. In 2015, she will assume an assistant professorship in the Department of Philosophy at the University of Waterloo in Canada.

Eduardo Giovannini (Postdoctoral Fellow, University of Buenos Aires, Brazil)

Eighteenth-Century Axiomatics in Germany and the Concept of Space

Eduardo Giovannini's research project seeks to reconstruct and analyze the axiomatic conceptions of geometry developed in eighteenth-century German textbooks. A main aim of the research is to investigate how the foundational and methodological discussions presented in these textbooks were connected to a new, modern conception of geometry as the theory of space. Particular attention is paid to the discussions and disputes on the nature and role of axioms and definitions in geometry, the nature and scope of geometrical constructions, and the value of diagrams in geometrical proofs. During his stay at the MPIWG, Giovannini focused in particular on the works of the German mathematician Abraham Gotthelf Kästner (1719–1800), who wrote one of the most important and influential mathematical textbooks of the second half of the eighteenth century: *Anfangsgründe der Arithmetik, Geometrie, ebenen und sphärischen Trigonometrie und Perspektive* (first edition 1757). Finally, Giovannini examined the relevance of the axiomatic conceptions of geometry presented in these textbooks for Kant's concept of space and philosophy of geometry, especially in the period after the first *Critique*.



Eduardo Giovannini

Tal Glezer (Predoctoral Fellow, Stanford University, USA); funded by the Minerva Foundation)

Leibniz's Conception of Force

Tal Glezer's work at the MPIWG attempts to reconstruct some of the distinctive features of Leibniz's conception of force in order to address certain puzzles regarding his attitude toward both Cartesian and Newtonian physics. Specifically, the reconstruction aims to explain (a) why Leibniz took his discovery of the *vis viva* conservation principle to refute Descartes's reduction of all material properties to extensional properties, despite the fact that his conservation principle itself relies only on extensional properties; and (b) why Leibniz regarded the very idea of a real force acting at a distance (e.g., Newtonian gravity as Leibniz understood it) to be unintelligible, despite the fact that he does not share the Cartesian assumptions that typically ground the contemporary adherence to mechanistic explanations. Considerable progress can be made on both these puzzles by showing how, on Leibniz's conception of force, it belongs primarily to a level of description that is more fundamental than physics, and constrains the features of space, matter, and causal development in a way that precludes basic tenets of Cartesianism and Newtonianism alike. The MPIWG Working Group allowed rare and valuable opportunities to collaborate with historians of science versed in the minutiae of the *vis viva* controversy, as well as the deep and involved ideas of Leibnizian metaphysics.



Tal Glezer



Hannes Ole Matthiessen

Hannes Ole Matthiessen (Postdoctoral Fellow, MPIWG)

The Eye in the Centre of a Sphere in Eighteenth-Century Educational Literature: A Possible Source for Thomas Reid's *Geometry of Visibles*

Hannes Ole Matthiessen is studying the perspectival character of visual perception and the geometry of visual space both from a systematic and from an historical perspective. He is particularly interested in Thomas Reid's theory of vision, according to which the geometrical properties of objects in the visual field equal the geometrical properties of their projections on the inside of a sphere with the observer in the center.

At the Institute, Matthiessen surveyed eighteenth-century introductions to projective geometry, navigation, and astronomy, in which the model of the eye in the center of a sphere is widely in use, and wrote the paper "Who Placed the Eye in the Centre of a Sphere? Speculations about the Origins of Thomas Reid's *Geometry of Visibles* (submitted to the *Journal of Scottish Philosophy*), in which he draws the attention of Reid scholars to this body of neglected literature and argues that Reid's *geometry of visibles* results quite naturally from some astronomical doctrines of his time in conjunction with George Berkeley's theory of vision.



Marij van Strien

Marij van Strien (Postdoctoral Fellow, University of Ghent, Belgium)

The Law of Continuity and the Relation between Physics and Mathematics in the Eighteenth Century

Marij van Strien's work concentrates on the history of continuity, causality, and determinism in physics and the relations between physics and mathematics from the eighteenth up to the early twentieth century. At the Institute, she worked on a project on the law of continuity in the eighteenth century, focusing on the work of Johann Bernoulli, Émilie Du Châtelet, and Roger Boscovich. For these authors, the law of continuity (which is a principle they took from Leibniz) states that all geometrical curves, as well as all processes in nature, are continuous; there is thus a direct correspondence between continuity in nature and continuity in mathematics. This principle was a guiding one in their thought on questions of physics, and guaranteed the possibility of the mathematical treatment of nature. They offered metaphysical arguments to demonstrate its validity. However, by ruling out all discontinuities in geometry, the principle turned out to be too restrictive: both Du Châtelet and Boscovich struggled to account for the possibility of mathematically defining curves with sharp bends. Thus a different foundation for the mathematizability of nature was needed.

Tzuchien Tho (Postdoctoral Fellow, Berlin-Brandenburgische Akademie der Wissenschaften, Germany)

Quantity and Space in Leibniz's *Dynamics*

Tzuchien Tho's research employs historical approaches to study philosophical problems in the early modern and contemporary periods. His project at the Institute dealt with Leibniz's use of quantities and space in developing a theory of physical causality based on force. The research contributed to a chapter in his forthcoming monograph *Vis, Vi, Vim: The Declinations of Force in Leibniz's Dynamics*, in which he provides a systematic account of Leibniz's theory of physical reality from metaphysical, mathematical, and mechanical perspectives. Through a re-examination of historical sources, Tho aims to provide solutions to long-standing problems in Leibniz interpretation, such as the harmony of final and efficient cause.



Tzuchien Tho

Henry Zepeda (Postdoctoral Fellow, University of Oklahoma, USA)

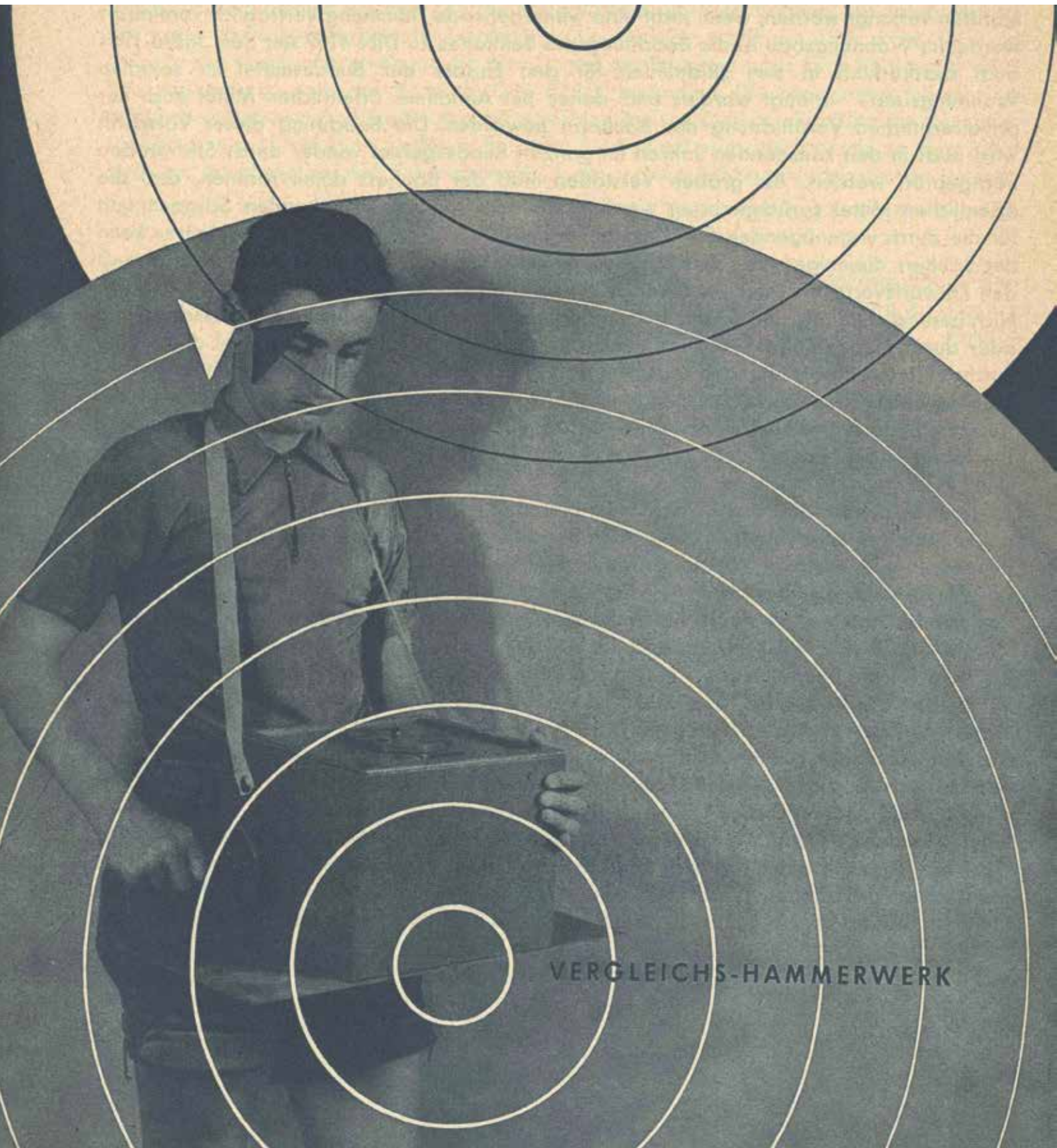
"Secundum Stilum Euclidis": The Medieval Use of Euclid's *Elements* as a Model of Axiomatic Science

While Ptolemy's *Almagest*, which provided the most authoritative system of astronomy available to medieval scholastics, has a narrational format with books divided into chapters that contain particular examples of calculations and both deductive and empirical argumentation, medieval commentators in the twelfth to fifteenth centuries restructured and altered the work to make it an axiomatic science. They provided lists of principles and divided the content of the *Almagest* into propositions and proofs. They replaced examples of calculation with proofs of the validity of computational methods, and they omitted or deemphasized the empirical considerations of the *Almagest* in order to focus on the abstract, deductive aspects of astronomy. The medieval commentaries on the *Almagest* show a concern for reformulating the discipline of astronomy into the type of deductive, universal science that appeared in Euclid's *Elements*. While the main precepts of Ptolemaic astronomy were rarely challenged in the Middle Ages, commentators altered the very concept of astronomy as a scientific discipline. Henry Zepeda has published an article on this topic, "Euclidization in the *Almagestum parvum*," in the journal *Early Science and Medicine* (March 2015). In his postdoctoral position at the Ptolemaeus Arabus et Latinus project at the Bayerische Akademie der Wissenschaften, Zepeda is editing these Euclidized commentaries on the *Almagest*.



Henry Zepeda

“Norm- und Vergleichshammerwerks”
[Advertisement], in: Wedler, Bernhard
(Hrsg.) Baut ruhige Wohnungen.
Bad Godesberg, Bundesminister für
Wohnungsbau, 1957 (Exemplar der
FU Berlin).



Max Planck Research Group

Epistemes of Modern Acoustics

RESEARCH GROUP LEADER *Viktoria Tkaczyk* (2015–2020)

Introduction

In recent years, historians have argued that modern science was fundamentally shaped by a “hegemony of vision” in Western culture—one that, despite extending back to antiquity, only became a radically defining moment with the beginning of the early modern period and the invention of new optical instruments and visual technologies. Without calling into question the modern primacy of vision in general, this research group will initiate a more intensive consideration of sound in its dual function as an object of scientific investigation and as an epistemic tool. The genealogy of acoustic knowledge will be traced throughout the modern era. We ask about the conditions that enable acoustic knowledge, guided by the premise that the genealogy of acoustic knowledge goes beyond the history of the exact sciences and involves a considerably broader cultural and historical context.

Acoustics only started to become established as an academic discipline at the end of the nineteenth century, though the first definitions of the subject date back much further. As early as 1701, mathematician Joseph Sauveur argued that a distinction should be drawn between music theory, with its emphasis on euphonious sounds, and a general science of sound. Sauveur’s call, in turn, built on an existing interest in the physical and mathematical definition and experimental study of sound that had been growing since the sixteenth century. However, during the sixteenth to nineteenth centuries it was mainly instrument builders, musicians, architects, and engineers whose practical dealings with sound fueled the formation of acoustic theory. In the twentieth century, the production of acoustic knowledge became the province of disciplines as varied as physics, medicine, zoology, psychology, phonetics, linguistics, philosophy, musicology, architecture, and archaeology.

These disciplinary shifts and splits in acoustics are part of what is explored by the new Max Planck research group “Epistemes of Modern Acoustics.” The group focuses on the religious, political, and artistic practices, the media technologies, and the material cultures that prompted a new study of the nature and perception of sound. Acoustic strategies of knowledge production are another of the research group’s interests. What historical knowledge could be acquired or represented only acoustically? When and how were acoustic apparatuses, instruments, and machines deployed as alternative means of research?

These questions will be answered through the prism of historical case studies in acoustic subdisciplines such as bioacoustics, electroacoustics, and underwater acoustics, or more specifically through such phenomena as acoustic memory, audiometry, the materials of musical instruments, elevator music, and sound photography. Four working groups, each with ten to fifteen researchers, will come together several times over a period of three years. Their themes are (a) “Testing Hearing: Science, Art, Industry,” (b) “Sonic Objects in Transition: Knowledge, Science, Heritage,” (c) “Betwixt and Between: Sound in the Humanities and Sciences,” and (d) “The Geography of Sound: Formation, Transformation, and Circulation of Acoustic Knowledge and Practices.” Together, the four groups will create a website providing access to difficult-to-find sources in the history of acoustics.

The research group “Epistemes of Modern Acoustics” is based on a collaboration between the Max Planck Institute for the History of Science and the Humboldt-Universität zu Berlin, and forms part of the Berlin Center for the History of Knowledge. Additional funding is provided by the VolkswagenStiftung. Further cooperation partners are the Universiteit van Amsterdam, the Deutsches Museum in Munich, the DFG research network “Auditory Knowledge in Transition,” and the French ANR project ECHO (Ecrire l’Histoire de L’Orale).

For more information see the group’s website and the group’s feature story:

<http://www.mpiwg-berlin.mpg.de/en/research/projects/RGTkaczyk>

<http://www.mpiwg-berlin.mpg.de/en/news/features/feature39>

Group Members

- *Viktoria Tkaczyk* (Research Group Leader), March 1, 2015–February 29, 2020: Knowledge of the Ear: Auditory Memory in the Arts and Sciences around 1900
- *Joeri Bruyninckx* (Research Scholar), June 1, 2015–May 31, 2018: Listening and the Shaping of Work Performance in the Twentieth Century
- *Rebecca Wolf* (Postdoctoral Fellow), March 1, 2015–February 28, 2017: The Elements of Sound: Experiments in Musical Instruments, 1830–1950
- *Anna Kvičalová* (Predoctoral Fellow, funded by VolkswagenStiftung), January 1, 2013–December 31, 2015: Disciplining the Sense of Hearing: Auditory Practices in Mid-16th-Century Geneva

Visiting Scholars in 2015

- *Roland Wittje* (Visiting Scholar, Indian Institute of Technology Madras), March 1–May 31, 2015: Electroacoustics in the Laboratory, Late 19th to Early 20th Century
- *Alexandra Hui* (Visiting Scholar, Mississippi State University), April 1–July 31, 2015: Sonifying Space: A History of the Science of Background Music, 1900 to 2001
- *Sabine von Fischer* (Postdoctoral Fellow), May 1–July 31, 2015: A Visual Imprint of Moving Air
- *Steven Lydon* (Visiting Predoctoral Fellow, Harvard University), August 1–December 31, 2015: Nietzsche’s Tuning Fork
- *Mara Mills* (Visiting Scholar, New York University, funded by Alexander von Humboldt Foundation), August 1–September 30, 2015: Talking Book Archives in the 1950s; preparation of the workshop Thresholds of Audibility
- *Jonathan Sterne* (Visiting Scholar, McGill University), December 1–31, 2015: Listening with the Ears, Eyes, and Hands: Comparing Music Technologies and Their Models



Members of MPRG Tkaczyk (Epistemes of Modern Acoustics) in Summer 2015
 From left to right: Rebecca Wolf, Anna Kvičalová, Sabine von Fischer, Viktoria Tkaczyk, Alexandra Hui, Joeri Bruyninckx, Kate Sturge, Birgitta von Mallinckrodt



Joint Activities

Cooperation and Outreach

Hansjakob Ziemer

Berlin Center for the History of Knowledge: New Developments

In 2013 and 2014, the collaborations of the MPIWG with the Berlin universities intensified significantly. The Berlin Center for the History of Knowledge has increasingly evolved into a platform for scholarly exchange that transcends institutional boundaries. The cooperation provides a fertile ground for inspiring new projects, identifying common clusters of interest, and fostering dialogue among scholars from various backgrounds and different institutional affiliations. Drawing from the existing network and the formal cooperation agreement between the Berlin universities and the Max Planck Society (MPG) in 2011, the Berlin Center is in the midst of a five-year expansion plan in order to develop the potential of Berlin's unique scholarly resources and to integrate the work of university faculty members, MPIWG researchers, doctoral candidates, and postdoctoral scholars on central themes of a history of knowledge, such as the boundaries of knowledge and science. In 2013 the presidents of the Freie Universität Berlin (FU), Humboldt-Universität zu Berlin (HU), Technische Universität Berlin (TU), and MPG appointed a new board for the Berlin Center which has become engaged in the planning and realization of joint projects. As a forum for new research endeavors and as a platform for public discussion, the Berlin Center hopes to increase the visibility of Berlin's multidisciplinary research potential in the history of knowledge and aims to nurture thematic clusters.

As a new cornerstone in this development, the four cooperation partners established a five-year postdoctoral fellowship program that is realized with financial support from the Innovation Fund of the President of the Max Planck Society and matching contributions from the universities. The goal of this program is to realize common projects, to contribute to reflection on the foundations of a theoretically grounded history of knowledge, and to improve scholarly communication by establishing close links between specific, already ongoing scholarly projects, groups, and departments. The cooperation partners jointly organized a selection procedure in 2013 and awarded eight fellowships, starting in the fall of 2013. Each Berlin Center Fellow is based at one of the four institutions and in addition assigned to one more institution; all of them receive library privileges and office space at the MPIWG. As part of the postdoc program, the FU endowed a new junior professorship position for the global history of knowledge and—with the support of the MPIWG—successfully appointed historian Nadin Heé in the fall of 2014.

The postdoc fellowship program was initiated with a colloquium at the MPIWG on November 11, 2013, which included individual project presentations, planning discussions, and an informal gathering of the Berlin Center Fellows with the members of the Berlin Center Board. Since then, the Berlin Center Fellows strengthened the internal links between the participating institutions by participating in colloquia, conferences, and working groups, and they have—in addition to their own research projects—organized three workshops with financial and logistical support from the MPIWG: (a) “The Making of Useful Knowledge,” (b) “Unusual Lives: Historicizing Life as a Problem of Knowledge,” and (c) “Constructing Hellenism in Classical Islam and Renaissance Europe: Transfer, Appropriation and Transformation.” All three workshops focused on the frontiers of knowledge and the history of science: on the making of life and the role of institutions for knowledge production, on the relationship of scholarly and practical knowledge, and on the transformation and appropriation of Hellenism from the Byzantine world to the Arabic and European cultural spheres. Work on these topics will continue in various forms, and it is planned in a first step to publish the results of the workshops in the preprint series of the MPIWG as well as in special journal issues.

→ p. 171

→ p. 147

Scholarly exchange between the Berlin institutions has developed further through one new and two existing Max Planck research groups. The two existing groups are directed by Professor Veronika Lipphardt (“Historicizing Knowledge about Human Biological Diversity in the 20th Century,” since 2009) and by Professor Sven Dupré (“Art and Knowledge in Pre-modern Europe,” since 2011). Both are affiliated with the FU and teach one course per semester. A third Max Planck research group leadership position was advertised in the winter of 2012/13 in conjunction with the HU. This position matches the appointment of Junior Professor Philipp Felsch for the History of the Human Sciences at the Cultural Studies Institute (HU), a position that was created through the Cooperation Agreement. A joint search committee of the MPG and the HU organized a joint selection process in 2013 and selected Viktoria Tkaczyk for the position. She was appointed Max Planck Research Group Leader by the MPG as well as S-Professor for History of Knowledge and the Acoustic. She launched her research group “Epistemes of Modern Acoustics” in March 2015 and will resume her teaching obligations at the Cultural Studies Institute in the summer semester of 2015. The presidents’ offices of both the HU and the MPG actively supported the joint selection and hiring process.

→ p. 219

These efforts to make a long-lasting impact on institutional structures are complemented by a number of initiatives to foster dialogue between researchers and students based in Berlin. In particular, Professor Anke te Heesen (HU) organized a successful lecture series in the winter semester of 2013 with sixteen senior scholars from all Berlin institutions, who each introduced their field: from classical medicine to historical epistemology, from artists’ knowledge to Chinese knowledge traditions, from gender history to experimental cultures, and many more. Creating new pathways to research and teaching in the history of knowledge in Berlin has also included the continuation of two annual doctoral workshops: the “Studenttag Literatur und Wissenschaftsgeschichte,” which took place in 2014 for the ninth time, co-organized by the MPIWG and Professor Jutta Müller-Tamm (chair for New German Literature, FU) and the “Berliner DoktorandInnenforum für Wissensgeschichte,” which took place in

2014 for the third time, co-organized by Professors Dupré (FU/MPIWG), van der Eijk (HU), te Heesen (HU), Lipphardt (FU/MPIWG), and Steinle (TU). Both workshops bring together doctoral students from Berlin institutions and match them with senior scholars by topic. Furthermore, the annotated list of all courses that are offered at the Berlin universities in the field of the history of knowledge (*Berliner Vorlesungsverzeichnis Wissenschaftsgeschichte*), co-organized by the MPIWG and published at the beginning of each semester (ca. 500 copies), has now become an indispensable tool for students and scholars alike in navigating Berlin's rich history-of-science landscape. It is also published on a website which is now also available in English and which regularly gives new information on Berlin's scholarly life in the history of science. Future plans include a new Berlin Center Colloquium starting in the spring of 2015, with a series of short presentations by the board members and extensive discussion on the by now established Berlin Center theme: the boundaries of knowledge and science.

Members of the Board of the Berlin Center 2013–2015

FU *Peter Geimer, Jutta Müller-Tamm*
 HU *Anke te Heesen, Philipp Felsch*
 TU *Friedrich Steinle, Hans-Christian von Herrmann*
 MPIWG *Lorraine Daston, Jürgen Renn (2013), Dagmar Schäfer (2014–2015)*



Three posters announcing the workshop programmes that were organized by the Berlin Center Postdocs in 2014.



Overview Berlin Center Postdoc Fellows (2013–2015)

- | | |
|-------|---|
| MPIWG | <ul style="list-style-type: none"> • <i>Michael Stanley-Baker</i> Charting Interior and Exterior Worlds: Towards a Social Geography of Medieval Chinese Healthcare • <i>Damien Janos</i> Between Harmony and Interference: Studying the Relation of Astronomy, Physics, and Metaphysics in the Works of Major Arabic Philosophers and Scientists (750–1200 CE) • <i>Rohan Deb Roy</i> „Imperial Insects: British Empire, Knowledge Networks and the Making of Medical Entomology, 1790–1920 |
| HU | <ul style="list-style-type: none"> • <i>Han Lamers</i> The Place of the Greek World. The Spatial Turn in Greek Studies (16th–17th cent.) • <i>Teri Chettiar</i> Inventing the Global Child |
| TU | <ul style="list-style-type: none"> • <i>Giuditta Parolini</i> Uncovering Statistical Knowledge in Experimental Research • <i>Cesare Pastorino</i> The Material Origins of Experimentation: Disciplines of Profit and the Rise of Empiricism in Early Modern Britain • <i>Thomas Morel</i> Markscheidekunst and Mathematics Teaching in the German Mining Academies |

Outreach Activities of the Institute

Journalist-in-Residence Program

In 2013, the Institute set up a new Journalist-in-Residence program. This program attempts to support journalism in the field of the history of science, to foster the communication of central themes in the history of science to the broader public, and to improve the dialogue of the history of science within the humanities, social sciences, and natural sciences. The MPIWG hopes to make its research more visible and actively attempts to develop new strategies to communicate ongoing research to a wider audience. At the same time, this program invites journalists to take advantage of library and research resources for their own projects and to allow dialogue between the journalists and the researchers at the Institute.

The MPIWG selected from over seventy applications six journalists for an extended stay of two months between 2013 and 2015. They were each assigned to one (or two) departments and research groups according to their intellectual interests. In addition to regular participation in department events, we also asked each of the journalists for a contribution to the Institute's life. Their contributions included seminars on topics such as “Communicating History of Science in/to the Media” (Klaus Taschwer), “What History of Science Can Contribute to the Media” (Alexander Mäder), and “Adventures in Communication: When Academics Speak to Journalists” (Sarah Everts); others, such as Thomas de Padova, were active in coordinating the Institute's press release on Galileo's 450th birthday. The seminars were very well attended by MPIWG research staff and encouraged new, lively debates about the relationship of research and journalism within the Institute. This new program received very positive responses from the journalists themselves. As Alexander Mäder pointed out in his Facebook blog (which he started while at the Institute), “One notices in the history of science that research could have happened differently if the researcher would have made other decisions. If a journalist knows these kinds of cases—this is my working hypothesis—perhaps he will ask different questions in his investigations on recent developments.”

Journalists-in-Residence 2013/2014

	News-Outlet	Stay at the MPIWG	Host Department
<i>Klaus Taschwer</i>	Der Standard	May–June 2013	MPRG Lipphardt/Dpt. Rheinberger
<i>Sarah Everts</i>	Freelance	Sept–Oct 2013	Dpt. 2
<i>Daniel Gross</i>	Freelance	Sept '13–Aug '14	Dpt. 2
<i>Alexander Mäder</i>	Stuttgarter Zeitung	Nov–Dec 2013	Dpt. 2
<i>Thomas de Padova</i>	Freelance	Jan–Feb 2013	Dpt. 1
<i>Andreas Bernard</i>	Süddeutsche Zeitung	Aug–Sept 2015	Dpt. 2

MPIWG in the Media

Not least because of the coverage from the new journalists, researchers at the MPIWG appeared regularly on international, national, and local media in 2013 and 2014 (75 appearances in total). They were invited to participate as experts on historical and recent developments in the sciences; they participated in radio interviews and appeared in news and topic-driven television programs; their work was frequently cited in newspaper articles; their books were reviewed in high-circulation journals; they received public recognition in special features of their projects; and they contributed work as authors. The MPIWG made a special effort in publishing two major press releases in 2014 on the occasion of Galileo's 450th birthday and on the occasion of the launch of Department III. The press releases consisted of substantial texts, authored by MPIWG research scholars, and were supplemented by video interviews that are still available at the MPIWG website and the MPG's YouTube channel. They received wide public attention.

Left: MPIWG press release on the occasion of the launch of Department III on October 17, 2014. Contributing authors: Dagmar Schäfer, Nina Lerman, Martina Siebert.

Right: MPIWG press release on the occasion of Galileo's 450th birthday on February 13, 2013. Contributing authors: Jürgen Renn, Jochen Büttner, Matteo Valleriani, Thomas de Padova.



Media Appearances 2013–2014 (Selection)

Entries with * indicate authorship of the MPIWG researcher

Newspapers

“Und der Mensch machte sich die Erde untertan,” article about the Anthropocene Project; *Tagesspiegel*, January 11, 2013.

* “Tippfehler vertiefen die Korrespondenz,” Andreas Mayer introduces the book about Sigmund Freud exchanging letters with the psychiatrist Eugen Bleuler from Zurich; *Frankfurter Allgemeine Zeitung*, March 2, 2013.

“Wird ‘Big Data’ zur Chiffre für den digitalen GAU?,” an article about the conference “Fragile Daten”; *Frankfurter Allgemeine Zeitung*, March 4, 2013.

“Der Traum von der weiblichen Elite,” an article about Christine von Oertzen’s new book; *Tagesspiegel*, March 27, 2013.

“Die Schrift des Lebens,” an article about Francis Cricks with input from Hans-Jörg Rheinberger and Soraya de Chadarevian; *Frankfurter Allgemeine Zeitung*, April 8, 2013.

* “Geschichten vom Todestrieb,” Andreas Mayer on Freud; *Frankfurter Allgemeine Zeitung*, May 8, 2013.

“Eureka,” an article on the new exhibition about Archimedes; *La Repubblica*, May 28, 2013.

* “‘Gleichgültigkeit gegenüber Forschung sitzt tief,’” the MPIWG’s Journalist-In-Residence Klaus Taschwer interviews the ERC’s president Helga Nowotny; *Der Standard*, May 28, 2013.

* “Und wir warten auf die Laureaten,” article by the MPIWG’s Journalist-In-Residence Klaus Taschwer on ‘Austrian Science’; *Der Standard*, May 29, 2013.

“Il genio di Archimede le macchine del futuro,” an online article on the new exhibition about Archimedes; *La Repubblica*, May 31, 2013.

“Der aufrechte Gang war nur der Anfang,” Andreas Mayer’s new book is reviewed by *Die Welt*, August 6, 2013.

“Software Forschung,” an article on the joint project Text-Grid; *Göttinger Tageblatt*, September 5, 2013.

“Und wenn ich geh, dann geht nur ein Teil von mir,” in this article Andreas Mayer’s book is being reviewed; *Frankfurter Allgemeine Zeitung*, September 16, 2013.

“Beständig verhindertes Fallen,” a review on Andreas Mayer’s new book; *Süddeutsche Zeitung*, September 24, 2013.

* “Für weltweite Ächtung des Klonens von Menschen,” Klaus Taschwer interviews Hans-Jörg Rheinberger about synthetic biology and biohacking; *Der Standard*, September 24, 2013.

“Expedition zum Urknall,” Jürgen Renn is cited in this article on physicists arguing about uniform laws of nature; *Die Zeit*, October 2, 2013.

* “Wissenschaftsgeschichte für alle—Das MPIWG in Berlin öffnet neue Zugänge zu alten Texten und neuen Studien,” an article on the MPIWG; *Der Standard*, November 6, 2013.

- * “Man kann heute ein bisschen mutiger sein,” an interview with Jürgen Renn on the globalization of science and its consequences; *Der Standard*, November 6, 2013.
- “Kulturschätze für alle,” Jürgen Renn on open access, and how it makes an impact on museums; *Der Tagesspiegel*, November 12, 2013.
- * “Ein Qualitätssiegel für Informationen,” Jürgen Renn on the future development of the internet into an “epistemic web”; *Frankfurter Allgemeine Zeitung*, November 21, 2013.
- * “Das zerplatze Atom,” Dieter Hoffmann on the research of neutral fissions in Berlin Dahlem in the 1930s; *Der Tagesspiegel*, December 17, 2013.
- “Wie Galileo Galilei mit dem Fernrohr das Weltbild veränderte,” an article for children portraying the mathematician Galileo; *Thüringische Landeszeitung*, February 4, 2014.
- * “Aufstieg und Fall eines Himmelsstürmers,” Journalist-in-Residence Thomas de Padova on Galileo Galilei; *Der Standard*, February 12, 2014.
- * “Kolumbus des Himmels,” Journalist-in-Residence Thomas de Padova recapitulates Galileo’s work; *Der Tagesspiegel*, February 14, 2014.
- “Auf Umwegen zur Revolution,” an article about Galileo Galilei quoting Jürgen Renn; *Süddeutsche Zeitung*, February 15, 2014.
- “Er sah dem Mond ins Gesicht,” an article on Galileo quoting Jürgen Renn; *Sächsische Zeitung*, February 15, 2014.
- “Gegen den Starrsinn der Kirche,” an article on Galileo Galilei quoting Jochen Büttner; *Stuttgarter Zeitung*, February 15, 2014.
- * “Wir sollten immer offen für Zufälle sein,” an interview with Lorraine Daston by Journalist-in-Residence Klaus Taschwer; *Der Standard*, March 4, 2014.
- “Als Dr. Seltsam einmal gegen Chruschtschow spielte,” a review of Lorraine Daston’s new book *How Reason Almost Lost Its Mind. The Strange Career of Cold War Rationality*; *Frankfurter Allgemeine Zeitung*, April 12, 2014.
- “Erinnerung an Niklas Luhmann,” Lorraine Daston is awarded with the Bielefelder Wissenschaftspreis; *Neue Westfälische*, May 15, 2014.
- “Sommersitzung der Göttinger Akademie der Wissenschaften,” Lorraine Daston has received the Lichtenberg-Medaille; *Göttinger Tageblatt*, June 23, 2014.
- “La Rivincita del Rinascimento,” *Corriere della Sera* interviews Jürgen Renn on the impact of the Renaissance on European identity; *Corriere della Sera*, August 18, 2014.
- “Viel Geschichte in Lunz,” a report about the history of the Biologische Station Lunz referring to Hans-Jörg Rheinberger; *Niederösterreichische Nachrichten*, October 27, 2014.
- “Einstein va anotar al dibuix de la nena: ‘La meva és morta’”—(“Einstein shows that nobody can discover anything in isolation”), Jürgen Renn is interviewed on Einstein’s manuscripts in *La Vanguardia*, October 31, 2014.
- “Das beste Fach von allen!” Lorraine Daston, who has received the Bielefelder Wissenschaftspreis, is interviewed by *Westfalen-Blatt*, November 4, 2014.
- “Auszeichnung für Lorraine Daston,” Lorraine Daston, Director at the MPIWG, received the Bielefelder Wissenschaftspreis 2014; *Neue Westfälische*, November 4, 2014.

“Vereint forschen,” an artikel on the recent changes of scientific institutions in Berlin, referring to Dieter Hoffmann; *Berliner Morgenpost*, November 9, 2014.

“Einsteins Netzwerke,” Einstein’s estate is accessible online, an article by Jürgen Renn; *Frankfurter Allgemeine Sonntagszeitung*, December 7, 2014.

“Die DNS von Dahlem,” Hans-Jörg Rheinberger is quoted in this article about the 50-year-anniversary of the Max Planck Institute for Molecular Genetics; *Tagesspiegel*, December 8, 2014.

Magazines

“Zeit für Geschichte,” portrait of Lorraine Daston; *duz Magazin*, January 1, 2013.

“Le divan animé,” interview with Andreas Mayer; *Zibeline*, February 2, 2013.

“Objects and (their) time,” an interview with Lorraine Daston; *MOUSSE* 37, March 1, 2013.

“Das trügerische Wissen,” an interview with Lorraine Daston; *Wirtschaft & Wissenschaft*, April 1, 2013.

“Monster, Marvels, and the Birth of Science,” Lorraine Daston, Executive Director at the MPIWG, is interviewed by Steve Paulson for *Nautilus*, August 1, 2013.

“Was unseren Gang ausmacht,” an interview with Andreas Mayer by *Wirtschaftswoche*, August 17, 2013.

“Entschleunigung täte gut,” says Hans-Jörg Rheinberger being interviewed on scientific knowledge by *Horizonte*, September 9, 2013.

“Wie spielt man mit Zufällen, Herr Rheinberger?” is one of the questions in an interview with Hans-Jörg Rheinberger by the *Philosophie Magazin* 5/13, September 9, 2013.

“Von klugen Pferden und einfältigen Mediennutzern,” a report on the symposium of the cogito foundation and Hans-Jörg Rheinberger’s presentation; *Universität Zürich News*, September 13, 2013.

“Die Natur ist unwiderstehlich,” Lorraine Daston is interviewed about our understanding of nature; *Mitteilungen des ZiF*, January 14, 2014.

“Keine Hexerei,” Sven Dupré, Research Group Director at the MPIWG, is interviewed by *Kulturmagazin des Westens*, April 30, 2014.

“Warum sollte die Natur sich rächen?” Lorraine Daston is interviewed about our changing understanding of natural catastrophies; *Psychologie Heute*, May 7, 2014.

* “Mit den Händen denken,” Hans-Jörg Rheinberger on the innovative capacity of experiments; *OrganisationsEntwicklung*, July 18, 2014.

“Junges und altes Wissen in Kooperation,” Hans-Jörg Rheinberger is interviewed by *Kulturmanagement Magazin*, July 28, 2014.

Radio

“Geschichten aus dem brutalistischen Ufo,” a radio feature on the architecture of the former Czech embassy, later the first home of the MPIWG; *Dradio Kultur*, June 25, 2013.

“Entscheidet der Zufall mein Leben?” was the title of conversation between Hans-Jörg Rheinberger, director at the MPIWG and the philosopher Wolfram Eilenberger at the German *Dradio Kultur*, July 17, 2013.

“Schaut den Baumeistern auf die Finger!” An interview with Jürgen Renn; *Österreichischer Rundfunk*, October 8, 2013.

“Silk,” Dagmar Schäfer is being interviewed in a radio show by the *BBC*, October 30, 2013.

“Forschung Wissen ist erst dann Wissen, wenn andere daran teilhaben,” Jochen Büttner, director of a junior research group at TOPOI, on shared knowledge in Antiquity; *Deutschlandfunk*, November 21, 2013.

* “Thomas de Padova: ‘Leibniz, Newton und die Erfindung der Zeit,’” a review on the new book by the MPIWG’s Journalist-in-Residence, Thomas de Padova; *SWR2*, January 8, 2014.

“‘Ich habe abgeschworen.’ Der Fall Galilei,” an interview with Jochen Büttner; *Österreichischer Rundfunk* (ORF1), February 12, 2014.

“450. Geburtstag Galileo Galilei,” an interview with Jürgen Renn; *RBB Inforadio*, February 16, 2014.

“Burnout am schwarzen Loch,” Jürgen Renn is quoted in this radiofeature about black holes; *Deutschlandradio Kultur*, December 18, 2014.

TV

“Die Akte Galilei—Wissenschaft und Glaube,” an interview with Matteo Valleriani; *Österreichischer Rundfunk* (ORF2), February 11, 2014.

“Deutschlands Chemiewaffen—Forschung seit dem 1. Weltkrieg,” Florian Schmaltz, research scholar at the MPIWG, is interviewed on the research of toxic gas since World War I by *rbb TV*, March 24, 2014.

“Dunkle Seite der Chemie,” Jürgen Renn speaks in this broadcast on Fritz Haber; *3sat*, June 27, 2014.

“Scobel: Krise in den Wissenschaften?” Jürgen Renn speaks as guest in a talkshow about changes and problems in science; *3Sat*, December 1, 2014.

Online

“Wir sind die DDB: Das Max-Planck-Institut für Wissenschaftsgeschichte in Berlin,” portrait of the MPIWG Berlin; *Deutsche Digitale Bibliothek*, February 11, 2013.

“Source Reflection #5: Programmieren als Experiment—Laborverhalten,” a new experimenting way of programming is being discussed in this article citing Hans-Jörg Rheinberger; *heise developer*, November 20, 2013.

“Open Access soll restliche 90 Prozent schaffen,” a blog article on the 10 years anniversary of the Open Access Declaration cites Jürgen Renn; *solarify*, November 22, 2013.

“450 Jahre Galileo Galilei,” an editorial on the MPIWG’s work about Galileo; *scinexx.de*, February 14, 2014.

“Vom Lautenspieler zum Mathematiker,” Jürgen Renn is quoted in this article on Galileo’s career; *scinexx.de*, February 14, 2014.

* “Eine Orgelpfeife als Teleskop,” Matteo Valleriani on Galileo’s achievements in telescopic astronomy; *scinexx.de*, February 14, 2014.

* “An den Gezeiten gescheitert,” Jochen Büttner on Galileo studying the tides; *scinexx.de*, February 14, 2014.

* “In Galileis Gedankenwerkstatt,” Jürgen Renn writes about Galileo’s “Discorsi”; *scinexx.de*, February 14, 2014.

“450 Jahre Galileo Galilei,” an editorial on the MPIWG’s work about Galileo; *scinexx.de*, February 14, 2014.

“Open Access revolutioniert die Wissenschaft,” article with MPIWG director Jürgen Renn about the meaning of Open Access for science on occasion of the release of the new science platform “ScienceOpen”; *Deutsche Welle*, May 7, 2014.

“Jürgen Renn: ‘He lluitat durant tota la meva vida científica per obrir el coneixement’—(“Open knowledge”), Jürgen Renn participates in a roundtable on the future of the humanities in Barcelona; *Universitat Pompeu Fabra*, October 21, 2014.

“Jeder universalgelehrt?” Jürgen Renn is interviewed on the role of digital media, in: “Revolution—Die Wissensshow zur digitalen Gesellschaft,” a publication of the Science Year 2014, October 27, 2014.

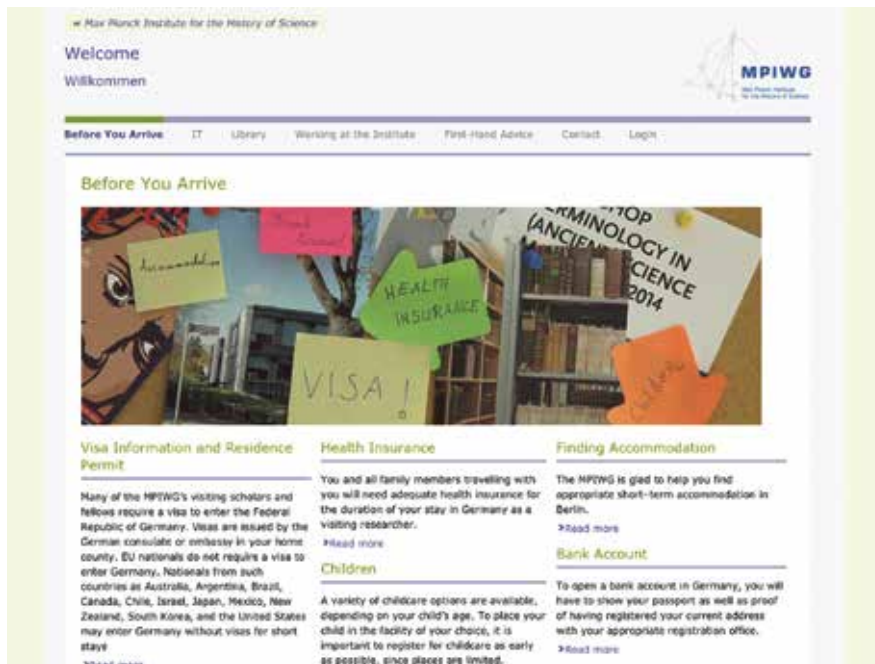
“Geschichte der Wissenschaften. Ein Blick in die Vergangenheit und Zukunft der Wissenschaft,” Annette Vogt reflects in a podcast on the history of science; *forschergeist*, November 3, 2014.

“Sound Signatures 2014: From Hearing Tubes to Computer Hacking,” conference report by Anna Kvičalová, co-organized by Viktoria Tkaczyk (MPIWG); *sensory-studies*, November 27, 2014.

“Tagungsbericht: Wachstum ohne Alternativen? Geschichtskulturelle und wissenschaftliche Dimensionen von Wachstumsnarrativen,” a report on the recent conference of the same name at the MPIWG; *hsozkult*, December 20, 2014.

Website Developments

In 2013, the MPIWG relaunched its website, with a revision of the front page and a new launch of its “Resources” pages and of its research portal. The goals of this re-launch were to increase the visibility of publications, to create a single gateway to the sources made available at the website, and to improve the accessibility of research projects in general. In this context, a new internal website was published: “Welcome Website.” On the initiative of the scholars’ representative, Christine von Oertzen, the Institute now has a platform for all of its guests where they can find information on all matters concerning their visit: from visa applications to information on housing, from childcare facilities around the Institute to helpful tips on shopping in the vicinity of the Institute. This website is accessible once the researcher has accepted the Institute’s invitation, and it also contains a large section with reports written up by researchers after their stay, describing how things work from their perspective. These projects were co-planned and realized with the help of Ulla Drenckhan, who also substituted for Hansjakob Ziemer during his parental leave of absence (February–July 2014).



Since 2014, the “Welcome Website” provides information and help to newcomers to the MPIWG.

Research Topics Online and In Print

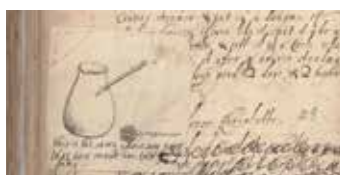
The MPIWG has continued to publish its by now well-known format “Research Topics.” Every six to eight weeks, research fellows present individual contributions on one relevant aspect of their research or present a new research project. “Research Topics” appears on the home page of the Institute’s website and in a printed version available in the MPIWG’s entrance hall. The online version makes the latest research easily available and provides links to sources, databases, audiovisual material, publications, authors, and partner institutions. Published in German and English, the collection of research topics gives a representative picture of the ways in which research is conducted at the Institute. Since its inception in 2008, the Institute has published 37 “Research Topics,” and they have been available in brochure form since 2013. The full archive is also available online at: www.mpiwg-berlin.mpg.de.

Research Topics 2013–2014



No. 29 Metallurgy, Ballistics and Epistemic Instruments

Historian of science Matteo Valleriani has published a new edition of *Nova scientia* by the mathematician Nicolò Tartaglia that sheds new light on the emergence of ballistics as consequence of technological innovations around 1500.



No. 30 How Recipes Created Knowledge in Early Modern Households

In a new project, historian of science Elaine Leong studies hundreds of medical notebooks in order to understand home-based knowledge and practices in the scientific world of early modern England.



No. 31 Looking at Diversity

The Max Planck Research Group *Twentieth Century Histories of Knowledge about Human Variation*, directed by Veronika Lipphardt, has invited Katrin von Lehmann as an artist-in-residence to contemplate the role of visualizations in the study of human variation.



No. 32 Ancient Balances at the Nexus of Innovation and Knowledge

A new junior research group at TOPOI, led by historian of science Jochen Büttner, will study the relationship between practical and theoretical knowledge in antiquity.



No. 33 Historicizing Big Data

A new working group examines data practices and epistemologies across many current disciplines to explore continuities and ruptures in the emergence of data-driven science.



No. 34 Galileo's Laboratory of Ideas

New studies on Galileo Galilei carried out at the MPIWG reveal the role played by practical knowledge in the seventeenth century's Scientific Revolution.



No. 35 Making Genetics Human

Historian of science Jenny Bangham argues that many of the questions and techniques of contemporary human genetics were first established between 1920 and 1960, when the only human characters with clear-cut inheritance were blood groups.



No. 36 Rooting Language Family Trees

Historian of science Judith Kaplan studies the encounters of linguists, anthropologists and biologists in their search for human origins.



No. 37 Is Bigger Better

A new department directed by Dagmar Schäfer studies the history of artifacts, action, and knowledge and starts with a project on the histories of planning.

Preprints

-
- 437** *Jürgen Renn* Schrödinger and the Genesis of Wave Mechanics
-
- 438** *Pietro Daniel Omodeo* “L’iter” europeo del matematico e medico scozzese
Duncan Liddel
-
- 439** *Irina Tupikova & Klaus Geus* The Circumference of the Earth and Ptolemy’s World Map
-
- 440** *Pietro Daniel Omodeo und Jürgen Renn* Das Prinzip Kontingenz in der Naturwissenschaft der Renaissance
-
- 441** *Horst Kant und Jürgen Renn* Eine utopische Episode—Carl Friedrich von Weizsäcker in den Netzwerken der Max-Planck-Gesellschaft
-
- 442** *William G. Boltz and Matthias Schemmel* The Language of ‘Knowledge’ and ‘Space’ in the Later Mohist Canon (TOPOI—Towards a Historical Epistemology of Space)
-
- 443** *Stefano Bordoni* Looking for a Rational Thermodynamics in the late XIX century
-
- 444** *Sonja Brentjes and Jürgen Renn* The Arabic Transmission of Knowledge on the Balance
-
- 445** *Horst Nowacki* Archimedes and Ship Design
-
- 446** *Matthias Schemmel* Elements of a Historical Epistemology of Space (TOPOI—Towards a Historical Epistemology of Space)
-
- 447** *Martin Thiering and Wulf Schiefenhövel* Spatial Concepts in Non-Literate Societies: Language and Practice in Eipo and Dene Chipewyan (TOPOI—Towards a Historical Epistemology of Space)
-
- 448** *Jürgen Renn* Einstein as a Missionary of Science
-
- 449** *Hubert Laitko* Der Ambivalenzbegriff in Carl Friedrich von Weizsäcker’s Starnberger Institutskonzept
-
- 450** *Stefano Bordoni* When Historiography met Epistemology. Duhem’s early philosophy of science in context
-
- 451** *Renate Wahsner* Tausch—Allgemeines—Ontologie oder Das Auseinanderlegen des Konkreten und seine Aufhebung
-
- 452** *Jens Høyrup* Algebra in Cuneiform. Introduction to an Old Babylonian Geometrical Technique
-
- 453** *Horst Nowacki* Zur Vorgeschichte des Schiffbauversuchswesens
-
- 454** *Klaus Geus and Mark Geller* (eds.) Esoteric Knowledge in Antiquity (TOPOI—Dahlem Seminar for the History of Ancient Sciences Vol. II)
-
- 455** *Carola Sachse* Grundlagenforschung. Zur Historisierung eines wissenschaftspolitischen Ordnungsprinzips am Beispiel der Max-Planck-Gesellschaft (1945–1970)
-
- 456** *David E. Rowe and Robert Schulmann* General Relativity in the Context of Weimar Culture
-
- 457** *F. Jamil Ragep* From Tūn to Turun: The Twists and Turns of the Ṭūsī-Couple
-
- 458** *Pietro Daniel Omodeo* Efemeridi e critica all’astrologia tra filosofia naturale ed etica: La contesa tra Benedetti e Altavilla nel tardo Rinascimento torinese
-



459 Simone Mammola Il problema della grandezza della terra e dell'acqua negli scritti di Alessandro Piccolomini, Antonio Berga e G. B. Benedetti e la progressiva dissoluzione della cosmologia delle sfere elementari nel secondo '500

460 Stefano Bordonni Unexpected Convergence between Science and Philosophy: A debate on determinism in France around 1880

461 Angelo Baracca Subalternity vs. Hegemony – Cuba's Unique Way of Overcoming Subalternity through the Development of Science

462 Eric Hounshell & Daniel Midena "Historicizing Big Data" Conference, MPIWG, October 31 – November 2, 2013 Report

463 Dieter Suisky Emilie Du Châtelet und Leonhard Euler über die Rolle von Hypothesen. Zur nach-Newtonschen Entwicklung der Methodologie

464 Irina Tupikova Ptolemy's Circumference of the Earth (TOPOI – Towards a Historical Epistemology of Space)

465 Irina Tupikova, Matthias Schemmel, Klaus Geus Travelling along the Silk Road: A new interpretation of Ptolemy's coordinates

Library

HEAD OF LIBRARY *Urs Schoepflin* (until March 2015)



Overview

The Library's mission is to provide the best possible information services to the research groups of the Institute and to create and maintain optimal access to both print and electronic resources and tools. It aims to develop effective services and infrastructures for research in the history of science by exploiting the potential of traditional and new media for scholarly work and for disseminating research results.

With the rapidly growing importance of scholarly content that is available online, libraries—building on their strengths and expertise in collection building and dissemination—are shaping new roles and practices throughout the entire scholarly communication chain. The open sharing of content and data has become another crucial library activity.

To meet the evolving needs of the existing research groups at the Institute and to integrate the topics of new groups, particular attention was given to the following key areas: (a) continuous development of the collections, content provision, and services; (b) enhanced acquisition and curating of digital content and sources, and development of appropriate access systems; (c) support of scholarly publication and dissemination activities by copyright clearing services and additional publication aids with a special focus on implementing the Max Planck Society's open access policy; and (d) extension of the collaborative network of the Library through outreach activities. The Library thus continues to develop into a universal information instrument, covering the widespread needs of a multidisciplinary research area and extending its

services to the entire scholarly information cycle. It is prepared to flexibly master new bodies of knowledge as new research directions and themes appear. For the technical development of the Library, the collaboration with the IT Group has proved instrumental. The years 2013 and 2014, in particular, focused on consolidating existing development projects and preparing the library system to migrate into a unique scholarly discovery framework that will constitute a primary gateway to trusted content.

The Library's Collections and Services

The Library's physical collections currently hold 75,000 volumes in print and 25,000 historic works and materials in microform. In addition to the systematic collection building policy in line with the scholarly needs of the Institute, as in past years the print collection has benefited from special book collections endowed to the Library, in particular, items of the private library and archive of Peter Damerow. These unique kinds of collections are of particular interest because they reflect the special approach of the collector or the collecting body to specific thematic areas relevant to research at the MPIWG.

In addition, original archival resources contain some 10,000 items, mainly papers of physicists of the first half of the twentieth century (Gehrcke collection, Rupp correspondence, Einstein letters), the majority of which are made available in digital form. With recent additions, the Gehrcke collection constitutes the most important collection of Gehrcke materials.

Access to electronic resources includes over 30,000 electronic journals, more than 200 full-text and reference databases, and 500,000 scholarly e-books, largely as a result of the basic information provision of the Max Planck Digital Library (MPDL) and of the ongoing National Licensing Program of the German Research Foundation (DFG).



Library services and scholarly information cycle.

Complementing the access to these holdings and resources, the interlibrary loan service continues to be in high demand and has maintained a level of between 10,000 and 12,000 loans per annum. This special service priority of the Library allows for rapid document delivery, providing books and articles from a wide network of national and international research libraries within days of a scholar's request and responding flexibly to new thematic user needs. Thus, the Library represents a central node of an information network—which currently extends to the holdings of well over 500 individual libraries worldwide—that flexibly brings together information from a wide range of relevant sources and makes content available to scholars at the MPIWG and at its collaborative research centers.

Digital Research Library and Acquisition of Digital Content and Sources



Harriot manuscript "The Moon"; private collection Lord Egremont.



Access to digital sources and other materials has become crucial for research in the history of science. To address this issue, the Library has unfolded a multilayered strategy to enhance acquisition and access to digital content and sources. The strategy includes several elements:

The Library has further developed the special program for digitizing and presenting sources in the history of science in high-quality color facsimiles from the Library's rare books collection and in greyscale images from the microform archive. All digitized materials are made available in a Web-based Digital Research Library. The program includes the establishment of a special digitization group within the Library, which is equipped and qualified to digitize material at a high professional standard at

a rate of 500,000 pages per annum. The service, designed to flexibly react to new demands in the short term, is working closely with the research groups at the Institute that present their research on the Internet and that can immediately integrate the digitized sources in their presentation.

The ECHO open access infrastructure (<http://echo.mpiwg-berlin.mpg.de>; ECHO – Cultural Heritage Online; responsible project coordinator: Simone Rieger) is the Institute’s central digital research environment for uploading and openly presenting sources on the Internet and at the same time for offering appropriate scholarly tools to work with the digital sources. It is a widely recognized flagship repository for historic material, making some 200,000 items available to a scholarly public. → p. 249

To maintain it at a high level of performance, the Library, together with the IT Group, is rebuilding the ECHO infrastructure and its functionalities, focusing on the integration of innovative tools developed by the IT Group in the framework of activities in the Digital Humanities (TextGrid and DARIAH-DE). The Library maintains the central repository of metadata of all digital objects created at the Institute, which includes consistent information on copyright and permissions by systematically attributing Creative Commons licenses. → p. 248ff

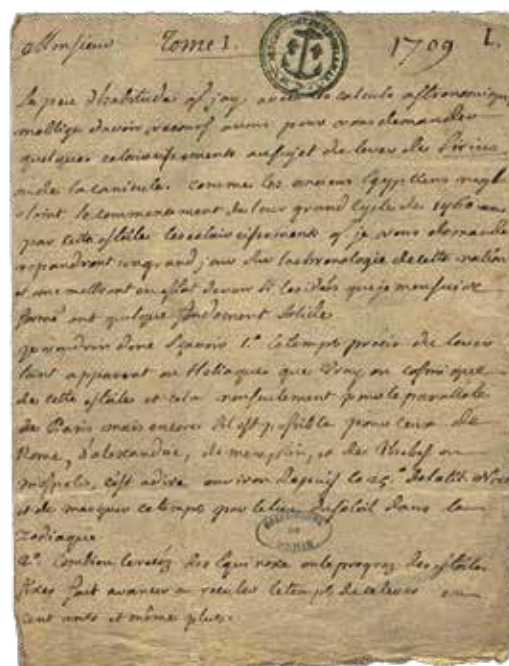
ECHO materials and other digital objects of the Institute are made known to a larger national and international audience by the uploading of more than 1,400 digital facsimiles and video recordings to Deutsche Digitale Bibliothek (DDB) and to Europeana.

Delisle correspondence; Bibliothèque de l’Observatoire, Paris.

The Library is redesigning its system in order to address the need for integrated access to the multitude of content created internally and externally—for example, CrossAsia—and to allow for flexibly using taxonomies developed in the research groups with the library collections. The search environment will concentrate in a first step on the central metadata repository of all digital objects, the library catalog, preprint series, PubMan publication repository, archival resources, data from ECHO and from other research databases at the Institute, and data resulting from full-text conversion. Thus, for the first time, access to these highly focused resources will be possible through a single search environment.

The Library’s investment into professional mobile digitization equipment and its expertise in systematically digitizing source materials on remote sites yielded in a number of campaigns in institutions or in private collections to make these items available to scholarly research. Special highlights were the digitization of the Hilprecht Archive and Cuneiform Collection at Jena University (using also 3-D scanning, in cooperation with Jena University and Department I), the digitization of the collection of Arabic scientific manuscripts at the Berlin State Library (in cooperation with the ISMI project of Department II and McGill University, Canada), and the digitization of the correspondence of the French astronomer Joseph-Nicolas Delisle, held at the Bibliothèque de l’Observatoire, Paris. → p. 94

The Library has been granted exclusive access in digitizing the unique Harriot manuscript collection held by Lord Egremont at Petworth House, West Sussex, in the → p. 247

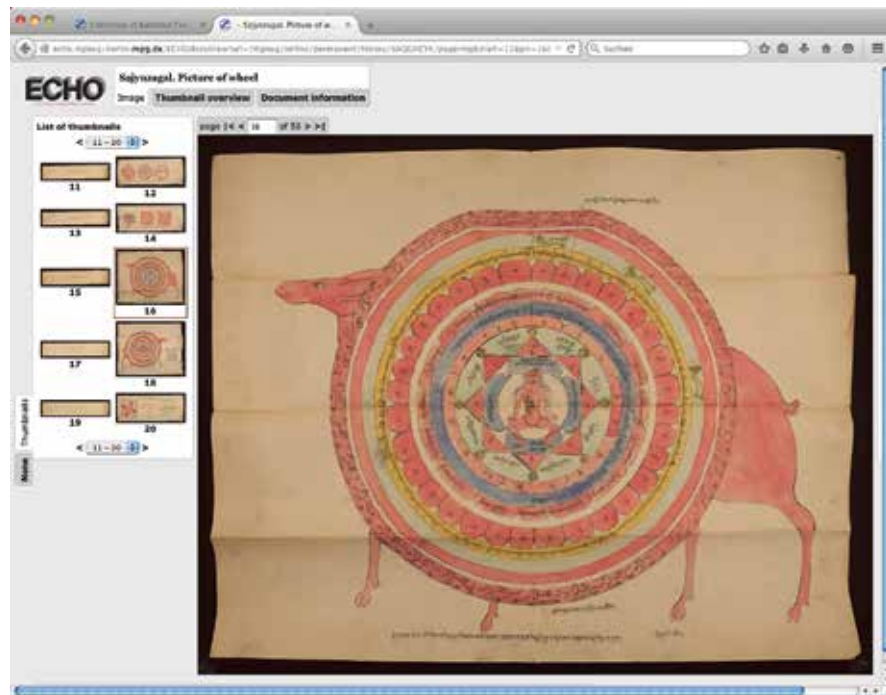


United Kingdom. These manuscripts now filled in the blanks of the Harriot manuscript collection of the British Library already available in ECHO, and for which a new contract allowing for permanent open presentation and reuse has been negotiated with the British Library. In addition, the Library is involved in the XML text acquisition and XML structuring of primary source works in Western languages as well as in Chinese. This work is performed in cooperation with the IT Group and the research groups at the MPIWG.

→ p. 58

Finally, the Library has been intensively involved in designing and implementing the digitization workflow for the project “History of the Max Planck Society” and installing two dedicated groups in Berlin and Munich for digitizing archival materials.

Support of the Scholarly Publication and Alternative Dissemination Process



Sajynzgal, picture of wheel, Mongolian manuscript; Mongolian Academy of Sciences.

In carrying out the Max Planck Society’s open access policy, the Library took on the responsibility for uploading the Institute’s bibliography and publication output (metadata and documents) to the Max Planck Society publication server PuRe. On this server, the searchable bibliographic data and—depending on the individual authors’ agreements—the full text of the research results, presentations, and so forth, are made available for either internal or open use. Data curating throughout the life cycle of the documents is also part of the Library’s responsibility to secure long-term availability and enhanced international visibility of the Institute’s research output.

To foster awareness and acceptance of open access publishing, the Library offers guidelines for MPIWG scholars, with information on the open access process, publishing standards, electronic publishing on the repository, legal issues, copyright

transfer agreements, and recommendations of what rights to retain, and has held several seminars with hands-on information. Since December 2014, Simone Rieger is Open Access Ambassador of the Max Planck Society.

With Edition Open Access (<http://www.edition-open-access.de>), a major desideratum for peer-reviewed open access publishing of monographs is addressed (see Department I). The Library is actively involved both in developing the concept and in negotiating and providing access to sources to be included in the edition. In the framework of the commented source series Edition Open Sources (<http://www.edition-open-sources.org/>), developed through the close collaboration of Department I and the Library with the University of Oklahoma in the United States, the head of the Library serves as one of the editors.

Furthermore, in an effort to concentrate content production and rights management, the responsibility for the media library was given to the Library. This responsibility, assumed by Hartmut Kern, includes the production, editing, and archiving of audio and video recordings of talks and conferences at the Institute. The video material is disseminated as part of the public outreach of the Institute. At the same time, the concept of a media journal as an innovative medium to document current research is being explored in collaboration with Department III.

Outreach Activities

The Library was involved in several collaborative projects. The two paramount aims of cooperating with research and cultural institutions are, on the one hand, the sharing of rare and manuscript materials in order to enhance access to these resources for research purposes and, on the other hand, the transfer of skills by sharing expertise in maintaining digital projects in order to make these resources available on the Internet.

In a number of international collaborations, the Library employed its expertise in digitizing and in making available cultural heritage materials on the Internet. The Library is working closely with the MPIWG's partners at the Institute for the History of Natural Sciences at the Chinese Academy of Sciences in Beijing in digitizing collections, which includes advisory meetings and training sessions in Beijing and Berlin. The cooperation with the Competence Center for Digitizing Cultural Heritage at the Mongolian Academy of the Sciences in Ulaanbaatar, which was implemented and guided by the Library in the framework of a cooperation Agreement be-

Talk at "Science 2.0" conference, Hamburg 2014.



tween the Mongolian Academy of Sciences and the Max Planck Society, has resulted in the digitization of several key manuscripts held in Mongolia. The Library's key concepts are communicated in many different ways. In particular, its basic ideas were conveyed during several expert visits from Germany and abroad.

With its involvement in library education, the Library is assuming another responsibility: it offers internships on a regular basis to students in library and information science who are preparing for a career in modern library management. These internships provide an efficient means for transferring our concepts into library education, a fact that is reflected in subsequent master's and diploma theses. In addition, Urs Schoepflin frequently gives presentations at Berlin universities, the Berlin State Library, and professional meetings. He also was invited to give talks and lectures on library concepts, on ECHO (together with Simone Rieger), and on open access publishing at such institutions as Villa Vigoni, Italy; the University of Oklahoma, USA; the Rijksmuseum in Amsterdam, The Netherlands; the International Conference on "Science 2.0" in Hamburg, Germany; and on digitizing Mongolian cultural heritage at the University of Bonn, Germany (together with Simone Rieger).

As a member of the Expert Advisory Board of the German Digital Library (Deutsche Digitale Bibliothek), he provides advice on its development from a scholarly perspective.

Finally, the Library is actively involved in the discussions on the concept of the Max Planck Digital Library (MPDL). The strategic cooperation with the MPDL will provide the necessary support for further generalizing and maintaining the services developed at the Institute, integrate new services, and secure the long-term availability and archiving of the scholarly results in a reliable and stable environment so crucial to research.

Library Team, from left to right:
Beate MacPhail, Hartmut Kern,
Sabine Bertram, Ralf Hinrichsen,
Simone Rieger, Ellen Garske,
Matthias Schwerdt, Urte Brauckmann,
Ruth Kessentini, Anke Pietzke,
Urs Schoepflin.



Digital Humanities

Dirk Wintergrün

Introduction

In the years 2013–2014, our work focused on the preparation phase of Department III, preparation for new research groups, and a major review of the Institute’s digital infrastructure. As a consequence of this review, it was decided to migrate major elements of the infrastructure to a new system to ensure its sustainability and to simplify the maintenance of the system. → p. 115

This effort is intended to recalibrate the line between the maintenance and the development aspects of the Institute’s research infrastructure by employing widely used state-of-the-art standard solutions, thus freeing resources for the development of genuinely new tools to support the Institute’s research. The process of finding adequate standard solutions and migrating the existing in-house developments also required resources in this period, but this change will ensure the freeing of resources for the development of new solutions in the coming years.

The work on standardizing, integrating, and publishing the database as research tools and research outcomes has been continued, and new websites were publicly launched. Conceptual work on how to deal with large corpora and distributed sources has been pursued in order to prepare new lines of research in all departments of the Institute. This work involves planning the hardware infrastructure but also investigating the application of new methods and technologies from the digital humanities to tackle these problems. Research at the Institute is traditionally based on large and heterogeneous corpora, which lead to the early involvement of the Institute in large-scale digital methods. In the meantime the focus has shifted from making these sources externally and internally available—which is still a prerequisite—to researching methods of working with these large-scale sources. This new focus has also become a topic in the wider realm of digital humanities, often referred to under the catchword “big data.” In this context, big is meant in the sense of variety and velocity, but more increasingly also in volume. Hence, the amount or the structure of the data is too complex to be handled by the traditional means of “close reading.” Ways must be found to support “distant reading” or, more generally, to process data algorithmically without violating the standards of critical methods in the humanities. In the projects of all departments, these methodological questions have become increasingly important (e.g., local monographs, ISMI and IGY, “History of the Max Planck Society,” Sphaera).

Providing Data for Research

→ p. 157

The ColourConText database has been developed to facilitate the consultation and exploitation of the large corpus of recipe collections, making sources available by means of transcriptions, translations, and digital images (Sylvie Neven, Sven Dupré, Dirk Wintergrün). Thanks to subject classification, keywords can be used when researching specific recipes, methods, or materials. The database's different thesauri allow users to combine an ingredient with a specific technique, mentioned in a limited geographical/chronological framework, when making their search. The database was publicly launched in November 2014. Work on the database of the Islamic Scientific Manuscripts Initiative (ISMI) has continued. A public front-end for navigating the collection and a new flexible viewer for the digital reproductions of codices have been developed. On the conceptual level, we have spent time continuing the work on modeling the data to reuse for network analysis and publishing as linked open data (Jamil Ragep, Sally Ragep, Jorge Urzúa, Robert Casties, Dirk Wintergrün).

→ p. 94

For the project "History of the Max Planck Society," a complex but flexible data model and database infrastructure have been designed which will help manage digital archival material in connection with relevant metadata as persons and institutions (Juliane Stiller, Sebastian Kruse, Dirk Wintergrün, Florian Schmaltz). The infrastructure is intended to support the management of the digitization workflow but also support the analysis of the material by providing search facilities, optical character recognition support (OCR) and analyzing tools such as topic modeling and clustering tools (see below). To ensure the longevity of the project results on both the content level and the technical and conceptual level, the design is meant to be as general as possible so that it can be reused in other projects and for the general digital infrastructure of the Institute. It matches the challenges in Department III, where heterogeneous metadata from different sources have to be integrated into one research environment (Shih-Pei Chen). The prototyping of these structures was completed over 2013 and most of 2014, and implementation began in mid-2014.

→ p. 58

Data structures are documented in OWL. The data of the different databases are transformed in RDF as an archival and exchange format. As described in the research report for the period 2011–2012, the current RDF standards are only partially able to deal with the challenges of representing and processing historical data. We therefore combine a combination of a pragmatic and a more rigorous approach to overcome this situation and, importantly, make it possible to develop solutions as they are needed in the process of building the tools and databases for the project. We use OWL in this context as a pragmatic tool to describe data, but not dogmatically in so far that we are not enforcing the formal consistency of the data model. We take this approach mainly because of the shortcomings of OWL in dealing with the inconsistencies of data which result not from errors in cataloging but from contradicting or erroneous original information given by the sources used in historical research.

→ p. 132

The data are also available in a triple store and can be queried in SPARQL. Although we foresee that this technology is the most promising strategy to ensure the long-term availability of structured research data, so far the tools to work with the data in RDF are not available to the researchers. While development in this area is ongoing, the front ends have been developed with the use of traditional technologies—for the

most part, SQL-based back ends—so that they can work with the data driven by the research needs of particular projects. Nevertheless, the data structure allows for easy migration of the data into more sustainable formats.

To overcome the shortcomings of existing standards of describing and encoding historical data, the Institute is involved in different research projects on the national and international levels (DM2E, DARIAH).

Full Texts: Transcription Assistance, OCR, and Text Mining

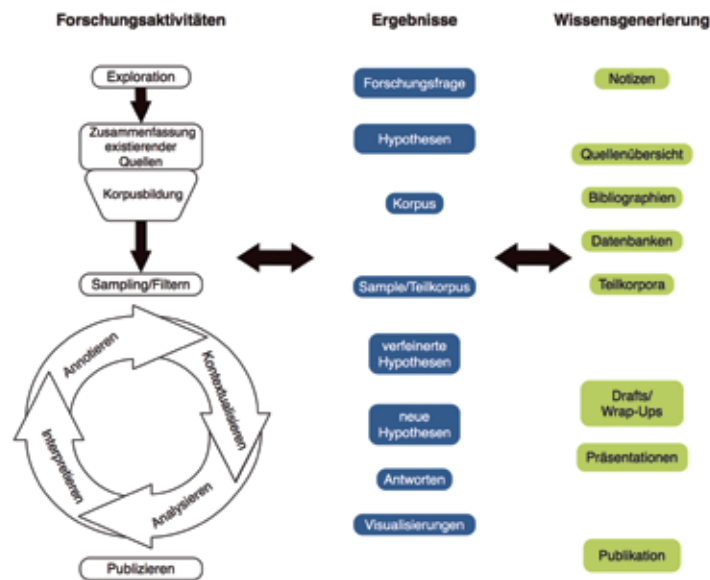
With the increase in the number of documents to be analyzed (see “History of the Max Planck Society,” IGY) → p. 58, it is becoming more and more pressing to find ways to analyze text that are supported by digital technologies. In recent years the Institute has already begun to use text extracted by optical character recognition (OCR). Depending on the properties of the original material, the outcome of the OCR process may still require improvement; but with the acquisition of new software for this purpose, the error rates have decreased, so that it is possible to apply text-mining tools to the resulting text. To this end, tools developed in the framework of corpus linguistics and computer philology were tested to recognize named entities in the text and make them available for searching. For the classification of documents prior to a detailed “manual” analysis of their content, experiments on the application of topic modeling techniques have been conducted with promising results (IGY, “History of the Max Planck Society”).

Supported by the European Project “Digitised Manuscripts to Europeana” (DM2E), the collection of manuscripts of Thomas Harriot could be significantly extended (see: → p. 30, 241f http://echo.mpiwg-berlin.mpg.de/content/scientific_revolution/harriot). This collection provides access to more than eight hundred manuscripts of Thomas Harriot by means of a graphical navigation system. In cooperation with scholars at the MPIWG, the University of Oxford (UK), and the University of Notre Dame (USA), an innovative model for the presentation of manuscripts was developed which allows scholars to create highly complex structures of interconnected networks with simple, openly available graphical tools. A workflow was established to transform the GraphML output of the tools into HTML presentations as shown on the website, but also into machine-readable networks represented in RDF. The first prototypical results can be explored with the network viewing tools LodLive (<https://it-dev.mpiwg-berlin.mpg.de/LodLive/>) and RelFinder (<http://it-dev.mpiwg-berlin.mpg.de/refinder/bin/>). The Harriot manuscripts have been integrated into Europeana; during the process we learned that the copyright policy of Europeana is difficult to fulfill for research institutions not owning the material they provide on the Web as the outcome of their scholarly research, which delayed the process significantly. Furthermore, interviews were conducted with members of the working group, which provided valuable input to the work on the “Scholarly Domain Model” of DM2E and helped form the final version published in the deliverable.

VirtualSpaces (<http://virtualspaces.sourceforge.net/>), a tool initially developed at the MPIWG by Julia Damerow to create virtual exhibitions, has been extended so that objects from Europeana can be directly integrated. This work was also supported by DM2E.

Conceptual Work on the Research Data Life Cycle

In its goal to better support the researchers at all stages of the research process and also to understand the current gaps in digital tools for the research process, the IT Group was able to secure two half-time positions in the context of the project DA-RIAH (Digital Research Infrastructure for the Arts and Humanities) in order to undertake research on the use of digital tools in the humanities. One goal was the development of a generic research model that makes it possible to target IT services to the different phases of the research process in the humanities. On the one hand, the model helps to map specific tools to the different research tasks, which can support scholars and help manage their data and research output in sustainable ways. On the other hand, it helps to identify the gaps in digital services that need to be built in order to better support scholars in their everyday work.



A pragmatic approach to classify research activities, their results, and the final output with regard to knowledge generation to analyse gaps in the digital tool chain.

In a first step, the IT Group identified generic research activities that can be found in research processes (Column 1). Second, the output of these activities was collected, specifying the type of data and their usual formats in each research step (Column 2). Lastly, the output was determined, targeting the products of knowledge generation. These products need to be sustained in order to serve as a reference and building blocks for future research. They might be a publication, often marking the end of a research cycle, or databases and overviews of sources. Each of these results and output products have different characteristics and technical requirements which need to be considered when designing tools and digital services. To offer targeted services and tools for scholars, it is essential to recognize that every research step produces some form of output that needs to be accessible and editable in the next research step supported by a tool. The IT Group wants to minimize the breaks in the research cycle, which often occur due to copying and converting data. Instead of making the data fit the tools, tools and service should be adapted to the specific requirements of scholars.

Annotations and Image Federation Standards

Annotating books and other kinds of documents has been part of the scholarly workflow for as long as written documents exist. In the digital realm, different forms of annotation have developed over time, but only in the last few years have tools and standards emerged that enable pervasive annotation of all content on the Internet and at the same time use the concept of annotation for linking existing information to documents and the creation of new networks of information and knowledge.

The IT Group has continued the development of an annotation server and front ends for annotating text and images integrating the widely used OpenAnnotation (<http://www.openannotation.org/>) standard and the Annotator.js (<http://annotatorjs.org/>) library into the text and image viewers used at the Institute. The IT Group has also participated in the international discussion and the creation of standards for the use of annotations on the Web and in humanities research in particular by presenting at the W3C working group on annotations, the international iAnnotate conference, and national meetings. The IT Group is also participating in activities on standardizing the use of annotations in the humanities infrastructure DARIAH. The work on adapting the digital annotation tools to the needs of the researchers at the Institute is still ongoing, but the existing solutions have already been used in some projects at the Institute (“History of the Max Planck Society”). The IT Group is also cooperating with the Freie Universität Berlin on a project researching and developing new user interfaces for humanities scholars using annotations. → p. 58

In another effort to enable the global use and reuse of digitized resources, the IT Group has participated in a Mellon-funded project to add the International Image Interchange Format (IIIF; <http://iiif.io>) and SharedCanvas standards (superseded by the IIIF Metadata API) to the TextGrid repository and the digilib image server used at the Institute. This step enables the creation of documents with shared images from all repositories implementing the standard, which already include important institutions such as the Bibliothèque Nationale de France, the British Library, ArtStor, and Europeanana.

Reconfiguring the Infrastructure

Over the past decade the Institute’s infrastructure has grown organically according to the needs of the Institute’s different projects. This development led to a system that made it increasingly difficult to maintain the structure given the constraints of the Institute’s technical staff. For this reason a new general structure for the Institute’s infrastructure was proposed in 2012, consisting mainly of three conceptual pillars: ECHO for managing resources, the concept of the digital scrapbook as a metaphor for the interactive part of the infrastructure, and the publication infrastructure with Edition Open Access and Edition Open Sources as the first outcomes. In 2013–2014 the focus was primarily on a critical review of the ECHO infrastructure. New requirements were discussed, and the decision was made to shift from the current legacy environment based on Python/Zope to a front-end environment based on the open source platform Drupal (<https://www.drupal.org>) and a flexible middleware, which → p. 241 → p. 243

now allows the integration of external services. The current version of the ECHO environment allows, in addition to access to MPIWG's own collection, access to the Europeana search; further extensions will follow in 2015.

Consequently, new project websites are now implemented by using Drupal as a front end to simplify the maintenance. Existing solutions, such as the Institute's public website, have been in the process of being migrated to Drupal since 2014, which will result in a new infrastructure in 2015 that is more flexible and easier to extend and requires less specialized knowledge of the IT Group.

In parallel, the development of the infrastructure for the publications framework used within the Edition Open Access and Edition Open Sources has been continued, so that the underlying framework is now easy to reuse and can be packaged to be used and maintained by cooperation partners. The University of Oklahoma is already using this solution for Edition Open Sources.

The GeoBrowser has been used as a visualization and research tool in the project "Following the Data of the International Geophysical Year" (Elena Aronova), the project "History of the Max Planck Society" (Florian Schmalz), and the Chinese local gazetteers project (Shih-Pei Chen).



GeoBrowser

In cooperation with Topoi, the development of the GeoBrowser—now called PLATiN, Place and Time Navigator (<https://github.com/skruse/PLATIN>)—has been continued, and a module to integrate it into the new infrastructure has been developed. The GeoBrowser is a tool for the tempo-spatial visualization and analysis of all historical data that can somehow be assigned a place and a time. The GeoBrowser works with any Web browser, and it can load data-sets in simple comma-separated-value format like those produced by Excel. Data-sets can be overlaid on maps from various sources, including historical maps. The display can be zoomed and panned; data can be selected by means of temporal or spatial selections, and displayed in additional graphs and charts. → p. 26

Outreach and Outlook

IT at the MPIWG is aiming at cutting-edge research in the digital humanities in order to support research in the departments and groups as well as to secure long-term provision of online data. Since the beginning, the goal of the IT Group has been to keep digital output from projects at the MPIWG accessible even after the end of a project. This goal is a basic condition for the establishment of digital publications as scholarly works equal to printed articles and monographs. Because the Institute focuses on innovative research, cooperation has been established with other institutions within the Max Planck Society as well as with external organizations to secure long-term provision, with the aim of having these tasks be taken over by service centers at libraries or computer centers.

To achieve this goal, the Institute's IT Group collaborates with other research institutes, academic libraries, and projects at universities within the BMBF-funded TextGrid project and the EU project "Digitised Manuscripts to Europeana" (DM2E). In particular, the Institute is a partner in DARIAH-DE. It is co-heading one of Virtual Competence Centers on Impact, Outreach and Advocacy of DARIAH-EU. The IT Group also supports the Library in integrating the Institute's resources into the Online Portal of the German Digital Library and Europeana. Initiated by partners of the TextGrid project, the MPIWG continues to host the German Digital Humanities blog. At the regional level, initiatives have been started to build a sustainable infrastructure; one such initiative is the Humanities Data Centre (HDC; <http://humanities-data-centre.org>), led by the University of Göttingen, where the MPIWG is an associated partner. In Berlin the "Interdisziplinärer Forschungsverbund Digital Humanities" (if|DH|b; <http://www.ifdhberlin.de>) has been established to coordinate the activities in Berlin. The MPIWG is taking part in the working groups dedicated to infrastructures for research, and is co-leading the working group on sustainability. All of these activities are aimed at easing the workload for maintaining and providing a technical infrastructure, so that research can be the focus of the Institute's information technology.

The Institute's Colloquia

2012/2013: Practical Knowledge

Practical knowledge is the knowledge needed to obtain a certain product, for instance, artistic or mechanical artifacts, or a certain defined output such as healing practices or mathematical results, following a defined workflow. The workflow can be a construction procedure, a recipe, or even an algorithm, which, from a formal point of view, are all equivalent to one another.

A series of colloquia, organized by Matteo Valleriani (Department I) was dedicated to the role of practical knowledge in the frame of the process of the emergence of scientific knowledge. The topics for the colloquia were selected to offer the widest possible temporal spectrum, from antiquity to the twentieth century, and to cover the largest possible geographic area.

- **The Ship as “New World“: Long-distance Oceanic Voyages and the Practice of Science (15th to 18th Century)**, September 12, 2012, *Henrique Leitão* (University of Lisbon, Portugal)
- **Die Bedeutung praktischen Wissens für Wasserradtheorien im 18. und 19. Jahrhundert**, October 31, 2012, *Gerhard Rammer* (Technische Universität Berlin, Germany)
- **Towards an Infrastructure for Digital Humanities at the MPIWG: From ECHO to the Digital ScrapBook**, November 27, 2012, *Dirk Wintergrün* (MPIWG)
- **Evaluating Galileo’s Discorsi: Theoretical and Practical Knowledge in the Scholarly Practices of 17th-century Readers**, November 28, 2012, *Renée Raphael* (University of California, Irvine, USA):
- **Experts in the Royal Prussian Porcelain Manufactory**, December 5, 2012, *Ursula Klein* (MPIWG):
- **Linking Scholars. Bringing your Research on the Web—Copyrights, Publication Agreements, and Other Issues**, December 19, 2012, *Urs Schoepflin* (MPIWG)
- **Practical Astronomy in Early Modern Prague: Compiling Observations at the Court of Rudolph II**, January 23, 2013, *Patrick Boner* (John Hopkins University, Baltimore, USA)
- **From Collections to Databases: Theory and Practice in Modern Paleontological Data Analysis**, February 20, 2013, *David Sepkoski* (MPIWG)
- **Cause and Effect in Biology Revisited: Is Mayr’s Proximate-ultimate Dichotomy Still Useful?** March 6, 2013, *Kevin Laland* (University of St. Andrews, UK)
- **The Early Modern Engineer’s Nature**, April 17, 2013, *Matteo Valleriani* (MPIWG)
- **The Archaeology of Practical Knowledge: Instruments, Techniques and Craft Practice**, May 15, 2013, *Stephen Johnston* (Museum of the History of Science, University of Oxford, UK)
- **Colour Knowledge in the 18th Century: Practice, Systematisation, and Natural Philosophy**, May 22, 2013, *Friedrich Steinle* (Technische Universität Berlin, Germany)
- **Prolegomena zu einer Theorie antiker Innovationsprozesse**, June 12, 2013, *Jochen Büttner* (MPIWG and Excellence Cluster TOPOI, Berlin)

2013/2014

The Institute's Colloquium series for 2013/14, co-organized by Elaine Leong and David Sepkoski (Department II), explored knowledge production in the human and natural sciences in a variety of epistemic spaces. The series featured a number of prominent scholars presenting research on a wide range of topics across many centuries and disciplines—from early modern China through 18th- and 19th-century Europe, to late 20th-century global projects in large-scale physics. One theme that emerged from this diverse selection was concrete sense of how data or experience collected in a variety of contexts and over long periods of time acquires coherence and authority through distinct genres of compilation and publication.

- **Plant Tributes and Trials in the French Empire, 1670–1730**, October 22, 2013, *Emma Spary* (University of Cambridge, UK, and MPIWG)
- **Herculean and Promethean Adventures on Long Journeys to the Future**, October 29, 2013, *Sharon Traweek* (UCLA, USA)
- **How Physicians Know: From Ars Excerpti to the Ditto Machine**, November 12, 2013, *Volker Hess* (Charité Berlin, Germany) / *Andrew Mendelsohn* (Queen Mary, University of London, UK)
- **Asylums and the Data of Human Heredity**, December 17, 2013, *Ted Porter* (UCLA, USA, and Wissenschaftskolleg zu Berlin, Germany)
- **Happy Endings: Narratives of Reproduction in Late Imperial Chinese Medical Cases**, January 21, 2014, *Francesca Bray* (University of Edinburgh, UK, and MPIWG)
- **Hermann Bahr and the Interview—between Journalism and Social Sciences**, February 25, 2014, *Anke te Heesen* (Humboldt-Universität zu Berlin)
- **The Future of Academic Publishing—Special Institute's Colloquium**, March 11, 2014, *Karen Darling* (University of Chicago Press)
- **Darwin on Paper: From Rags to Wood-Pulp**, March 18, 2014, *Jim Secord* (University of Cambridge, UK)
- **Secundum Quid and Contingentia: Scholastic Concepts in Early Modern Physics**, May 20, 2014, *Pietro Omodeo* (MPIWG)
- **Leibniz Editions and Narrative Repetition in the History of Science**, June 10, 2014, *André Wakefield* (Pitzer College, USA, and MPIWG)

2014/2015: Materialities

The Institute's Colloquium 2014/15 (organized by Department III) circled around materiality as a theme in the History of Science and Technology. While physical things—stuff, objects, materials, bodies; their properties and “concrete” realities—have long populated accounts in the histories of science and technology, materiality studies emphasize the processual and reciprocal character of interactions. The artefact is thus analysed as a relational point of interest produced and used in knowledge production; its inner workings linked to/generated by/generating a continuum or network of objects, bodies, skills, environments, politics, and publics.

Speakers each month invite conversational threads: What were and are the roles of artefacts and materials in scientific and technological developments and why and how did those change? How have the material properties of things shaped and been shaped by, coproduced, been transformed and afforded change in, environments, practices, and expressions of boundaries, truths, reliabilities? How can materiality be effectively studied/what are useful ways of studying materiality?

- **The Skeleton as Object and Artefact in Early Modern Europe**, September 16, 2014, *Anita Guerrini* (Oregon State University, USA)
- **Strings and the History of Presence**, October 21, 2014, *Shigehisa Kuriyama* (Harvard University, USA)
- **Craftwork as Problem Solving: Studies with Fine-woodwork Trainees and Instructors at London’s Building Crafts College**, November 18, 2014, *Trevor Marchand* (School of Oriental & African Studies, London, UK)
- **Academic Publishing, Copyright and Open Access—Special Institute’s Colloquium**, December 9, 2014, *Urs Schoepflin* (MPIWG)
- **On Materiality and Epistemic Things**, December 16, 2014, *Hans-Jörg Rheinberger* (MPIWG)
- **Models, Modeling, and Knowledge Transfer in Japanese Crafts of the Early Modern Era**, January 20, 2015, *Christine Guth* (Royal College of Art, London, UK)
- **Magic in the Black Box? Anthropological Reflections on Skilled Practice, Technical Ignorance and the Materiality of Things**, February 17, 2015, *Mareile Flitsch* (Völkerkundemuseum Universität Zürich, Switzerland)
- **What do Historians want from “Materiality”? Reflections on Theory and the Humanities since the 1970s**, March 17, 2015, *Martin Collins* (Smithsonian Institution, Washington D. C., USA)
- **Texts, Images and Machines in the Spread of Ancient Mechanics**, April 21, 2015, *Joyce van Leeuwen* (MPIWG)
- **Waste, Value, and Radioactive Excess in Africa**, May 19, 2015, *Gabrielle Hecht* (University of Michigan, USA)
- **Materialities Roundtable**, June 16, 2015, *Ann-Sophie Lehmann* (Utrecht University, The Netherlands); *Sally Gregory Kohlstedt* (University of Minnesota, USA); *Honghong Tinn* (MPIWG)

Yehuda Elkana

To commemorate the memory of Yehuda Elkana (1934–2012), a series of workshops and public symposia was organized, in collaboration with the Tel-Aviv University, the Van Leer Jerusalem Foundation, the Central European University (Budapest) and the VolkswagenStiftung.



From Local Universalism to Global Contextualism: A Symposium in Commemoration of the Work of Yehuda Elkana, 17–18 September 2013
(MPIWG, Berlin)

The Concept of Intellectual Quality in the Humanities, Workshop,
10–11 September 2014 (VW-Stiftung, Hannover, Germany)

Curricula: Between Tacit Knowledge and Public Discourse, Workshop,
9–10 September 2015 (Van Leer Jerusalem Institute/ Tel Aviv University, Israel)

Obituary

Prof. Dr. Johannes Fehr 28. 3. 1957–17. 7. 2014

Johannes Fehr, our colleague, frequent guest, and friend, left us forever in the summer of 2014.

Johannes was one of the earliest visitors to the institute during the spring and summer of 1995. He had studied German and French languages and psychology at the Universities of Zurich and Paris. In 1987 he earned his PhD with a linguistic study on Sigmund Freud's early writings. At the time of his visit, he was about to finish his second book, a semiological study on the unpublished notes of Ferdinand de Saussure. It was a seminal work, published in 1997 and soon also translated into French. That same year, Johannes habilitated at the University of Zurich and became program officer of the Collegium Helveticum, then newly founded by Yehuda Elkana and Hega Nowotny at the Federal Institute of Technology in Zurich. Since 2001, Johannes was its deputy director. From 2005 onward, he devoted his energy to building up the Ludwik Fleck Center at the Collegium Helveticum. The center soon gained an international reputation and was instrumental in promoting the renaissance of Ludwik Fleck's writings.

Johannes continuously shared his ideas with us on short visits or workshops over the past two decades. We will miss a good friend and fine scholar, his genuine sensitivity for language, and his sense of humor.

Hans-Jörg Rheinberger



Overviews

Workshops and Conferences

10. 1.–13. 1. 2013, Conference and Forum

The Anthropocene-Project. An Opening

Co-organized with Haus der Kulturen der Welt, Berlin, Germany

31. 1.–1. 2. 2013, Workshop

Colour Terminology

7. 3.–8. 3. 2013, Conference

Laboratories of Art

9. 4. 2013, Colloquium

Burchard Brentjes Commemorative Colloquium

11. 4. 2013, Workshop

Aristotelisierung in der Antike

24. 4. 2013, Workshop

Kant and the Euclidean Tradition

07. 5. 2013, Conference

Renaissance, Part I

16. 5.–17. 5. 2013, Workshop

Zukunftsphilologie: Commentary Cultures. Technologies of Medieval Reading

29. 5. 2013, Workshop

Finite Geometry, Indivisibles and Minima from the Middle Ages to the 18th Century

7. 6. 2013, Workshop

Shaping Education and Distributing Areas of Knowledge in France, England, Germany and the United States 1750–1950

17. 6.–19. 6. 2013, Workshop

Geometry and Logic

Co-organized with the Scuola Normale Superiore di Pisa, Italy

27. 6.–28. 6. 2013, Symposium

Research on Bio-Historical Co-Evolution

30.8.2013, Workshop

Aristotelisms in Syriac and Arabic

5.9.–6.9.2013, Conference

Transfer of Knowledge in the Iberian Colonial World

Co-organized with the Fundación Canaria Orotava de Historia de Ciencia in Tenerife and the Consejo Superior de Investigaciones Científicas in Madrid, Spain

12.9.–13.9.2013, Colloquium

An Intellectual Life Across Disciplines (in honour of John Stachel's 85th birthday)

17.9.–18.9.2013, Symposium

From Local Universalism to Global Contextualism—A Symposium in Commemoration of the Work of Yehuda Elkana

19.9.2013, Book presentation

Isaac Newton and the Origin of Civilization, Jed Z. Buchwald and Mordechai Feingold

20.9.–21.9.2013, Workshop

Early Modern Colour Practices, 1450–1650

11.10.2013, Workshop

Alum—A Material at the Crossroads of the Arts, Crafts, and Learned Inquiry

30.10.–31.10.2013, Workshop

Mathematics, Physics and Logic at the Crossroads

Co-organized with the University of Urbino, Italy

31.10.–2.11.2013, Conference

Historicizing Big Data

4.11.–6.11.2013, Workshop

The Structures of Practical Knowledge I

15.11.2013, Workshop

What's in a Place? Orientation Workshop for Historical Research Projects Using Geographical Data and GIS Technology

19.11.–20.11.2013, Conference

10th Anniversary of the Berlin Declaration

Co-organized with other Max Planck Institutes and the Max Planck Society

13.12.2013, Workshop

Perspectives on Deafness in 18th to 20th Century France and Russia

19. 12.–20. 12. 2013, Colloquium

Peter Damerow Commemorative Colloquium

8. 1.–9. 1. 2014, Workshop

Probability in Physics

Co-organized with the German-Israeli Foundation for Scientific Research and Development (GIF) in Jerusalem, Israel

10. 1.–11. 1. 2014, Workshop

Physicians, Paper and Polis

16. 1. 2014, Workshop

“Aristotelization”—Aristotle and the Scale

24. 1.–25. 1. 2014, Workshop

Anthropocene Curriculum

Co-organized with Haus der Kulturen der Welt, Berlin, Germany

29. 1.–30. 1. 2014, Workshop

Early Modern History of Science

6. 2.–7. 2. 2014, Conference

Rhetorical Practices in Medical Writings and Medical Imaginings in 17th- to 19th-Century Literature

19. 2. 2014, Symposium

Grundlagenforschung und Zukunftsgestaltung

27. 2.–1. 3. 2014, Workshop

Down-To-Earth Chemistry: Between the Country and the City

10. 3. 2014, Symposium

Nach Cassirer. The Ideal of Knowledge and its Transformations in Biology until Today

13. 3.–15. 3. 2014, Workshop

Itineraries of Materials, Recipes, Techniques, and Knowledge in the Early Modern World (Part I)

21. 3.–22. 3. 2014, Workshop

Early Modern Colour Practices, 1450–1650 II

19. 5. 2014, Workshop

Geometrical, Astronomical and Geographical Notions of Space in the Renaissance

22. 5.–23. 5. 2014, Conference

Language, Norms, and Forms of Life

2. 6. 2014, Doktorandentagung

Land Ahoy! – Open Predoc Colloquium of Department 1

16. 6. 2014, Symposium

Wissenschaftshistorisches Symposium zum 150. Geburtstag von Walter Nernst

Co-organized with the Deutsche Physikalische Gesellschaft e. V. at the Magnus-Haus, Berlin, Germany

19. 6. 2014, Workshop

“Aristotelization” – Aristotle in Byzantium

23. 6.–25. 6. 2014, Conference

Geometry and Mechanics

26. 6.–27. 6. 2014, Workshop

Testing Drugs and Trying Cures Workshop

30. 6.–1. 7. 2014, Conference

Studies of Knowledge in Eurasia and Africa: Issues of Methodology and Future Perspectives

8. 7.–9. 7. 2014, Workshop

Core Group Meeting: The Renaissance of General Relativity in History: Assessing Einstein’s Legacy in Post World War II Physics

9. 7.–11. 7. 2014, Workshop

Itineraries of Materials, Recipes, Techniques, and Knowledge in the Early Modern World (Part II)

14. 7. 2014, Workshop

Mental Troubles, Bodily Troubles, Medical Categories: What Kinds of Stories Can We Write?

11. 8.–12. 8. 2014, Workshop

Meta-Scientific Foundations of Astronomy

Co-organized with the Collaborative Research Center (CRC) 980, Berlin, Germany

18. 8.–22. 8. 2014, Summer School

Sound Signatures

18. 9.–20. 9. 2014, Colloquium

“Visions in Science” – Open Predoc Colloquium of Department 1

19. 9.–20. 9. 2014, Workshop

Reading How-To

8. 10.–9. 10. 2014, Conference

Finale of Antiquity

Co-organized with the Collaborative Research Center (CRC) 644, Berlin, Germany

17. 10. 2014, Conference

Human Impacts and Their Consequences – An open forum on the occasion of the first meeting of the Anthropocene Working Group

Co-organized with Haus der Kulturen der Welt, Berlin, Germany

30. 10. 2014, Conference

The Making of Useful Knowledge

31. 10.–1. 11. 2014, Workshop

Early Modern Colour Practices Final Workshop

6. 11.–7. 11. 2014, Workshop

Wachstum ohne Alternativen? Geschichtskulturelle und wissenschaftliche Dimensionen von Wachstumsnarrativen

13. 11. 2014, Conference

Constructing Hellenism in Classical Islam and Renaissance Europe: Transfer, Approbation, and Transformation

Co-organized with the Excellence Cluster Topoi in Berlin, Germany

14. 11.–15. 11. 2014, Workshop

Unusual Lives: Historicizing Life as a Problem of Knowledge

14. 11.–22. 11. 2014, Summer School, Workshops, Forum

Anthropocene Campus

Co-organized with Haus der Kulturen der Welt, Berlin, Germany

21. 11.–22. 11. 2014, Workshop

Participant and Observer Narratives about Medieval Cross-cultural Knowledge Transfer: Missing, Single or Multiple Translations

Co-organized with the University of Sevilla, Spain

24. 11.–26. 11. 2014, Conference

Contextualising Technical Innovations in Prehistory

Co-organized with the Excellence Cluster Topoi in Berlin, Germany

4. 12.–5. 12. 2014, Workshop

Institutionalization of Science in Early Modern Europe

10.12.–12.12.2014, Workshop

The Structures of Practical Knowledge II

17.12.2014, Workshop

Epistemic History of Architecture

Collaborations, Academic Achievements, and External Activities

Professorships

Lorraine Daston is Professor at the University of Chicago, USA, and Honorary Professor at the Humboldt-Universität zu Berlin, Germany.

Sven Dupré is Professor at the Freie Universität Berlin, Germany.

Dieter Hoffmann is außerplanmäßiger Professor at the Humboldt-Universität zu Berlin, Germany.

Ursula Klein is außerplanmäßige Professorin at the Universität Konstanz, Germany.

Wolfgang Lefèvre is außerplanmäßiger Professor at the Freie Universität Berlin, Germany.

Veronika Lipphardt was Professor at the Freie Universität Berlin, Germany.

Glenn W. Most is Professor at the Scuola Normale Superiore di Pisa, Italy, and Professor on the Committee on Social Thought at the University of Chicago, USA.

Jürgen Renn is Adjunct Professor at the Boston University, USA, and Honorary Professor at the Humboldt-Universität zu Berlin and the Freie Universität Berlin, Germany.

Hans-Jörg Rheinberger (Emeritus Scientific Member) is Honorary Professor at the Technische Universität Berlin, Germany.

Dagmar Schäfer is Professor at the University of Manchester, UK.

Viktoria Tkaczyk is Professor at the Humboldt-Universität zu Berlin, Germany, and Assistant Professor at the Universiteit van Amsterdam, The Netherlands.

Annette Vogt is Honorary Professor at the Humboldt-Universität zu Berlin, Germany.

Cooperation Partners

Amsterdam Centre for Cultural Heritage and Identity (The Netherlands)

Berlin-Brandenburg Academy of Sciences and Humanities (Germany)

Berliner Antike-Kolleg (Germany)

Bibliotheca Hertziana, Max Planck Institute for Art History (Italy)

Bibliothèque de l'Observatoire de Paris (France)

British Library (UK)

Centre Alexandre Koyré (France)

Centre de recherche sur l'intermédialité (Canada)

Centro Internazionale di Studi Telesiani "Alain Segonds" Calabria (Italy)

Chinese Academy of Sciences (China)
 Collaborative Research Centre 644 “Transformations of Antiquity” (Germany)
 Collaborative Research Centre 980 “Episteme in Motion” (Germany)
 Collected Papers of Albert Einstein at Caltech, Pasadena
 Cologne University of Applied Sciences (Germany)
 Europeana Foundation (The Netherlands)
 Excellence Cluster “Image Knowledge Gestaltung” (Germany)
 Excellence Cluster “TOPOI” (Germany)
 Freie Universität Berlin (Germany)
 Friedrich-Schiller-Universität Jena (Germany)
 Fritz Haber Institute of the Max Planck Society (Germany)
 German Archaeological Institute (Germany)
 Harvard University (USA)
 Haus der Kulturen der Welt Berlin (Germany)
 Hebrew University (Israel)
 Humboldt-Universität zu Berlin (Germany)
 Jacobs University Bremen (Germany)
 Kunsthistorisches Institut in Florenz (Italy)
 La Fundación Canaria Orotava de Historia de la Ciencia (Spain)
 Laboratoire SPHERE (CNRS, France)
 Lindau Nobel Laureate Meetings (Germany)
 Max Planck Institute for European Legal History
 McGill University (Canada)
 Minerva Humanities Center at Tel Aviv University (Israel)
 Mongolian Academy of Sciences
 Museo Galileo in Florence (Italy)
 Museum Kunstpalast, Düsseldorf (Germany)
 New York University (USA)
 Rijksmuseum Amsterdam (The Netherlands)
 Royal Netherlands Academy of Arts and Sciences (The Netherlands)
 Scuola Normale Superiore di Pisa (Italy)
 Sociedad Cubana de Física (Cuba)
 Sociedad de la Historia de la Ciencia y Tecnología Cuba
 Stiftung Preußischer Kulturbesitz (Germany)
 Technische Universität Berlin (Germany)
 The Latin American Center of Physics (Brazil)
 Tufts University (USA)
 Universidad de La Habana (Cuba)
 Universität Regensburg (Germany)
 Université François-Rabelais de Tours (France)
 Universiteit van Amsterdam (The Netherlands)
 University of Barcelona
 University of Bergamo (Italy)
 University of California at Los Angeles (USA)
 University of Cambridge (UK) University of Chicago (USA)
 University of Göttingen (Germany)

University of Lisbon
University of Lucerne (Switzerland)
University of Oklahoma (USA)
University of Oxford (UK)
University of Rostock (Germany)
University of Saskatchewan (USA)
University of Urbino
University of Wisconsin–Madison (USA)
Utrecht University (The Netherlands)
Van Leer Institute, Jerusalem (Israel)

Appointments

Elena Aronova (Research Scholar September 1, 2012–August 31, 2015) was appointed as Assistant Professor at the University of California, Santa Barbara, USA (as of January 2016).

Massimiliano Badino (Visiting Scholar January 1–December 31, 2013) was appointed as Marie Curie International Outgoing Fellow at the MIT School of Humanities, Arts, and Social Sciences, Cambridge, USA.

Naomi Beck (Postdoctoral Fellow December 1, 2012–December 31, 2013) was appointed as Research Fellow at the Institut d'histoire et de philosophie des sciences et des techniques, Université Paris 1, France.

Sven Dupré (Research Group Leader July 1, 2011–August 31, 2015) was appointed as Professor of History of Art, Science and Technology at the Faculty of Humanities, Utrecht University, The Netherlands.

Yulia Frumer (Postdoctoral Fellow September 1, 2012–August 31, 2013) was appointed as Assistant Professor in the Department of History of Science and Technology, Krieger School of Arts and Sciences, John's Hopkins University, Baltimore, USA.

Hajime Inaba (Predoctoral Fellow December 1, 2012–July 31, 2015) was appointed as JSPS Research Fellow at the University of Tokyo, Japan.

B. Harun Küçük (Postdoctoral Fellow September 1, 2013–August 31, 2014) was appointed as Assistant Professor for History and Sociology of Science, University of Pennsylvania, Philadelphia, USA.

Karin Leonhard (Research Scholar October 1, 2011–February 28, 2014) was appointed as Professor of Art History at the Universität Bonn, Germany, in 2014 and Professor of Fine Arts and Art History at the Universität Konstanz, Germany, in 2015.

Victoria Lee (Postdoctoral Fellow September 1, 2014–August 31, 2016) was appointed as Assistant Professor of History of Science and Technology in the Department of History, Ohio University, Athens, USA (as of August 2016).

Veronika Lipphardt (Research Group Leader March 1, 2009–June 4, 2015) was appointed as Professor in Science and Technology Studies, University College Freiburg, Germany.

Andreas Mayer (Research Scholar November 1, 2010–October 31, 2012) was appointed as Heisenberg Fellow, University of Bremen, Germany, and as of January 2014 as Chargé de recherche, 1re classe, CNRS, Centre Alexandre Koyré, Paris, France.

András Németh (Research Scholar September 1, 2011–August 31, 2013) was appointed as Curator at the Biblioteca Apostolica Vaticana, Rome, Italy.

Christine von Oertzen (Research Scholar since 2005) obtained a W2 position within the Max Planck Society (as of January 1, 2015).

Marcus Popplow (Visiting Scholar September 1, 2013–August 31, 2014) was appointed as Professor for the History of Technology at the Technische Universität Berlin, Germany.

Florian Schmaltz (Research Scholar) obtained a W2 position within the Max Planck Society (as of 2015).

Mihai Surdu (Postdoctoral Fellow May 1, 2014–January 15, 2015) was appointed as Senior Fellow at the Central European University Institute for Advanced Study (CEU IAS), Budapest, Hungary.

Shenmi Song (Predoctoral Fellow August 15, 2014–January 15, 2015) was appointed as Lecturer at the Department of the History of Traditional Chinese Medicine, University of Traditional Chinese Medicine, Shanghai, China.

Viktoria Tkaczyk (Dilthey Fellowship Research Group Leader September 1, 2011–August 31, 2016) was appointed as Research Group Leader at MPIWG and Humboldt-Universität zu Berlin, Germany (as of March 2015).

Jaipreet Virđi-Dhesi (Predoctoral Fellow April 1, 2013–July 31, 2013) was appointed as Instructor at Ryerson University, Toronto, Canada.

Annette Vogt (Research Scholar since 1994) has received a Honorary professorship at Humboldt-Universität zu Berlin, Germany (as of December 2014).

Kathleen Vongsathorn (Postdoctoral Fellow September 1, 2012–August 31, 2014) was appointed as Visiting Assistant Professor of History at Lafayette College, Easton, USA.

Anja Werner (Postdoctoral Fellow April 1, 2012–March 31, 2013) was appointed as Research Scholar at the Martin-Luther-Universität Halle-Wittenberg, Germany.

Completed Ph. D. Dissertations

Jenny Bangham: Blood groups and the rise of human genetics in mid-twentieth century Britain (University of Cambridge, UK, 2013)

Samuël Coghe: Population Politics in the Tropics. Demography, Health and Colonial Rule in Portuguese Angola, 1890s–1940s (European University Institute, Florence, Italy, 2014)

Sean Dyde: Brains, minds and nerves in British medicine and physiology, 1764–1852 (University of Cambridge, UK, 2014)

Hajime Inaba: Historical investigations into the development of classical statistical mechanics (Kyoto University, Japan, submitted December 2014, defended January 2015)

Anna Perlina: Shaping a New Field: Kurt Lewin and the Experimental Psychology in the Interwar Period (Humboldt-Universität zu Berlin, Germany, submitted October 2014, defended May 2015)

Alma Steingart: Conditional Inequalities: American Pure and Applied Mathematics from the Cold War to the Present (Harvard University, USA, 2014)

Stefan Paul Trzeciok: Alvarus Thomas und sein Liber de triplici motu: Naturphilosophie an der Pariser Artistenfakultät (Freie Universität Berlin, Germany, submitted July 2014, defended January 2015)

Dora Vargha: Iron Curtain, Iron Lungs: Polio Epidemics in Cold War Hungary, 1952–1963 (Birkbeck College, University of London, UK, 2013)

Jaipreet Virdi-Dhesi: “From the hands of quacks”: Aural Surgery, Deafness, and the Making of a Surgical Specialty in Nineteenth-Century London (University of Toronto, Canada, 2014)

Teaching Activities

Winter 2012/2013

Alexander Blum and *Christoph Lehner*: Klassiker und Revolutionäre. Probleme der modernen Physik in Originaltexten. (Seminar, Freie Universität Berlin, Germany)

Luisa Bonolis: Physics and Group Theory. From Evariste Galois to Emmy Noether. From Noether’s Theorems to the “Gruppenpest” in the new Quantum Mechanics. (Lectures, History of Physics Winter School, Italian Association for Physics Teaching, Piacenza University, Italy)

Sven Dupré: The Material Culture of Knowledge: Objects of Art and Science in the Early Modern History of Collecting. (Seminar, Freie Universität Berlin, Germany)

Ursula Klein: Philosophie der Chemie. (Seminar, Universität Konstanz, Germany)

Veronika Lipphardt: Theorie, Methoden und Geschichte der Geschichtswissenschaft. (Seminar, Freie Universität Berlin, Germany)

Veronika Lipphardt: Wissenschaftsgeschichte, Wissenschaftstheorie, historische Epistemologie. Zur Einführung. (Seminar, Freie Universität Berlin, Germany)

Jürgen Renn: Die Globalisierung des Wissens in der Geschichte und ihre normativen Herausforderungen. (Doctoral Colloquium, Universität Wien, Austria)

Jürgen Renn: Knowledge Exchange between Europe and Asia in the Early Modern Period. (Doctoral Colloquium, Chinese Academy of Science, Beijing, China)

Matthias Schemmel, *Klaus Vogel* and *Günther Görz*: Karten, Globen, Kosmographien und der Weltbildwandel um 1500. (Seminar, Technische Universität Berlin, Germany)

Matteo Valleriani: Antike Hydrostatik und Pneumatik: Entstehungs- und Diffusionsprozesse. (Seminar, Technische Universität Berlin, Germany)

Spring/Summer 2013

Naomi Beck: Evolutionary Theory and Ideas in the Human and Social Sciences.

(Upper level undergraduate seminar, University of Chicago, USA)

Lorraine Daston: Against the Gods: Comparative Perspectives on Human Resistance to the Higher Powers. (Seminar, University of Chicago, USA)

Lara Keuck: Tierversuche zwischen wissenschaftlicher Notwendigkeit und ethischer Fragwürdigkeit. (Proseminar, Humboldt-Universität zu Berlin, Germany)

Sven Dupré: Künstlerwissen. The History and Theory of Artists' Knowledge.

(Colloquium, Freie Universität Berlin, Germany)

Veronika Lipphardt: Berlin im Kalten Krieg – Ein Nachlass wandert ins Archiv.

(Seminar, Freie Universität Berlin, Germany)

Veronika Lipphardt: Colloquium zur Wissensgeschichte (Freie Universität Berlin, Germany)

Viktoria Tkaczyk: The Histories of Art Studies and Media Studies. (Graduate course, Universiteit van Amsterdam, The Netherlands)

Viktoria Tkaczyk (with Bram Kempers): Communities of the Arts in the Early Modern Period. (Graduate course, Universiteit van Amsterdam, The Netherlands)

Viktoria Tkaczyk (with Carolyn Birdsall): Sound Cultures. (Undergraduate course, College of Humanities, Universiteit van Amsterdam, The Netherlands)

Annette Vogt: What is statistics? – From the historical perspective. (Seminar

in English and German, Humboldt-Universität zu Berlin, Germany)

Winter 2013/2014

Luisa Bonolis: Bruno Pontecorvo. Universality of Weak Interactions and Muon Decay. (Seminar, Sapienza University, Rome, Italy)

Luisa Bonolis: Bruno Maksimovic Pontecorvo. From Slow Neutrons with Enrico Fermi in Rome to Neutrino Oscillations in Dubna. (Seminar, Deutsches Elektronen-Synchrotron (DESY), Hamburg and Zeuthen, Germany)

Samuël Coghe (with Christoph Kalter): Kolonialgeschichten. Frankreich und Portugal in Afrika, ca. 1870–1975. (Hauptseminar, Freie Universität Berlin, Germany)

Sven Dupré: Optics and Perspective in Early Modern Art. (Seminar, Freie Universität Berlin, Germany)

Christine von Oertzen: Deutsche Teilung: Politik, Kultur, Alltag. (Seminar, Technische Universität Braunschweig, Germany)

Matthias Schemmel and *Sascha Freyberg*: Das Verhältnis von Experiment und Metaphysik bei Edgar Wind. (Seminar, Humboldt-Universität zu Berlin, Germany)

Viktoria Tkaczyk: Performance, Sound and Space. (Seminar within the Winter School “SoundSignatures: Spaces, Objects, and Embodied Practices”, organized with Carolyn Birdsall (UvA), Myles Jackson (NYU), and Mara Mills (NYU), Universiteit van Amsterdam, The Netherlands, co-sponsored by Netherlands Institute for Cultural Analysis, New York University and VolkswagenStiftung)

Spring/Summer 2014

Lorraine Daston: Observation: A History of the Sciences, the Senses, and the Self. (Seminar, University of Chicago, USA)

Elena Aronova (with Christian Joas): Cold War Science. (Bilingual undergraduate course, Ludwig-Maximilians-Universität München, Germany)

Sven Dupré: Alchemy and Art: The Mystery of Transformation. (Seminar, Freie Universität Berlin, Germany)

Veronika Lipphardt: Unberührte Geschichte(n): Eine praxisnahe Einführung in die Arbeit von ArchivarInnen. (Methodenübung, Freie Universität Berlin, Germany)

Veronika Lipphardt: Colloquium zur Wissenschafts- und Wissensgeschichte (Freie Universität Berlin, Germany)

Pietro Daniel Omodeo: Renaissance Astronomy in “Storia del pensiero scientifico”. (Master Seminar, University of Turin, Italy)

Viktoria Tkaczyk: Archiving Vocal Signatures. (Seminar within the Summer School “SoundSignatures: Epistemologies and the Order of Sound”, organized with Carolyn Birdsall (UvA), Myles Jackson (NYU), and Mara Mills (NYU), New York University Berlin / Max-Planck-Institute for the History of Science, Berlin, Germany, co-sponsored by New York University, VolkswagenStiftung and Junge Akademie)

Viktoria Tkaczyk (with Bram Kempers): Early Modern Metropolises: Interactions between the Arts and Sciences. (Graduate course, Universiteit van Amsterdam, The Netherlands)

Viktoria Tkaczyk (with Stephen Amico): SoundCultures. (Lecture Series, College of Humanities, Universiteit van Amsterdam, The Netherlands)

Matteo Valleriani: The Emergence of Science in the Early Modern Period. (Silverman Professorship – Advanced Seminar, Cohn Institute, University of Tel Aviv, Israel)

Annette Vogt: What is statistics? – From the historical perspective. (Seminar in English and German, Humboldt-Universität zu Berlin, Germany)

Winter 2014/2015

Viktoria Tkaczyk (organized with Sven Dupré (MPIWG), Veronika Lipphardt (MPIWG), Anke te Heesen (HU Berlin), Friedrich Steinle (TU Berlin)): Berlin Doctoral Forum for the History of Science. (MPIWG)

Kathleen Vongsathorn: Health in African History. (University of Indiana, Bloomington, USA)

Sven Dupré: Technical Art History. (Seminar, Freie Universität Berlin, Germany)

Ursula Klein: Philosophie und Geschichte der Technikwissenschaften. (Seminar, Universität Konstanz, Germany)

Pietro Daniel Omodeo: Methode und Kosmos. Descartes’ “Meditationen und Prinzipien“. (Seminar, Freie Universität Berlin, Germany)

Matteo Valleriani: Die Entstehung der frühneuzeitlichen Mechanik. (Seminar, Technische Universität Berlin, Germany)

Annette Vogt: What is statistics? – From the historical perspective. (Seminar in English and German, Humboldt-Universität zu Berlin, Germany)

Awards

Sabine Arnaud (Research Group Leader) received the 2014 “Prix d’Histoire de la Médecine de la Société Française d’Histoire de la Médecine et de l’Académie Nationale de Médecine” for her book *L’invention de l’hystérie au temps des Lumières* (Editions de l’EHESS, 2014).

Jenny Bangham (Research Scholar) received the Marc-Auguste Pictet Prize 2014 of the Société de Physique et d’Histoire naturelle de Genève for her dissertation „Blood groups and the rise of human genetics in mid-twentieth century Britain“ (University of Cambridge, 2013).

Lorraine Daston (Director) received the honorary doctorate of Princeton University, 2013.

Lorraine Daston (Director) received the Lichtenberg-Medaille, Akademie der Wissenschaften zu Göttingen, 2014.

Lorraine Daston (Director) received the Bielefelder Wissenschaftspreis (Stiftung der Sparkasse Bielefeld, 2014).

Lorraine Daston (Director) received the “Médaille Marc-Auguste Pictet” 2014 of the Société de Physique et d’Histoire naturelle de Genève.

Lara Keuck (Research Scholar) was selected as “Finaliste du Prix Jeunes Chercheurs 2013 de la Société de Philosophie des Sciences” for her paper “Introducing Epistemic Hubs” (History and Philosophy of the Life Sciences, 2011).

B. Harun Küçük (Postdoctoral Fellow) received the Chancellor’s Dissertation Medal 2012–13 for the best dissertation in the Division of Arts and Humanities (University of California, San Diego, USA).

Christine von Oertzen (Research Scholar) received the Translation Award „Geisteswissenschaften International“ (spring 2013).

Jürgen Renn (Director) received the Gustav Neuenschwander Prize of the European Society for the History of Science 2014.

Jürgen Renn (Director) received the Francis Bacon Prize for Outstanding Scholarship in the History of Science 2014.

Jürgen Renn (Director) received the Max Planck Communitas Award, 2014.

Jürgen Renn (Director) received the award Premio Internazionale “Marco & Alberto Ippolito,” Sezione cultura, 2014.

Hans-Jörg Rheinberger (Emeritus Scientific Member) received the Marsilius Medal from the Marsilius Kolleg of the University of Heidelberg, 2014.

Dora Vargha (Predoctoral Fellow) received the ICOHTEC Young Scholar Book Prize 2014 by the International Committee for the History of Technology.

Jaipreet Viridi-Dhesi (Predoctoral Fellow) received the University of Toronto Doctoral Completion Award 2013.

Publications

This bibliography comprises the publications of the Institute's members and guests during the period 2013–2014. Book reviews are not listed.

Bibliography editor: Sabine Bertram, MPIWG Library. Last update: May 6, 2015.

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Agnew, Vanessa. “Songs from the edge of the world : enlightenment perceptions of Khoikhoi and Bushmen music.” In *Representing humanity in the age of enlightenment*, eds. Alexander Cook, Ned Curthoys, and Shino Konishi. 79–93. London: Pickering & Chatto, 2013.

- 1 Akavia, Naamah. *Subjectivity in motion : life, art, and movement in the work of Hermann Rorschach*. Routledge monographs in mental health. New York [u. a.]: Routledge, 2013.

Allen, Stewart. “An award controversy : anthropology, architecture, and the robustness of knowledge.” *Journal of Material Culture* 19 (2 2014): 169–184.

Andretta, Elisa and Sabina Brevaglieri. “Storie naturali a Roma fra antichi e nuovi mondi : il ‘Dioscorides’ di Andrés Laguna (1555) e gli ‘Animalia mexicana’ di Johannes Faber (1628).” *Quaderni storici* 48 (142) (1 2013): 43–87.

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<http://dx.doi.org/10.1093/shm/hku086>

- 2 Arnaud, Sabine. *L'invention de l'hystérie au temps des Lumières (1670–1820)*. En temps & lieux ; 48. Paris: Ed. de l'EHESS, 2014.

Aronova, Elena. “Big science and “Big science studies” in the United States and the Soviet Union during the Cold War.” In *Science and technology in the global cold war*, eds. Naomi Oreskes and John Krige. 393–429. Cambridge, Mass. [u. a.]: MIT Press, 2014.

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<http://www.edition-open-access.de/studies/2/2/index.html>

3 Badino, Massimiliano and Jaume Navarro, eds. *Research and pedagogy : a history of quantum physics through its textbooks*. Max Planck Research Library for the history and development of knowledge, studies ; 2. Berlin: Edition Open Access, 2013.

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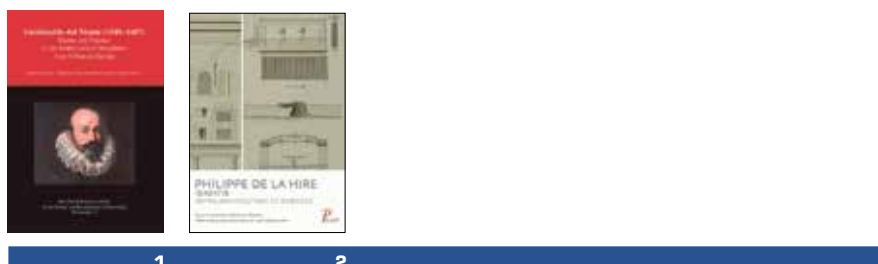
- 1 Becchi, Antonio, Domenico Bertoloni Meli, and Enrico Gamba, eds. *Guidobaldo del Monte (1545–1607) : theory and practice of the mathematical disciplines from Urbino to Europe*. Max Planck Research Library for the History and Development of Knowledge, Proceedings ; 4. Berlin: Edition Open Access, 2013.
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- 2 Becchi, Antonio, Hélène Rousteau-Chambon, and Joël Sakarovitch, eds. *Philippe de la Hire : entre science et architecture*. Paris: Picard, 2013.

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Bonolis, Luisa *see also Di Castro and Bonolis*

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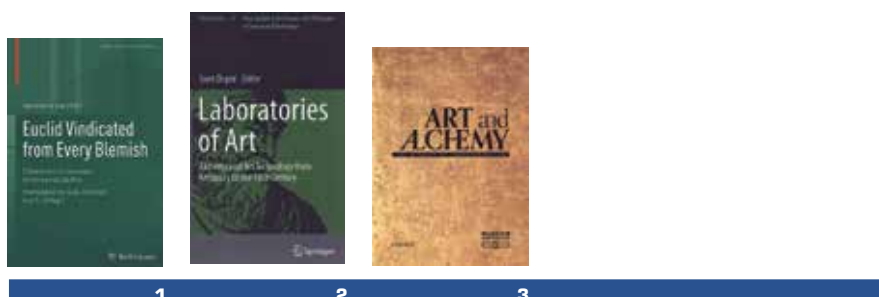
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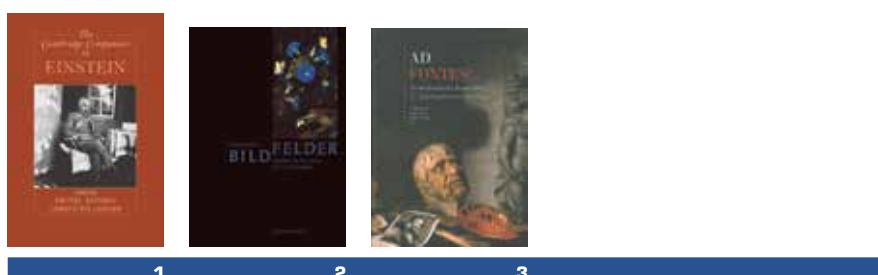
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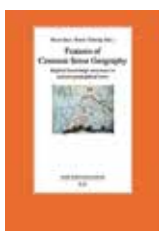
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Index

A

Abdounur, Oscar Joao 30
Abraham, Tara 88
Agnew, Vanessa 88
Alberts, Tara 95
Albrecht, Clemens 188
Allen, Stewart 127, 137
Alvarez, Mari-Tere 187
Amico, Stephen 268
Anderson, Robert 80
Arana, Andrew 211
Arnaud, Sabine 5, 9, 15, 179, 195,
 196, 199, 200, 205, 206, 269
Aronova, Elena 13, 63, 65, 66, 69,
 250, 264, 268
Arthur, Richard T. W. 210, 211
Aschauer, Lucia 205
Asmussen, Tina 153
Aspelmeyer, Markus 51
Asper, Markus 11, 34
Axworthy, Angela 18, 211, 212

B

Badino, Massimiliano 20, 47, 49,
 264
Baker, Tawrin 163, 164, 166, 213
Balcar, Jaromír 12, 18, 59
Bangham, Jenny 171, 173, 177,
 179, 187, 188, 189, 235, 265,
 269
Banks, Erik 210
Baracca, Angelo 55, 237
Bargheer, Stefan 88
Barker, Crispin 187
Barrera-Osorio, Antonio 103
Bartocci, Claudio 211
Basso, Paola 210
Bastos, Cristiana 191
Bauer, Susanne 186, 187
Baxstrom, Richard 126
Beatty, John 78, 79
Becchi, Antonio 30
Beck, Naomi 264, 267
Beizer, Janet 205

Belhoste, Bruno 88
Benoist, Jocelyn 205, 206
Benson, Etienne 13, 62, 63, 66
Beretta, Marco 148
Bernard, Andreas 227
Bernardoni, Andrea 149
Berrie, Barbara 164
Bertoloni Meli, Domenico 30
Bertram, Sabine 244, 271
Besse, Jean-Marc 210
Bevilacqua, Fabio 11
Biank, Johanna 39
Birdsall, Carolyn 108, 109, 267,
 268
Bis, Mattia 169
Bittel, Carla 90, 92
Blacker, Sarah 171, 176, 190
Blair, Ann 104
Blanchard, Pierre-Louis 187
Blaschke, Estelle 75
Bloor, David 121
Blum, Alexander 12, 18, 21, 22,
 24, 48, 49, 50, 51, 52, 53, 54,
 266

Bodenhamer, David 133
Bois, Yve-Alain 78
Bol, Marjolijn 152, 153, 166
Boltz, William G. 22, 32, 36, 236
Bombassaro, Luiz Carlos 39
Boner, Patrick 252
Bönker-Vallon, Angelika 210
Bonolis, Luisa 18, 51, 56, 57, 266,
 267
Bordoni, Stefano 49, 236, 237
Bork, Camilla 111
Bougleux, Elena 45, 46
Bouk, Dan 66, 75
Boulboullé, Jenny 153, 169
Boumediene, Samir 103, 106
Boyle, Robert 164
Bradshaw, Alexander 46
Brandhuber, Arno 46
Brauckmann, Urte 244
Braunstein, Jean-François 205
Bray, Francesca 11, 80, 95, 127,
 128, 253

Brentjes, Burchard 257
Brentjes, Sonja 12, 18, 31, 33, 34,
 35, 40, 236
Brock, Emily K. 14, 122, 123, 136
Brockmann, Sophie 113
Brody, Martin 88
Brownell, Emily 122, 123
Brusius, Mirjam 66, 75
Bruyninckx, Joeri 220
Buchwald, Jed Z. 258
Buell, Paul D. 129
Bullynck, Marteen 210
Bultman, Saskia 185, 190
Buning, Marius 160
Buono, Amy 164, 168
Burak, Guy 144
Butler, Shane 78
Büttner, Jochen 5, 12, 18, 25, 26,
 27, 28, 30, 227, 229, 231, 232,
 235, 252
Bycroft, Michael 103, 151, 152,
 169
Bynum, Caroline 78

C

Calvo-Lopez, Jose 166
Camerota, Filippo 166
Camprubí, Lino 13, 62, 63, 68, 69
Camps, Celine 162
Carolino, Luis Miguel 40
Carson, John 88, 206
Castagnetti, Giuseppe 12, 47
Casties, Robert 133, 246
Cataldi, Maddalena 187
Ceglia, Francesco Paolo de 103
Chadarevian, Soraya de 171,
 177, 188, 189, 191, 228
Chalmers, Alan 36
Chang, Che-Chia 95
Charmantier, Isabelle 104
Cházaro García, Laura 190, 191
Chemla, Karin 88
Chen, Esther 3, 17
CHEN Kaijun 139
Chen, Ming 95
CHEN Shih-Pei 14, 126, 132, 246,
 250

- Chettiar, Teri* 226
Chiletti, Silvia 201
Christie, John 80
Coghe, Samuël 171, 175, 190, 265, 267
Cole, Andrew 78
Collins, Martin 254
Cooter, Roger 199, 206
Crary, Alice 205
Creager, Angela N. H. 11, 81
Crippa, Davide 213
Crowston, Clare 127
Cucu, Alina-Sandra 140
- D**
- Dacome, Lucia* 154, 168
Dahl, Jacob 31
Dai, Lianbin 144
Damerow, Julia 247
Damerow, Peter 20, 22, 239, 259
Darling, Karen 253
Daston, Lorraine 5, 7, 13, 61, 63, 64, 65, 70, 76, 77, 78, 79, 80, 82, 94, 225, 229, 230, 262, 267, 268, 269
De Boer, Sander 210
Deb Roy, Rohan 181, 190, 191, 226
Debuiche, Valérie 210
Delbourgo, James 75
de Pablo, Montserrat 30
De Pace, Anna 210
De Risi, Vincenzo 5, 9, 15, 209, 212
Dey, Debolina 198
Dias, Nélia 67, 75
Diekmann, Nele 97
Dijksterhuis, Fokko Jan 164
DiMoia, John 121
Divarci, Lindy 18, 21
Draelants, Isabelle 33
Drenckhan, Ulla 233
Dubourg Glatigny, Pascal 168
Dunn, Rachel 80
du Plessis, Rory 202
Dupree, Mary Helen 111
- Dupré, Sven* 5, 15, 147, 148, 152, 157, 160, 163, 165, 166, 224, 225, 230, 246, 262, 264, 266, 267, 268
Dyde, Sean 197, 198, 265
- E**
- Echterhölter, Anna* 82
Eckes, Christophe 210
Eddy, Matthew 80
Eder, Sandra 91
Egorova, Yulia 181, 182, 188, 191
Eilenberger, Wolfram 231
Eisenstaedt, Jean 51
Elet, Yvonne 155, 169
Elhaik, Eran 191
Elkana, Yehuda 255, 258
Ellis, Erle 46
Encrevé, Florence 206
Enescu, Raluca 201
Englund, Robert 31
Enkelmann, Wolf Dieter 188
Epple, Moritz 11, 58, 79
Erickson, Paul 77
Everts, Sarah 88, 226, 227
- F**
- Farhat, Georges* 166
Fehr, Johannes 255
Fehrenbach, Frank 169
Feingold, Mordechai 41, 258
Feke, Jacqueline 214
Felder, Björn 190
Feldhay, Rivka 36, 93, 96
Felsch, Philipp 224, 225
Fend, Mechthild 88
Ferrarese, Estelle 205
Feuchter, Jörg 188, 190
Field, J. V. 166
Filzmoser, Romana 164
Fischer, Sabine von 221
Fitzgerald, Gerard J. 127
Flitsch, Mareile 11, 254
Forrester, John 11
Förtsch, Reinhard 133
Fossheim, Hallvard 184, 189
- Frank, Caroline* 18
Fransen, Sietske 97
Freguglia, Paolo 211
Freise, Georg 95
Freyberg, Sascha 18, 20, 267
Friedman, Michael 211
Friedrich, Bretislav 21
Friedrich, Karin 41
Friedrich, Kathrin 187
Friedrich, Markus 66, 68
Frumer, Yulia 83, 264
Fullilove, Courtney 88
- G**
- Gaille, Marie* 205
Galluzzi Bizzo, Maria Lettita 189, 191
Gamba, Enrico 30
Gan, Elaine 187
Garau, Rodolfo 18, 36
Garber, Daniel 210, 211
Garcia, Ben 187
Garske, Ellen 244
Gaudenzi, Nicolás 20
Gavroglu, Kostas 20
Gaycken, Oliver 88
Geimer, Peter 225
Geller, Markham J. 31, 236
Gere, Catherine 65, 83
Germanese, Donatella 13, 84
Gessner, Samuel 166
Gess, Nicola 111
Geus, Klaus 23, 236, 237
Giannini, Giulia 12, 18, 41
Giovannini, Eduardo 214, 215
Gissis, Snait B. 88
Giulini, Domenico 51
Gläsel, Astrid 18
Glezer, Tal 215
Glombitza, Daniel 105
Goenner, Hubert 51
Gonçalves Martín, Johanna 127, 189, 190
Gordin, Michael D. 77
Görz, Günther 23, 266
Göttler, Christine 160

- Götz, Vera 18
 Goulding, Robert 30
 Grace, Joshua 127
 Grafton, Anthony 77, 104, 144, 145
 Granada, Miguel Ángel 39
 Greene, Jeremy 103
 Gregory Kohlstedt, Sally 254
 Greyerz, Kaspar von 100
 Groebner, Valentin 187
 Gross, Ana 187
 Gross, Daniel 227
 Gruendler, Beatrice 11
 Grünberg, Angela 111
 Gruss, Peter 58
 Grzimek, Gina 136
 GUAN Xueling 125, 126
 Guerrini, Anita 154, 169, 254
 Guillaume, Bertrand 122, 123
 Guldi, Joanna 134
 Gül Sumelihindi, Emine 26
 Günergün, Feza 95
 GUO Fuxiang 125, 126
 Gutfreund, Hanno 53
 Guth, Christine 254
 Güthenke, Constanze 78
 Guthmüller, Marie 205
 GU Zhou 137
 Guzzardi, Luca 211
- H**
 Hackler, Ruben 113
 Haff, Peter K. 46
 Hagelberg, Erika 184, 189, 191
 Hagner, Michael 187
 Haines, Margaret 18, 25
 Hallam, Elizabeth 127
 Hamou, Philippe 166
 Hannah, Dehlia 187
 HAN, Yi 121
 Hansen, Svend 26
 Hanson, Marta 103
 Harari, Orna 211
 Harrington, Anne 199, 206
 Harris, Anna 127
 Hartnell, Jack 155, 169
- Hartog, François 207
 Haug, Henrike 149
 Hausken, Liv 187
 Hecht, Gabrielle 254
 Heeffe, Albrecht 167
 Heé, Nadin 223
 Heesen, Anke te 224, 225, 253, 268
 Heinrichs, Erik 103
 Heis, Jeremy 210
 Hemmo, Meir 48
 Henderson, Linda 88
 Hendriksen, Marieke 155, 169
 Herbert Amanda 105
 Hermens, Erma 150, 168, 169
 Herrmann, Hans-Christian von 225
 Hess, Volker 104, 253
 Hilke, Beatrice 18
 Hills, Paul 166
 Hinrichsen, Ralf 244
 Hochadel, Oliver 187
 Hochman, Adam 182
 Hoffmann, Dieter 12, 18, 21, 53, 229, 230, 262
 Holmes, Brooke 78
 Homburg, Ernst 80
 Hounshell, Eric 113, 237
 Høyrup, Jens 31, 236
 Hsia, Florence 65, 75
 Hsu, Elisabeth 78
 Hui, Alexandra 111, 221
 Hüntelmann, Axel 188
 Hurwitz, Brian 79
- I**
 Immer, Alexander 18
 Inaba, Hajime 18, 49, 264, 265
- J**
 Jackson, Myles 108, 267, 268
 Jaeggi, Rahel 205
 Jäggle, Julia 105
 Jähnert, Martin 18, 48
 James, Frank 80
 James, Jeremiah 48, 49
- Janković, Vladimir 65
 Janos, Damien 226
 Janssen, Michel 53
 Jardine, Boris 88
 Jerratsch, Anna 18, 39, 40
 Jesseph, Douglas 210
 Joas, Christian 48, 50, 268
 Johnson, Benjamin 49
 Johnston, Stephen 252
 Jones, Matthew L. 65
 Jones, Peter 80
 Jordi Taltavull, Marta 48
 Jørgensen, Dolly 135
- K**
 Kachru, Sonam 97
 Kaisling, Karl-Ernst 46
 Kalter, Christoph 267
 Kant, Horst 21, 236
 Kaplan, Judith 66, 70, 190, 235
 Kaplan, Steve 127
 Kassell, Lauren 103
 Kaster, Robert 144
 Katzir, Shaul 49
 Kempers, Bram 267, 268
 Kern, Hartmut 243, 244
 Kerssenbrock-Krosigk, Dedo von 148
 Kessentini, Ruth 244
 Keuck, Lara 171, 179, 197, 267, 269
 Kheirandish, Elaheh 166
 Kieffer, Fanny 148
 Klapi, Myriam 203
 Kleberg Hansen, Anne Katrine 190
 Klein, Judy L. 77
 Klein, Ursula 12, 18, 43, 80, 126, 252, 262, 266, 268
 Klimscha, Florian 26
 Klingan, Katrin 45
 Klump, Jens 133
 Knobloch, Eberhard 210
 Kocka, Jürgen 58
 Ko, Dorothy 95
 Kolboske, Birgit 18, 59

- Kollatz, Thomas* 133
Kowal, Emma 189
Krajewski, Markus 66
Krämer, Fabian 80, 104
Krause, Katja 99
Krebernik, Manfred 32
Kreuder-Sonnen, Katharina 113
Kronfeldner, Maria E. 191
Krüger-Fürhoff, Irmela 205
Kruse, Sebastian 18, 26, 59, 246
Ksiazkiewicz, Allison 164
Küçük, B. Harun 98, 264, 269
Kumar, Arun 127
Ku-ming Chang, Kevin 81
Künzel, Christine 188
Kuriyama, Shigehisa 11, 254
Kursell, Julia 111
Kusukawa, Sachiko 163
Kuttner, Oliver 188
Kvičalová, Anna 109, 220, 221, 232
Kyllingstad, Jon Røyne 184, 189
- L**
- Laemmlli, Whitney* 84, 127, 190
Laitko, Hubert 236
Laland, Kevin 252
Lalli, Roberto 45, 49, 51, 52, 56, 57
Lamers, Han 226
Lange, Britta 111
Langrock, Kristina 18
Laplane, Lucie 113
Laroche, Rebecca 105
Laubichler, Manfred 20, 28, 45, 46, 59
Laugier, Sandra 204, 205, 207
Laywine, Alison 210, 211
Lee, Jessica 113
Lee, Victoria 141, 264
Lefèvre, Wolfgang 30, 262
Lehmann, Ann-Sophie 254
Lehmann, Katrin von 192, 234
Lehmann, Philipp 13, 62, 63, 68, 71
Lehmkuhl, Dennis 51
- Lehner, Christoph* 12, 18, 37, 47, 48, 50, 51, 53, 266
Leitão, Henrique 210, 252
Leitch, Stephanie 167, 169
Lemercier, Claire 127
Lemov, Rebecca 65, 66, 71, 77
Leonelli, Sabina 72
Leong, Elaine 5, 13, 90, 93, 101, 102, 103, 104, 105, 106, 168, 234, 253
Leonhard, Karin 163, 164, 165, 264
Lerman, Nina 14, 120, 121, 127, 227
Lettow, Susanne 191
Leung, Angela-Ki 95
Lewowicz, Lucía 19
Leyssen, Sigrid 113
Lipphardt, Veronika 5, 8, 9, 15, 79, 171, 172, 175, 177, 178, 183, 186, 187, 188, 189, 224, 225, 227, 234, 262, 264, 266, 267, 268
Logan, Peter M. 205
Lücke, Martin 187, 188
LUO Wenhua 124, 125, 126
Lydon, Steven 221
- M**
- MacPhail, Beate* 244
Mäder, Alexander 226, 227
Mak, Geertje 185
Malet, Antoni 18, 36, 211
Mallinckrodt, Birgitta von 221
Malpangotto, Michela 210
Mammola, Simone 237
Mancha, José Luis 35, 40
Mancosu, Paolo 211
Mangold, Hannes 113
Manias, Chris 187
Marchand, Suzanne 65, 100
Marchand, Trevor 254
Marcore, Enrico 127
Margócsy, Daniel 162, 169
Marrati, Paola 205
Marseglia, Nathalie 127
Martelli, Matteo 40, 149
- Matthiessen, Hannes Ole* 216
Maxwell, Susan 161, 168
Mayer, Andreas 75, 228, 230, 265
McClive, Catherine 205
McCray, Patrick 66
McLaughlin, Peter 28, 36
McNamee, Megan 113, 144
McVaugh, Michael 103
MEI, Jianjum 134
Meinel, Christoph 11
Menchero, Mauricio 205
Mendelsohn, J. Andrew 65, 104, 253
Menon, Minakshi 99
Merrill, Elizabeth 25
Michel, Boris 88
Midena, Daniel 113, 237
Mills, Mara 108, 203, 221, 267, 268
Minkowski, Christopher 144
Missfelder, Jan-Friedrich 111
Mitman, Gregg 66
Mohren, Melanie 192
Molà, Luca 95
Molino, Paola 144
Moran, Bruce 28
Morat, Daniel 111
Morel, Thomas 210, 226
Morgan, Mary S. 78, 79
Morrall, Andrew 164
Morrison, Kathleen 134
Mortag, Marie-Luise 18
Moscoso, Javier 205
Mosley, Adam 210
Most, Glenn W. 5, 16, 76, 77, 78, 144, 262
Mugnai, Massimo 210, 211
Müller, Philipp 68
Müller-Tamm, Jutta 224, 225
Müller-Wille, Staffan 66, 72, 104, 186, 187
Mulsow, Martin 11, 80
Munroe, Jennifer 105
Murphy, Hannah 107

N

Nag, Anindita 88
Nappi, Carla 95, 100
Navarro, James 47, 49
Nemec, Birgit 113
Németh, András 77, 144, 265
Netz, Reviel 211
Neven, Sylvie 149, 152, 157, 246
Nieto-Galan, Agustí 20
Niveleau, Charles 113
Nowacki, Horst 236
Nowotny, Helga 228, 255
Nunn, Hillary 105

O

Odgers, Juliet 166
Oertzen, Christine von 13, 62, 63, 65, 66, 73, 89, 90, 91, 228, 233, 265, 267, 269
Ogien, Albert 205
Olesko, Kathryn M. 206
Oliveira da Silva, Glaucia 189
Oltrogge, Doris 157, 164, 168
Omodeo, Pietro Daniel 12, 20, 22, 30, 36, 39, 40, 41, 42, 236, 253, 268
Ordine, Nuccio 19, 21
Östling, Johan 88
Overath, Petra 191
Özşen, Ilyas 26

P

Paaß, Claudia 17
Padova, Thomas de 21, 226, 227, 229, 231
Pambuccian, Victor 211
Panza, Marco 211
Park, Hyunhee 126
Park, Katharine 100
Parnes, Ohad 3, 17
Parolini, Giuditta 190, 226
Pascacio-Montijo, Yuriditzi 180, 189
Pasini, Enrico 42
Pastorino, Cesare 226
Pawley, Emily 80

Peiffer, Jeanne 165, 166
Pei-San Ng, Jeanette 127
Perdue, Peter C. 11
Perkins, John 80
Perler, Dominik 78
Perlina, Anna 20, 266
Pflanz, Georg 18
Philip, Kavita 122, 123
Phillips, James 113
Pietzke, Anke 244
Pomata, Gianna 80, 103
Pontani, Filippomaria 144
Popper, Nicholas 104
Popplow, Marcus 30, 122, 123, 265
Porter, Ted 253
Priddat, Birger 187, 188
Principe, Lawrence 148, 150
Probst, Siegmund 210
Pugliano, Valentina 103, 164
Pulte, Helmut 211

Q

Qureshi, Sadiya 190

R

Rabouin, David 210
Radin, Joanna 66
Ragep, F. Jamil 93, 94, 96, 236, 246
Ragep, Sally P. 93, 94, 246
Ragland, Evan 103
Rammer, Gerhard 252
Rangel de Almeida, João 189, 191
Rankin, Alisha 93, 102, 107
Raphael, Renée 252
Rashed, Roshdi 211
Ratcliff, Jessica 100
Raynaud, Dominique 166
Realdi, Matteo 20
Reardon, Jenny 180
Redeker, Eva von 205
Regier, Jonathan 39
Reinhardt, Carsten 58
Reller, Armin 46

Remond, Jaya 159
Renn, Jürgen 5, 7, 12, 18, 19, 20, 21, 22, 24, 26, 28, 30, 34, 35, 36, 45, 46, 47, 48, 51, 52, 53, 54, 55, 58, 225, 227, 228, 229, 230, 231, 232, 236, 262, 266, 269
Rentetzi, Maria 25, 90
Reubi, Serge 113
Rezakhani, Khodadad 34
Rheinberger, Hans-Jörg 5, 16, 227, 228, 229, 230, 231, 254, 255, 262, 269
Rickles, Dean 54
Rieder, Philip 205
Rieger, Simone 30, 241, 243, 244
Riello, Giorgio 126
Rijks, Marlise 161
Rivest, Justin 103
Roberts, Lissa 80
Roccasecca, Pietro 166, 167
Rockman, Seth 127
Rogan, Tim Michael 113
Rohmann, Dirk 26, 27
Rohrbacher, Peter 191
Rommevaux, Sabine 211
Roos, Anna Marie 164
Rosenberg, Daniel 65, 73
Rosenfeld, Sophia 206
Rosol, Christoph 12, 18, 45
Rowe, David E. 236
Rynasiewicz, Robert 53

S

Sabeen, David Warren 11
Sachse, Carola 236
Saito, Ken 210
Salient Del Colombo, Emma 20
Salisbury, Donald 51, 54
Samir, Imad 19, 31
Sandmo, Erling 85
Santos, Ricardo Ventura 183, 184, 189, 192
Saraiva, Tiago 126
Sattelmacher, Anja 85, 113
Satzinger, Helga 191
Sauer, Tilman 51

- Schäfer, Dagmar* 3, 5, 8, 14, 95, 115, 121, 125, 126, 127, 132, 133, 134, 136, 225, 227, 231, 235, 262
- Schaffer, Simon* 134
- Schappacher, Norbert* 210
- Schär, Bernhard* 191
- Scheid, Volker* 126
- Schemmel, Matthias* 12, 18, 22, 23, 24, 30, 32, 34, 36, 51, 54, 210, 211, 236, 237, 266, 267
- Scherer, Bernd M.* 45
- Schiefenhövel, Wulf* 22, 236
- Schivelbusch, Wolfgang* 88
- Schlehofer, Jenny* 26
- Schlünder, Martina* 122, 123, 127
- Schmaltz, Florian* 5, 12, 18, 21, 58, 231, 246, 250, 265
- Schmelzer, Matthias* 188
- Schneider, Gregor* 211
- Schneider, Jochen* 3, 17
- Schoepflin, Urs* 3, 17, 30, 94, 126, 133, 238, 244, 252, 254
- Schomberg, Anette* 26, 27, 28
- Schönemann, Anna* 156, 168
- Schönfeldt, Kristina* 18
- Schrader, Robert* 51
- Schröter, Petra* 18
- Schulmann, Robert* 53, 236
- Schwartz, Manuela* 111
- Schwartz Marín, Ernesto* 188, 191
- Schweber, Silvan S.* 50
- Schwerdt, Matthias* 244
- Schwerin, Alexander von* 59
- Sebastiani, Valentina* 162, 168
- Secchi, Pietro* 39
- Secord, Jim* 253
- Sedgewick, Augustine* 127
- Sefrin-Weis, Heike* 211
- Senatore, María Ximena* 127
- Sen, Tansen* 95
- Sepahvand, Ashkan* 45
- Sepkoski, David* 13, 63, 65, 66, 74, 86, 252, 253,
- Serrano, Elena* 79, 80, 92
- Shaw, Claire* 200, 206
- Shenker, Orly* 48
- Sherman, William* 104
- Shuttleton, David* 205
- Sidoli, Nathan* 214
- Siebert, Martina* 14, 124, 125, 126, 136, 227
- Sieferle, Rolf Peter* 188
- Simões, Ana* 11
- Simon, Rainer* 133
- Slowik, Edward* 210
- Sluiter, Ineke* 144
- Smith, A. Mark* 166
- Smith, George* 211
- Smith, Kate* 127
- Smith, Lisa* 105
- Smith, Pamela H.* 11, 93, 95
- Smyth Birkbeck, Adam* 104
- Sommer, Marianne* 171, 177, 178, 186, 187, 190
- SONG Lingping* 124, 125, 126
- SONG Shenmi* 137, 265
- Spary, Emma* 107, 253
- Stachel, John* 53, 258
- Stanley-Baker, Michael* 138, 226
- Stedall, Jacqueline* 30
- Steigerwald, Jörn* 205
- Stein, Claudia* 88, 199, 200, 205, 206
- Steingart, Alma* 112, 266
- Steinhauser, Thomas* 59
- Steinle, Friedrich* 225, 252, 268
- Sterne, Jonathan* 221
- Stevens, Hallam* 66, 74
- Stewart, John* 80
- Stiller, Juliane* 12, 59, 246
- Stolberg, Michael* 104
- Storeck, Gunthild* 18
- Strasser, Bruno J.* 65
- Stratmann, Martin* 58
- Sturge, Kate* 221
- Sturm, Thomas* 77
- Suárez Díaz, Edna Maria* 191
- Suisky, Dieter* 237
- Suitner, Riccarda* 88
- Sundermeyer, Kurt* 54
- Surdu, Mihai* 184, 185, 265
- Surmelhindi, Gül* 18
- Sutherland, Daniel* 210
- Svendsen, Zoe* 135
- Swan, Claudia* 100, 161, 168
- T**
- Taape, Tillmann* 107
- Tamborini, Marco* 113
- Taschwer, Klaus* 189, 192, 226, 227, 228, 229
- Taub, Liba* 65
- Teicher, Amir* 187
- Tellmann, Ute* 188
- Terrall, Mary* 100, 206
- Thiering, Martin* 22, 236
- Thoden, Klaus* 12, 30
- Thoms, Ulrike* 18, 59
- Tho, Tzuchien* 217
- Tian Miao* 36
- Ticehurst, Kathryn* 189, 191
- Tigner, Amy* 105
- Timmermann, Anke* 150, 168
- TINN Honghong* 142, 254
- Tkaczyk, Viktoria* 5, 9, 13, 15, 62, 108, 110, 111, 219, 220, 224, 232, 262, 265, 267, 268
- Totelin, Laurence* 105
- Trachtenberg, Marvin* 166
- Tramelli, Barbara* 159
- Traweek, Sharon* 253
- Trzeciok, Stefan Paul* 18, 36, 266
- Tugendhaft, Aaron* 144
- Tupikova, Irina* 22, 23, 39, 236, 237
- Turchetti, Simone* 75
- Tzohar, Roy* 129
- U**
- Ugaglia, Monica* 210
- Urzúa Contreras, Jorge Patricio* 246
- V**
- Vacín, Luděk* 31
- Valeeva, Diliria* 187

- Valleriani, Matteo* 12, 26, 29, 33, 34, 35, 36, 38, 39, 227, 231, 232, 234, 252, 266, 268
- Van Beurden, Sarah* 121
- Vandendriessche, Eric* 130
- van der Eijk, Philip* 225
- van der Heijden, Pim* 20
- van Dongen, Jeroen* 51
- van Driel, Joppe* 80
- Van Drie, Melissa* 127
- van Leeuwen, Joyce* 18, 33, 254
- van Strien, Marij* 216
- Vargha, Dora* 112, 266, 269
- Verburgt, Lukas* 113
- Vermeir, Koen* 156
- Vermij, Rienk* 39
- Vidal, Fernando* 63, 67, 75
- Vila, Anne* 205
- Vine, Angus* 104
- Viridi-Dhesi, Jaipreet* 202, 265, 266, 269
- Visigalli, Paolo* 144
- Vlahakis, George* 53
- Vogel, Klaus* 39, 266
- Vogt, Annette* 13, 62, 86, 232, 262, 265, 267, 268
- Volkman, Armin* 133
- Vollandt, Ronny* 144
- Volmar, Axel* 88, 111
- Vongsathorn, Kathleen* 92, 265, 268
- W**
- Wahrig, Bettina* 192
- Wahsner, Renate* 236
- Wakefield, André* 87, 253
- Walker, Oriana* 113
- Wallis, Patrick* 127
- Walther, Daniel J.* 192
- WANG Guangyao* 125, 126
- Warburton, David* 27
- Watkins, Elizabeth* 90
- Watson, Cecilia* 113
- Weinberg, Joanna* 104, 144
- Welsh, Caroline* 111
- Welzer, Harald* 188
- Wendt, Helge* 12, 18, 33, 35, 37, 43, 45, 46, 55
- Werlin, Julianne* 88
- Werner, Anja* 201, 265
- Werrett, Simon* 164
- Wesley, Morgan* 150
- Widmer, Alexandra* 171, 175, 183
- Wilder, Kelley* 66
- Wild, Wayne* 205
- Wintergrün, Dirk* 17, 18, 30, 32, 94, 133, 157, 245, 246, 252
- Winterhalder, Martin* 192
- Wise, M. Norton* 11, 78, 79
- Wittje, Roland* 221
- Wolf, Martin* 21
- Wolf, Rebecca* 220, 111
- Wübben, Yvonne* 80
- Wylie, Caitlin Donahue* 113, 127
- X**
- Xie, Xin-zhe* 113
- Y**
- Yavetz, Ido* 28, 39
- Yeo, Richard* 104
- Yoeli-Tlalim, Ronit* 95
- Z**
- Zachmann, Karin* 11
- Zalasiewicz, Jan* 46
- Zanetti, Cristiano* 162
- Zepeda, Henry* 217
- Zhang Baichun* 36
- ZHANG Chaonan* 136
- ZHANG Qiong* 125, 126
- ZHANG Shuxian* 125, 126
- Zheng, Xinxian* 113
- Ziemer, Hansjakob* 17, 87, 111, 223, 233

Errata & Supplements

MPIWG Research Report 2013—2014

Image Captions

p. 86 Emma S. Woytinsky and Wladimir S. Woytinsky were private disciples of L. v. Bortkiewicz. The couple gained recognition as social statisticians in Germany and in the USA, their third exile country from 1935 onwards. Photo in: Emma S. Woytinsky, *Two Lives in One*. New York, 1965.

p. 170 Katrin von Lehmann (Artist in Residence). © Katrin von Lehmann. Reproduced with permission of the artist (2015). *World Citizen 1735–1990 (Detail)*. Photographic weaving, 130 cm in diameter, 2013. Photo: Bernd Hiepe.

p. 222 Katrin von Lehmann (Artist in Residence). © Katrin von Lehmann. Reproduced with permission of the artist (2015). *Blick auf Vielfalt 1 (Detail)*. The series consists of 23 works. Drawing, perforation, each 36 x 51 cm, 2012–2013. Photo: Bernd Hiepe.

p. 238 The MPIWG Library. Photo: Alrun Schmidtke.

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