



MAX-PLANCK-INSTITUT FÜR WISSENSCHAFTSGESCHICHTE

Max Planck Institute for the History of Science



Cover:

Drawing table of the scientific illustrator Nils Hoff,
Museum of Natural History, Berlin 2006.

Foto: Barbara Wittmann

Back cover:

A section of the Peutinger table, an ancient road map representing the worldview of Roman travelers rather than a geographical mapping. The world, surrounded by water, is extremely distorted, favoring the east-west direction. The original size of the map was ca. 0.34 x 6.75 m. The section displayed here shows Italy and Africa divided by the Mediterranean Sea; it reaches from Lombardy (Insubria) on the left to the city of Milan (Mediolanum) on the right.

Most of the portrait photographs were done by Skúli Sigurdsson.

RESEARCH REPORT 2008—2009

MAX-PLANCK-INSTITUT FÜR WISSENSCHAFTSGESCHICHTE

Max Planck Institute for the History of Science

Introduction

The Max Planck Institute for the History of Science (MPIWG) comprises three Departments, each administered by a Director, and several Independent Research Groups, each led for five years by an outstanding junior scholar. Since its foundation in 1994 the MPIWG has investigated fundamental questions of the history of knowledge from the Neolithic to the present time. The focus is on the history of the natural sciences, but the history of the human sciences has also played an increasing role in recent research projects. Of central interest are basic categories of scientific thinking and practice as well as their transformation over time, such as, for instance, experiment, observation, space, motion, number or force. The research of the Institute pursues questions of philosophical epistemology historically. The common perspective of the diverse research activities is therefore often labeled as “historical epistemology.”

The Library, which now holds over 60 000 volumes as well as the large number of digitized historical sources made openly available with the help of the Institute’s Information Technology Group, significantly contributes to these broad-ranging historical inquiries. The approaches and methods used rely on a multitude of disciplines, ranging over the history and philosophy of science, the history of art and literature, cultural studies, the philologies of various languages, psychology and cognitive science to social anthropology and computer linguistics. Since current research projects take a comparative view of scientific developments, disciplines such as sinology, Mongolian and Islamic studies are becoming ever more important. Scholars working at the Institute accordingly have a diverse and often multidisciplinary background, many of them trained in the natural sciences—an important presupposition in particular for dealing with the challenges of recent history of science. This Research Report describes in detail the work of the different research units over the past two years. This work would not have been possible without the support of our Advisory Board. We hope that the results presented in this report will reward the reading.

The three Departments of the Institute approach questions of historical epistemology in different ways. The Departments are organized neither along disciplinary lines, nor according to historical periods. Their work embraces numerous scientific disciplines and large historical timescales. Department I, directed by Jürgen Renn, focuses on

structural changes in systems of knowledge and investigates long-term processes of changes in scientific knowledge. These processes are studied in all their dimensions, in particular with regard to cognitive, material and societal aspects. Scientific knowledge itself is understood as part of a more comprehensive societal system of knowledge. Longitudinal studies examining the development of scientific knowledge from ancient to modern times are being complemented by transversal studies dedicated to global processes of knowledge transfer and transformation. Department II, directed by Lorraine Daston, focuses on the history of the ideals and practices of rationality. It investigates the history of epistemic categories and practices that have become so fundamental for modern science and culture that they appear self-evident, including scientific objectivity and observation. Working Groups composed of scholars from a variety of specialties and national scholarly traditions investigate such the history of such epistemic categories across historical epochs and diverse cultural contexts. Department III, directed by Hans-Jörg Rheinberger, studies experimental systems and spaces of knowledge. The scope of its historical subjects is broad, with special emphasis on the history of the life sciences and the epistemology of experiments. Research projects of the Department also treat foundational cultural techniques of science, the emergence of scientific concepts, and reflections on historicity. The Department of Hans-Jörg Rheinberger will be completing its work in January 2011, while Hans-Jörg Rheinberger himself will remain at the Institute until 2014. In agreement with the rules of the Max Planck Society (MPG) the search for a successor has been initiated. The Independent Research Group I, led by Dagmar Schäfer, at the Institute since 2006, traces the history of innovation in China. It collaborates closely with a Partner Group at the Chinese Academy of Sciences in Beijing.

In their individual research projects the Departments raise complementary questions, which, also in their concrete research, often lead to cooperative ventures. Department I and Research Group I, for example, share an interest in the history of science and technology in China; Departments II and III have common interests in the history of scientific observation and the ways in which observations are registered. All research units have developed an interest in issues of intercultural knowledge circulation. Joint conferences have been dedicated to issues such as historical epistemology and digital publication. The entire Institute has also been involved in a Research Network on the History of Scientific Objects, funded by the Innovation Fund of the President of the Max Planck Society, that also links the MPIWG to major international centers in the history and philosophy of science and technology, both universities and museums.

Over the past years, local cooperation with Berlin universities has intensified, resulting in a formal cooperation agreement in 2007 involving the Max-Planck-Society, the Free University and the Humboldt University. The cooperation has prepared the creation of an International Center for the History of Knowledge in Berlin. The center represents an open forum for the history of science and pursues three closely connected goals: it aims at encouraging an interdisciplinary dialogue with the goal of developing an all-encompassing cultural history of knowledge, it favors the exchange among natural, social, and cultural sciences, and it supports the creation of international research networks.

The establishment of the new center takes place in the context of an upsurge in the history of science at the Berlin universities and a growing interest in this subject. In the past two years, first steps have been undertaken towards dual appointments at both the MPIWG and the Berlin partner universities. Together with the universities, the Max-Planck-Society selected Veronika Lipphardt as a new Independent Research Group Leader in 2009 who has launched her new group “Historicizing Knowledge About Human Biological Diversity in the 20th Century”, and who is expected to be appointed as a W2-Professor for the History of Life Sciences at the Free University in 2010. Other new appointments made possible by the agreement included Mark Geller as professor for the History of Knowledge at the Free University, and a new junior professor for the History of the Human Sciences at the Humboldt University, due to be appointed in 2010. The *Kuratorium (Board of Trustees)* of the Institute as well as the Berlin center’s cooperation council, established in 2007, supported these cooperation efforts. In this context, partners have begun to intensify cooperation in research, for example, in the contexts of the Excellence Cluster TOPOI and the Berlin School of Mind and Brain. The MPIWG will further strengthen its ties to its Berlin partners in the next years, including the joint appointment of another Independent Research Group Leader together with the Free University. An expansion of the agreement will include the Technical University as well. With additional support by the MPG, the instrument of Independent Research Groups, allowing young and exceptionally gifted researchers to develop their own research projects independently, has been extended even beyond these cooperations so that in 2010, two new Research Groups will be initiated at the MPIWG. Due to the continuing expansion of the Institute, new offices have been procured at the neighboring Harnackstr. 5.

The Institute continues to sustain collaborative research projects with other Max Planck Institutes such as the Bibliotheca Hertziana in Rome, the Max Planck Institute for European Legal History in Frankfurt am Main, the Kunsthistorisches Institut in Florence, the Fritz Haber Institute in Berlin, the Albert Einstein Institute for Gravitational Research in Golm, and the Max Planck Institute for Comparative Public Law and International Law in Heidelberg. International cooperations have been extended beyond the well-established close partnerships in Europe, for example, with the Institute and Museum for the History of Science in Florence, in the U.S., for example, with Harvard University, and in China, in particular, with the Chinese Academy of Sciences. Intensive scholarly relations have meanwhile also been established with colleagues and with institutions in Brazil, Canada, India, Israel, Mexico, Mongolia and Syria.

The MPIWG aims to innovate first and foremost in research, but it has also pioneered new forms of publication and the exploitation of new source materials. The MPIWG has created a new genre of publication, “working group volumes,” which are the result of years of collaborative research by teams of scholars, in contrast to the more familiar conference proceedings or edited volumes. Further exploration of new channels of publication, making use of the rapidly developing electronic facilities, is planned. In the past years cooperation with museums and archives has intensified as well, including several exhibitions, in part also available in electronic form. Finally, all research

units are developing electronic research environments for historical work on science and knowledge on the basis of tools developed in cooperation with the Max Planck Digital Library. The Institute thus seeks to fulfill the pledge of the Berlin Declaration on Open Access to Science and the Humanities, launched by the Max Planck Society in 2001, to realize its part in the vision of a global and accessible representation of knowledge.

Obituaries

Blahoslav Hruška 5. 5. 1945 – 26. 6. 2008

At the Institute almost every year from 1995 (Dept. I)

Blahoslav Hruška, director of the Hussite Faculty of Theology at Charles University in Prague, passed away on 26 June 2008. A scholar of Sumerian, Akkadian, cuneiform writing, archaeology, ancient history and philosophy, he found international acclaim with his work on Mesopotamian agriculture. He taught for many years as a visiting professor at the Institute of Ancient Near Eastern Languages and Civilizations in Berlin, and was later involved in numerous international projects, for example, at Cambridge University and at the German Archaeological Institute in Berlin. Bibek, as he was known, was a regular guest of Dept. I where he contributed valuable work to the CDLI project and made substantial contributions to the history of agriculture in the Ancient Near East. An accomplished international research scholar and a kind and considerate person—he will be greatly missed by his many collaborators and friends at the Institute.

Lydia Marinelli 15. 7. 1965 – 8. 9. 2008

At the Institute from January to March 2001 (Dept. III) and
May to June 2008 (Dept. II)

Lydia Marinelli was trained as a historian at the University of Vienna where she received her PhD in 1999. From 1992, she worked as a curator at the Sigmund Freud Museum in Vienna and later served as its director of scientific research. She devoted much of her career to transforming this site from a mere tourist attraction into an institution with growing international prestige producing novel and serious scholarship. Her exhibitions, all realized at the Freud Museum, mostly under difficult conditions, were major contributions to a renewal of the image of Freud and psychoanalysis. She was the first to publish detailed studies on the role of the media and of material

culture in the making of psychoanalytic knowledge in a deep epistemological sense. Lydia was a frequent visitor to the Institute and it was with a deep sense of shock and loss that all those who knew her as a generous and gifted friend and colleague came to learn that she had taken her life on the 8th September 2008 in Vienna. Lydia Marinelli was one of the most brilliant Austrian historians of her generation and her loss is irreplaceable.

Malcolm D. Hyman 12.11.1970 – 4.9.2009

At the Institute from 2004 (Dept. I)

Malcolm Hyman was a historian of science, a linguist, a classical philologist, a Sanskrit scholar and an information scientist all combined in one person. For Dept. I and for the Institute as a whole he played a crucial role: he was a member of the Collaborative Research Centre 644 “Transformations of Antiquity,” he was a key figure in the project on the globalization of knowledge and its consequences, he initiated a workshop series on multilingualism and *linguae francae*, he successfully led a very productive group in the context of the Max Planck Digital Library, he organized one of the Cross-Sectional Groups of the TOPOI Excellence Cluster, and he was always there to give advice, to help out, or to stimulate new ideas. He was an outstanding scholar and a warm and gentle human being, a unique mind whose loss is irreplaceable. He leaves behind his wife Ludmila and their one-year-old son, Stanley.

Naamah Akavia 18.9.1977 – 7.2.2010

At the Institute from January to March 2008 (Dept. II) and from October to November 2008 (Dept. III)

Naamah Akavia was a student in the Adi Lautman Interdisciplinary Program for Outstanding Students at Tel-Aviv University. She completed her MA thesis at the Cohn Institute for the History and Philosophy of Science and Ideas in 2003, for which she was awarded the Amos Funkenstein Prize. That same year, she was accepted as a Ph.D. student in the Department of History at the University of California, Los Angeles, where she started to work on her dissertation. She became particularly interested in the theoretical conceptualization and clinical practice of psychotherapy in Germany and Switzerland in the 1920s, in particular, in the motives of dynamism and motion so virulent in the work of Hermann Rorschach, Ludwig Binswanger, and Hans Prinzhorn, on whom her work came to focus. In 2008 Naamah spent time as a predoctoral fellow in Dept. II and was invited to continue work on her dissertation by Dept. III. Unfortunately her health condition forced her to return home to Tel Aviv for medical treatment, during which she was devoting all available time to the completion of her thesis. Naamah was able to send her completed work to the History Department of UCLA a few days before she died on 7 February 2010. We will keep her in our minds as a fine scholar and colleague.

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Department III Experimental Systems and Spaces of Knowledge

DIRECTOR *Prof. Dr. Hans-Jörg Rheinberger*

RESEARCH SCHOLARS *Dr. Dr. h. c. Hans Erich Bödeker*, *Dr. Christina Brandt* (since February 2006: Research Group Leader), *Dr. Bernd Gausemeier*, *PD Dr. Christoph Hoffmann*, *Prof. Dr. Ursula Klein*, *Dr. Julia Kursell*, *PD Dr. Sybilla Nikolow* (April– September 2009), *Dr. Irina Podgorny* (October 2009– September 2010), *Dr. Henning Schmidgen*, *Dr. Alexander von Schwerin* (November 2008 – March 2009), *Dr. Barbara Wittmann*

Independent Research Group I (2006–2011)

Concepts and Modalities: Practical Knowledge Transmission

DIRECTOR *PD Dr. Dagmar Schäfer*

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Independent Research Group III (2009–2014)

Historicizing Knowledge about Human Biological Diversity in the 20th Century

DIRECTOR *Dr. Veronika Lipphardt*

RESEARCH SCHOLAR *Dr. Susanne Bauer*

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(from left to right, top to bottom):
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Stefan Paul Trzeciok, Johannes Mücke,
Dennis Kirchhoff, Anna Holterhoff,
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Department I

Structural Changes in Systems of Knowledge

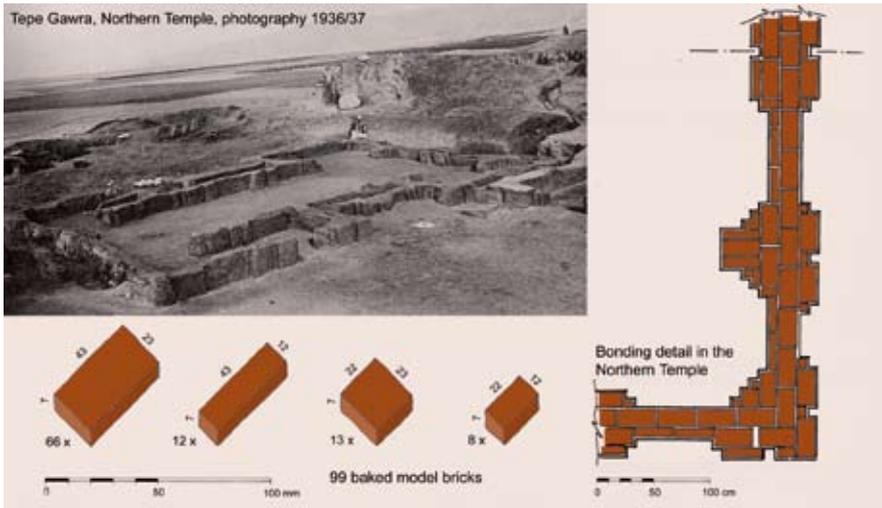
Director: *Jürgen Renn*

Research Focus

The work of the research group headed by Jürgen Renn is dedicated to understanding the historical processes of structural changes in systems of knowledge. This goal comprises the reconstruction of central cognitive structures of scientific thinking, the study of the dependence of these structures on their experiential basis and on their cultural conditions, and the study of the interaction between individual thinking and institutionalized systems of knowledge. This theoretical program of a historical epistemology is the common core of the different investigations and research projects pursued and planned by the research group. Historically, they stretch from ancient Babylonian mathematics and medicine to recent physics and institutional history of science.

Approach and Achievements

Department I understands its research program of a historical epistemology as contributing to an evolutionary history of knowledge but also to the reflectivity of present science and its institutions. The emphasis is on macro-studies to enable the identification of large-scale structures of knowledge development in social, technological, and cultural contexts. Approaches, methods, and objects of inquiry are taken from a large array of disciplines, ranging from the history and philosophy of science, technology and art, via the cognitive sciences and linguistics, to archeology, Middle Eastern studies, classics, Sinology, Indology, sociology, to physics, mathematics, chemistry, and other natural sciences. The creation of innovative IT instruments is essential for managing the concrete historical evidence for the research of Department I, provided by sources that are written in various languages and come from a broad range of historical periods, cultures, and fields. The work of the Department continues to take inspiration from challenges of the present and future development of science, tackling such issues as the role of the new information technologies, globalization, and the position of science in society. It thereby opens up opportunities for younger scholars of the Department in finding positions in a broad variety of fields, including science organization and dissemination, in addition to academic positions within and outside the history of science.



Research in Department I has led to the formulation of an overarching theoretical framework, offering cohesion to the wide spectrum of individual research activities realized under its auspices. Among past achievements was the filling of this framework with studies on the emergence of writing and mathematical thinking in ancient civilizations, investigations of the role of practical knowledge for the emergence of early modern science, a long-term history of mechanical

Preliminary planning in the 5th-millennium: complex bonding systems for bricks were laid out using small model bricks. Mesopotamia Tepe Gawra II, northern Iraq, chalcolithic period (ca. 4500–4500 BC). Partly redrawn after Arthur J. Tobler, *Excavations at Tepe Gawra*, 1950.

thinking, a comprehensive analysis of the relativity revolution at the beginning of the 20th century, groundwork for a long-term history of the development of architectural knowledge, as well as studies of knowledge development in an intercultural perspective. The Department has thus contributed to extending the perspective of the history of science to include a broader range of knowledge.

As the research projects of Department I integrate insights from a wide range of disciplines, cultures, and historical periods, they are realized in cooperative networks extending well beyond the boundaries of the Institute. The Institute typically represents, however, a central node of such networks, bringing together scholars to form teams characterized by intense co-operation over longer periods of time. The challenges of cross-cultural comparisons, diachronic studies of historical developments, and the close integration of computer-assisted source analysis and scholarly interpretations

A rare historical source on the history of architecture: *Vitruvius' De architectura*, 1524 from the Werner Oechslin Library collection in Einsiedeln, digitized and made openly accessible via the ECHO research environment.



are addressed with the help of a combination of core teams, who bear the main responsibility for a project, and an array of informal working groups which are often independently funded, characteristically shaped by the interests of younger scholars and connected by weaker or stronger links to the activities of the core team. A scientific coordinator is assigned to supervise each of the four central projects. Exploring and validating theoretical conclusions with reference to the vast collection of primary sources, but also building upon the existing scholarly literature would be inconceivable without the support and substantial active participation of the Institute's library, and the information management facilities that were built up with the support of the IT group.



Two-volume edition of *Yuanxi Qiqi Tushuo Luzui*, 1627 (Collected Diagrams and Explanations of the Wonderful Machines of the Far West), the first Chinese translation of Western mechanical knowledge and machines. The first volume (left) comprises essays, the second (right), a facsimile reproduction, transcription and commentaries.

Cooperations with the other departments, with the Independent Research Groups, and with other Max Planck Institutes have proven particularly valuable for the research pursued in Department I. Questions concerning knowledge and belief but also the challenges of archival science have emerged as a common interest with Department II, while processes of intercultural knowledge transfer in modern science are jointly studied with other Departments and Independent Research Groups. Investigating the role of challenging scientific objects in various historical contexts has remained a common concern of all three departments. The ECHO (European Cultural Heritage Online) infrastructure maintained by the Department jointly with the IT group and the library, continues to serve as the basic model and as a sustainable framework for all research projects of the Institute that deal with the digitization of cultural heritage. Research on the history of Chinese knowledge and its interactions with European science has greatly benefitted from cooperation with the Independent Research Group led by Dagmar Schäfer, but also with the Institute's Partner Groups, both the former and the present one, at the Institute for the History of Natural Sciences of the Chinese Academy of Sciences in Beijing. One of the results is a two-volume book publication in Chinese on the interaction between European and Chinese mechanics.

→ The Sciences of the Archive, p. 106

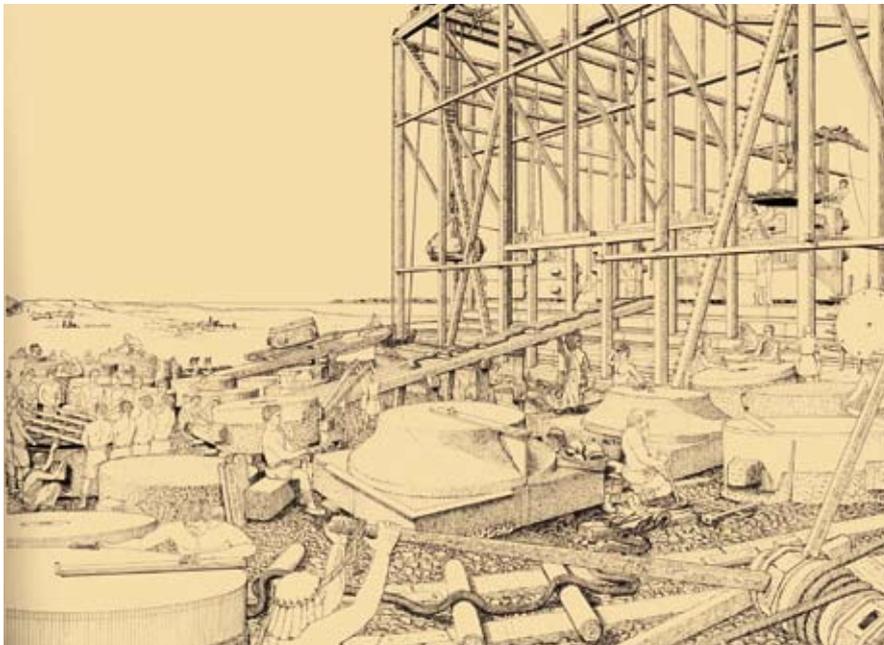
→ Conference, p. 214

→ p. 159

A common ongoing activity with the Independent Research Group and the present Partner Group headed by Sun Xiaochun focuses on the relation of ancient Chinese astronomy to the instruments used for astronomical observation documented by a text

→ p.177

Construction of the Older Parthenon on the Athenian Acropolis: Erection of the outer colonnade, shortly before 485 BC: Carving, surface-dressing, hoisting and placing of column drums and capitals. Drawing by Manolis Korres in M. Korres, *From Pentelicon to the Parthenon*, 1995.



of Shen Kua 沈括 (1031–1095), perhaps the earliest extant Chinese treatise on astronomical instruments. Furthermore, supported in part by the Strategic Innovation Fund of the President of the Max Planck Society, joint research endeavors have been undertaken also with other Max Planck Institutes, in particular with the Biblioteca Hertziana, the Fritz Haber Institute, the Kunsthistorisches Institut in Florenz, and the Max Planck Institute for Comparative Public Law and International Law. Resulting from the cooperation with the Biblioteca Hertziana, a major two-volume book publication has been dedicated to an epistemic history of architecture, conceived as the long-term history of the knowledge that has made the great architectural achievements of mankind possible. In cooperation with the Fritz Haber Institute a comprehensive history of quantum physics is in preparation.

As will be discussed more extensively below, the Department is also involved in institutionalized cooperations with other research centers both in Berlin and worldwide, benefitting from additional funding from the Deutsche Forschungsgemeinschaft,

from the Humboldt Foundation, the German Academic Exchange Service, and from other sources. One major cooperative venture is the *Project Cluster of Excellence TOPOI—The Formation and Transformation of Space and Knowledge in Ancient Civilizations*.

The Cuneiform Digital Library Initiative (CDLI) was launched by the Institute together with the University of California at Los Angeles, with support from the US National Science Foundation (NSF) and is now co-funded by the Mellon Foundation.

Completed Project: Epistemic History of Architecture

This joint project with the Biblioteca Hertziana in Rome and a team of scholars from several universities and institutes has completed its research in 2009. In the same year, a final internal workshop was held near Berlin, and some of the findings were presented at a symposium at Einsiedeln/Switzerland organized by the ‘Bibliothek Werner Oechslin’ and the Institute. The project was dedicated to establishing a long-term epistemic history of architecture, a new approach which focuses on knowledge as a crucial factor for the development of the building trade, in addition to the material, logistic, financial and personal resources involved. The historic periods covered by the project start with the very beginning of stone architecture in the Neolithic era and comprise the early civilizations in the Middle East and Egypt, Ancient Greece

→ p.60

and Rome, the Medieval period in northern Europe and the Italian Renaissance. The findings of the project for the various periods investigated provide new insights into the specific qualities of practical knowledge.

The final publication comprises three major sections. In the first section, the theoretical and methodological framework is presented, which focuses—for the first time—on knowledge as a decisive resource for the history of architectural development. An explanation is also given of the dual structure of the work, i.e., the distinction between contributions labelled as ‘basics’ or ‘specials’: the ‘basic’ contributions essentially represent review or survey papers and cover entire periods following a homogeneous set of fundamental topics and questions, whereas the ‘special’ contributions constitute more specialized contributions dedicated to key issues that called for substantially novel research because of their impact on building knowledge.

The second section comprises the main contributions and opens with a basic review of the Neolithic era in South-West Asia (Dietmar Kurapkat). Others are devoted to ancient Mesopotamia: a basic overview (Uwe Sievertsen) is complemented by special contributions dealing with cuneiform sources on architecture (Markus Hilgert), architectural drawings (Claudia Bührig) and the building trade in the older Babylonian period (Rosel Pientka-Hinz). A special contribution on Egypt (Ulrike Fauerbach) is followed by two basic surveys on Greece and Ancient Rome, together with an in-depth study of visual refinements in canonical architecture (Wilhelm Osthus). Further basic reviews cover the Middle Ages in Northern Europe (Günther Binding) and the early modern period (Hermann Schlimme, Dagmar Holste, Jens Niebaum). Related special contributions study the documents of the erection of the famous Cupola of the Florentine cathedral (Margaret Haines), the role of architects as researchers, the complex design of profiles for column shafts (Antonio Becchi), and the architectural knowledge contained in German ‘Hausväterliteratur’ (Torsten Meyer). The final section is dedicated to the overall interpretation and discussion of the project’s findings about the long-term development of building knowledge. A collection of relevant sources on the epistemic history of architecture was made freely available via the ECHO website. Work on this subject is being continued in the context of the collaboration with the Werner Oechslin Library in Einsiedeln.



Bones, muscles, ligaments of the construction and a new interpretation of the Vitruvian man. From B. Galiani, *L'architettura di M. Vitruvio Pollione, colla traduzione italiana e commento del Marchese Berardo Galiani*, 1758. Courtesy of the library of the Max Planck Institute for the History of Science. Courtesy of the library of the Max Planck Institute for the History of Science.

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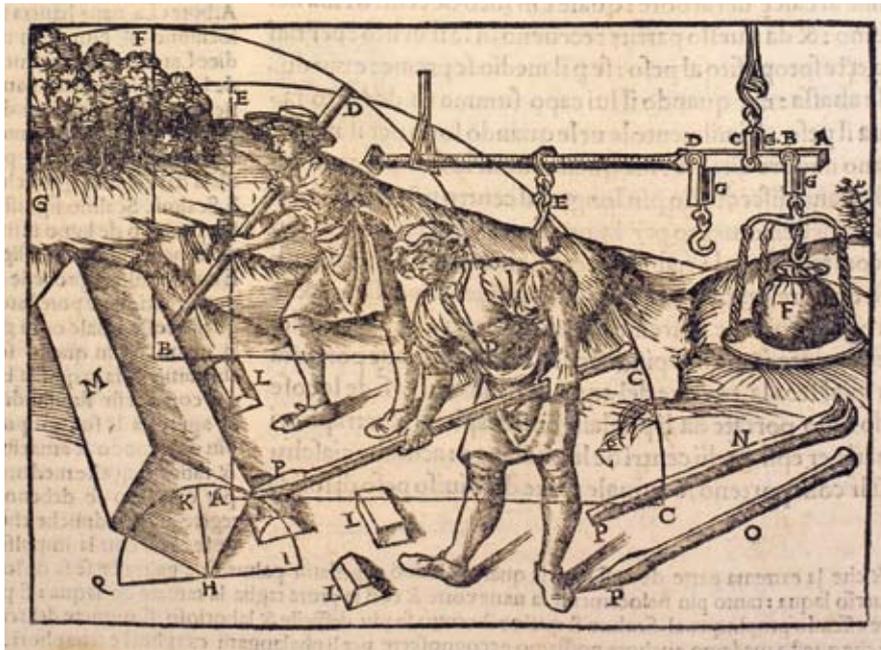
Ongoing Projects

Present research focuses on four central projects and on a cluster of activities directed at new forms of creating access to the empirical basis as well as to research results of the history of science. Each of the projects is coordinated by a research fellow and involves its own forum of discussion (project colloquium), while overarching issues are being discussed at team meetings involving the scholars responsible for the individual projects.

1. Mental models in the history of knowledge: the relation of practical experience and conceptual structures in the emergence of science

The aim of the project has been to study the origins and long-term development of scientific knowledge and to analyze the role of practical experience for the emergence and development of fundamental scientific concepts, such as those of weight, force, and motion. The project seeks to understand the emergence of such fundamental concepts as a result of reflecting on practical experiences, prior to the period in which experiments became the dominant experiential basis of science.

The project is in the final phase of publishing its results, in particular, in a book series entitled



Geometrical analysis of circular motions in the employment of basic mechanical devices such as the lever. Illustration by C. Cesarino, Vitruvius, 1521. Courtesy of the library of the Max Planck Institute for the History of Science.

The Historical Epistemology of Mechanics issued as part of the *Boston Studies in the Philosophy of Science*. At the same time, a number of follow-up studies have been undertaken in the framework of institutional cooperations, which made it possible to approach new subjects such as the emergence of modern hydromechanics in relation to pre-existing practical knowledge. In the report period the project has particularly benefitted from the support of the German Israeli Foundation (GIF) and the German Research Foundation (DFG) in the context of the Research Center—*Transformations of Antiquity* (coordinator: Matteo Valleriani).

2. Reorganizing knowledge in developed science: the history and foundations of quantum physics

The second project studies the reorganization of knowledge in developed science in the case of the development of quantum mechanics. It thus continues earlier studies on the relativity revolution in reconstructing the conceptual revolution of modern physics. A deeper understanding of this conceptual revolution requires tracing its roots in the established concepts and foundational debates of classical science. The project

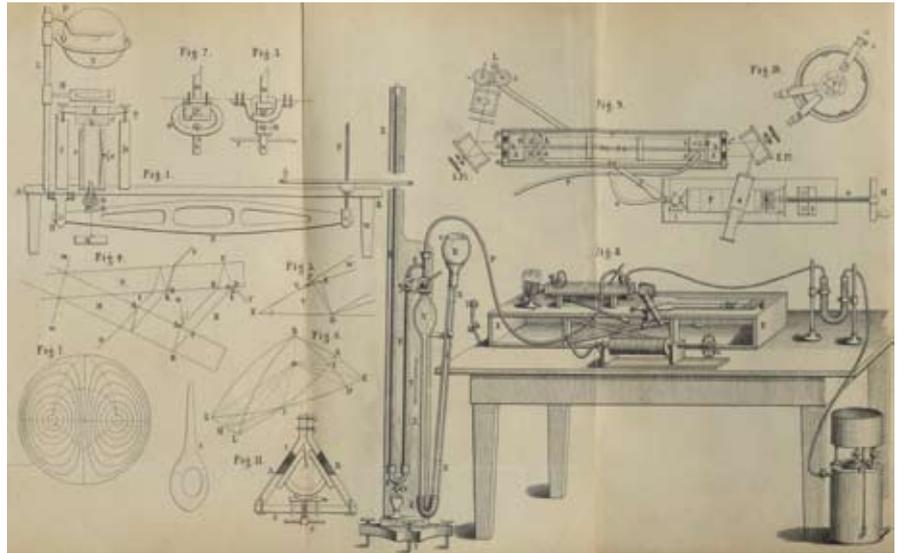
studies the empirical evidence and theoretical conflicts that led to a need to reassess established knowledge, and follows the conflicts about the reinterpretation of this knowledge within new conceptual frameworks.

The project, coordinated by Christoph Lehner, is a joint venture of Department I with the Fritz Haber Institute of the Max Planck Society (MPG), funded by the Strategic Innovation Fund of the President of the Society. It has established itself as the center of a large international network of historians, physicists, and philosophers. Through regular meetings and collaborative publications, it aims at establishing a continuing dialogue about the history of the conceptual foundations of quantum physics, transcending traditional disciplinary boundaries.

Just as the previous project on the relativity revolution, the project collects and digitizes key sources in the history of quantum mechanics. This includes the digitization of the existing microfilm archive for the history of quantum physics and the cataloging and digitization of Erwin Schrödinger's papers. The aim is to make these sources openly accessible.

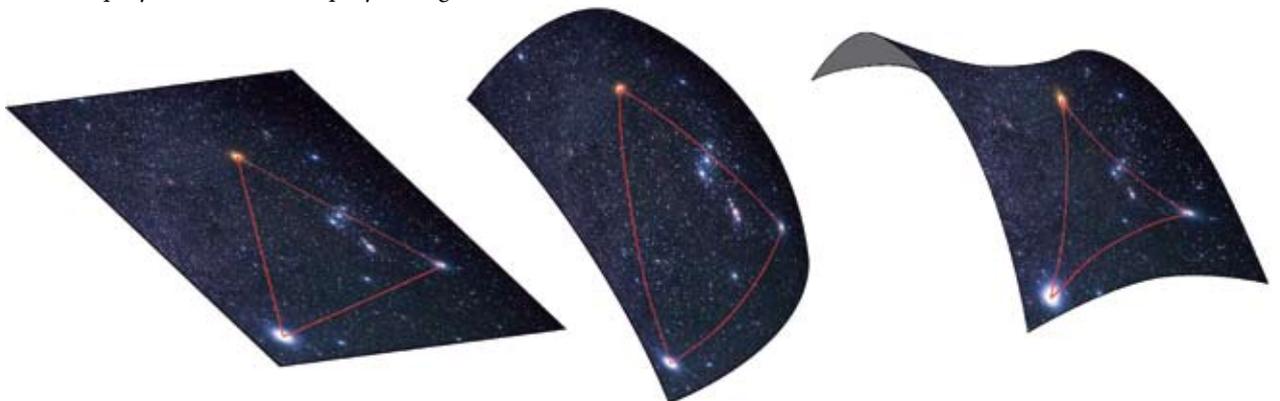
3. TOPOI—Historical Epistemology of Space: Experience and Theoretical Reflection in the Historical Development of Spatial Knowledge

The project on the historical epistemology of space is part of the Department's broad involvement in the Excellence Cluster 264, TOPOI: *The Formation and Transformation of Space and Knowledge in Ancient Civilizations*, which is a cooperative venture of the Free University, the Humboldt University of Berlin, the Berlin Brandenburg Academy of Sciences and Humanities, the German Archeological Institute, the Prussian Cultural Heritage Foundation, and the Max Planck Institute for the History of Science. Its long-term aim is to establish a lasting institutional structure for research on Antiquity: the Berlin Antiquity College.



Technical illustration showing a Jamin interferometer for the measurement of optical dispersion. E. Ketteler *Beobachtungen über die Farbenzerstreuung der Gase*, 1865.

Two dimensional models of spaces with different curvatures (Euclidean; spherical; hyperbolic). In 20th-century relativistic cosmology, it turned out that physical space is not Euclidean, but can only be adequately described as a curved four-dimensional Riemannian manifold. The modern transformations of ancient concepts of space are a central concern of the project on the *Historical Epistemology of Space*.



From the beginning of the TOPOI initiative in 2007 to the present, the Department has actively participated in forming the cluster. It is represented in the cluster's executive board (Jürgen Renn, member, and Matthias Schemmel, deputy) and in its organizational infrastructure, Jürgen Renn being the spokesperson of Area E, one of the five research areas of the cluster, jointly with Ernst Osterkamp of Humboldt University. The Area is central to the cluster in at least two respects: (1) It is the only research area whose historical subject goes beyond antiquity, investigating the later transformations of ancient spatial knowledge until the present. It therefore offers a reflective perspective on ancient knowledge which is of crucial relevance for the cluster at large. (2) It contains the so-called Cross-Sectional Groups which have the explicit mission to integrate research from different areas of the cluster by reflecting upon their results against the background of more general questions of the history of knowledge, and to feed back their results into the more specialized research projects. Within Area E, a series of working meetings has been held furthering the cross-fertilization of the research activities on space as transformed in the history of science centered at the Department on one hand and those on the transformation of spatial concepts in literature, art, and architecture centered at the Humboldt University on the other. The TOPOI project cluster further provided a framework for those research activities of the project *The Globalization of Knowledge and Its Consequences* that relate to the ancient world. Thus, work on the spread of knowledge through ancient cultures particularly focused on the role of writing, language, and multilingualism in the framework of a TOPOI Cross-Sectional Group. Contributions to the project by Manfred Krebernik, Mark Geller, and Mark Schiefsky were completed during their stay at the Institute.

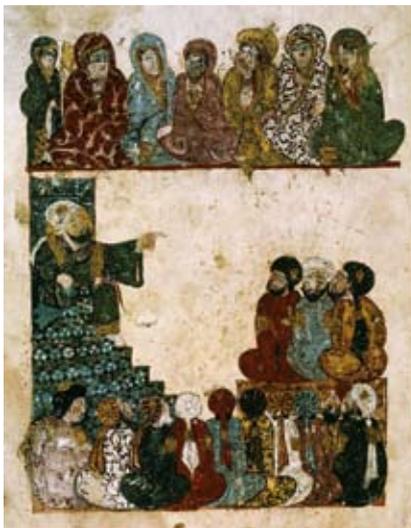
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4. The Globalization of Knowledge and its Consequences: The Transfer and Transformation Processes of Knowledge across Different Cultures

The fourth project, coordinated by Milena Wazeck, focuses on the conditions, pathways, and consequences of globalization processes of knowledge. The project aims at developing a new framework: a comparative history of knowledge on a large scale in which present processes of globalization are conceived as the outcome of historical developments and their interactions.

Transmission of knowledge by teaching. In an Islamic Madrasa, Al-Harir, *Maqamat*, Bagdad 1237 (left) © bpk-images; during the Renaissance, depicted on a marble panel by Luca della Robbia, ca. 1438 (right).



The four research foci of the project address historical phases in which knowledge production, transmission and transformation were critical for advancing processes of intercultural transmission. The first focus investigates a series of processes in the very early phases of globalization from the transmission of practical knowledge to the emergence of science. The second focus explores how knowledge was

disseminated as a consequence of the spread of power and belief structures on the Eurasian continent. The third focus deals with the encounters between culturally specific knowledge and globalized knowledge. The fourth focus is dedicated to the great challenges such as energy supply and climate change that humanity faces today when dealing with knowledge.

The research network established in 2007 has since been expanded. The participating scholars have collaborated in a variety of workshops and meetings on developing a theoretical framework and on producing a series of publications dedicated to an integrated and coherent history of the globalization of knowledge.

History of Science in Action: Alternative Forms of Dissemination

Further areas of work belong to what may be called “history of science in action” and are coordinated by Simone Rieger. Alternative forms of dissemination have been adopted to investigate the potential of the history of science as a mediator between science and society by exploring new forms of combining scholarly communication with public outreach, also in the service of the Max Planck Society as a whole. New forms of dissemination include the development of advanced tools for an historical epistemology: New electronic media have been used and developed—in close cooperation with the library and the IT group of the Institute—to explore innovative ways of creating access to the empirical basis and the research results of the history of science.

Events and Developments

The period of the report was mainly characterized by a consolidation of the new projects, in particular the quantum project and the project on the globalization of knowledge, and by substantial efforts invested in collaborative research on ancient science and its transformations, in particular in the context of the TOPOI-project and the Research Center—*Transformations of Antiquity*. Both projects successfully underwent external evaluations within this period. The sudden death of Malcolm Hyman in 2009, collaborating with both projects, as well as with the globalization project, was a major loss for the Department.

In 2008, Arne Schirrmacher was awarded the publication prize of the Deutsches Museum for his article “Der lange Weg zum neuen Bild des Atoms.” In 2009 Milena Wazeck was awarded the Georg-Uschmann prize for the history of science from the German Academy of Sciences, Leopoldina for her thesis on Einstein’s adversaries. In the same year, Julia Damerow received a special award for an outstanding contribution to computational science from the Heinz-Billing-Foundation of the Max Planck Society for her diploma thesis “Entwicklung eines MDD-Tools für eine virtuelle Ausstellung.” Miki Elazar was awarded the 2009 Funkenstein Prize of the Tel Aviv University for his doctoral dissertation “Honoré Fabri and the Concept of Impetus: A Bridge between Paradigms”. Together with Susan Neiman, Iris Nachum and Barbara Hahn, Peter McLaughlin received the 2009 Margherita-von-Brentano-Preis for the comprehensive edition and publication of the Nachlass of Margherita-von-Brentano.



Training session at the Mongolian Academy of Science 2008: Simone Rieger (center) showing Mongolian historians how to use the virtual spaces tool for a future virtual exhibition of historical Mongolian photo collections.



Title page of Milena Wazeck’s book *Einsteins Gegner*.

Collaborative Ventures

The ongoing investigations of the Department have once again been expanded with collaborative ventures supported by third-party resources. Several major research initiatives have been launched, such as the Excellence Cluster TOPOI or joint research ventures in Brazil, India, Israel, Mongolia and Spain.



Frontispiece of the Jesuit scientist Mario Bettini's *Aerarium philosophiae mathematicae*, 1648.

Since January 2005, the Department has been part of the Research Center—*Transformations of Antiquity* at the Humboldt University in Berlin, which concentrates on the transformation processes by which European cultures, arts, and sciences were formed in a continuation of the cultures of antiquity. The scholars of the Department taking part in this venture focus in particular on the conceptual structural changes in ancient knowledge as a result of its transmission. Within the framework of this cooperative venture, a special initiative has been launched with the Garden of Pratolino in Florence to investigate the transmission and transformation of the technical knowledge of antiquity. Its aim is to enable a comparison of the conflict between technical and theoretical knowledge during the Renaissance and during antiquity.

The cooperation on *Jesuit Mechanics in the Seventeenth Century: Scientific Education in a Catholic Context*, launched in 2008, is partly funded by the German Israeli Foundation for Scientific Research Development (G.I.F.) and undertaken with the Cohn Institute for History and Philosophy of Science and Ideas at Tel Aviv University. It continues to examine an important aspect of the development of mechanical knowledge: the dissemination and transmission of scientific knowledge in the early modern period through the highly developed communicative network of Jesuit colleges

and universities. A further cooperation with the Biblioteca Nacional de Portugal (BNP) was established to digitize and make openly accessible the Jesuit Coimbra Commentaries on Aristotle.

In addition to the ongoing collaborations of the project on the *History of Quantum Physics*, a new cooperation was launched with the Universidade Federal da Bahia in Brazil to research the history of the interpretational debates in quantum physics.

In the frame of the Department's cooperation with the Centre for Logic, History and Philosophy of Science at the University of Rostock, a new study was launched in January 2009 on the reorganization of knowledge in the life sciences.

Also in 2009, a new Minerva Center for the Humanities, headed by Rivka Feldhay, was founded at Tel Aviv University. In collaboration with Department I and oth-

er international research institutions, the section on *Migrating Knowledge* will explore knowledge in its dynamic dimensions focusing on a series of historical cases of knowledge transmissions between Europe and the Middle East and between Asia and Europe.

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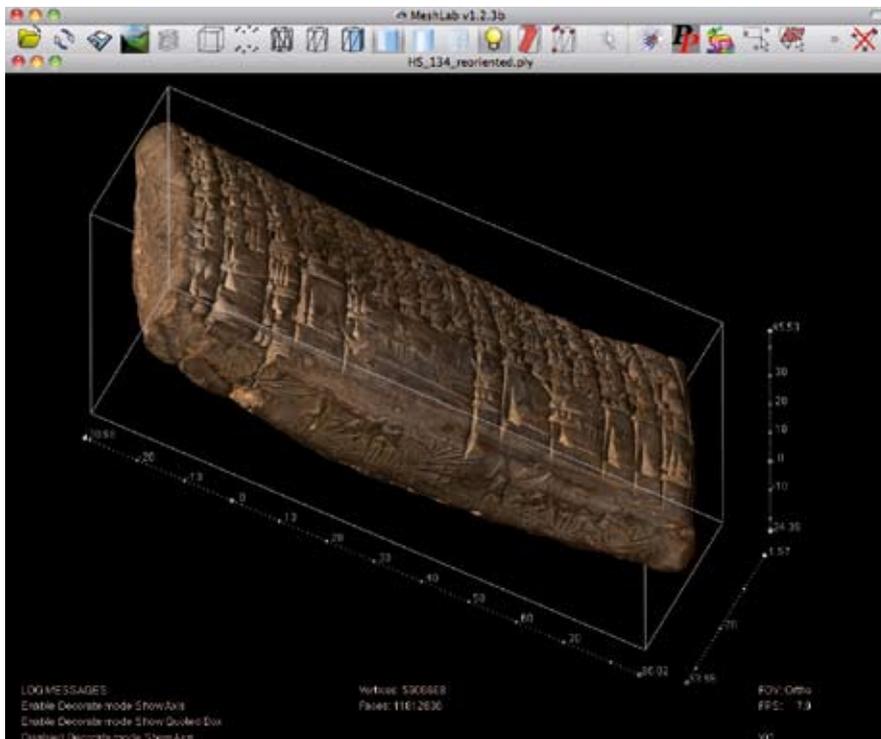
The Department's activities in developing an innovative digital infrastructure to support its research have continued in close cooperation with the Max Planck Digital Library (MPDL), a central body for scientific information management, which the Institute has helped to set up.

Several institutes of the MPG, among them the MPIWG, are developing a close cooperation with the Mongolian Academy of Sciences. A competence center for the digitization of Mongolian cultural heritage at the Mongolian Academy of Sciences is being established with the support of Department I and the Institute's library. This center supports the preservation of Mongolian cultural heritage by making it freely available in digital form using the advanced infrastructure developed within the Max Planck Society for such purposes, in particular the ECHO environment.

In cooperation with the Independent Research Group led by Dagmar Schäfer and Department II, an initiative was launched by the Max Planck Society in India to set up a new Partner Group to undertake research on the historiography of knowledge in different cultural contexts.

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A research venture "Convivencia" has been launched together with the Spanish Consejo Superior de Investigaciones Científicas (CSIC) by the Human Sciences Section of the MPG, following an initial proposal by the Kunsthistorisches Institut in Florence together with Department I. A preparatory conference took place in 2009 that investigated from a multidisciplinary perspective a formative period of the European world with its cultural and religious heterogeneity: the encounters and exchanges between



3D-scan of a sealed cuneiform tablet from the Hilprecht Collection at Jena.

Jewish, Christian and Islamic communities and elites in the millennium between the decline of the Roman empire and the beginning of the early modern period.

The ongoing collaboration between the MPIWG and the CDLI continues to augment the efforts of an international group of Assyriologists, museum curators and historians of science to make openly available through the Internet images and content of cuneiform tablets dating from the beginning of writing, ca. 3350 B. C., until the end of the pre-Christian era, cataloging cuneiform collections and capturing images of the cuneiform tablets. In the frame of CDLI, a cooperation between the MPIWG and the Friedrich Schiller University of Jena (FSU) was launched in December 2008 that aims to digitize the cuneiform tablets and the archival materials of the university's Hilprecht Collection and thus provide metadata for classifying the materials and reconstructing the process of the early philological and archaeological work. Pioneering 3D-scanning technology has been acquired that produces virtual images to replicate the original cuneiform tablets. Together with the Hilprecht Collection and the Kunsthistorisches Institut in Florence, in 2009 the project organized an international workshop in Jena on the future perspectives of the use of 3D-technologies in the sciences. This workshop became the starting point for cooperation between several research institutions on new applications dealing with three-dimensional data.

Project 1

Mental Models in the History of Knowledge: The Relation of Practical Experience and Conceptual Structures in the Emergence of Science

General Goals of the Project

The project focuses on mechanics as a part of science that has extraordinary significance for the development of science in general. More than other disciplines, mechanics has a continuous tradition from its origins in antiquity to the elimination of fundamental categories of mechanics by modern physics. The project covers the period from antiquity to the emergence of classical mechanics in early modern times. Key issues are followed up into the 20th century by the research activities of the project on *Reorganizing Knowledge in Developed Science*. Substantial parts of the project have been completed. The results have motivated an extension of the project to cover related areas such as hydromechanics and practical pneumatics. Furthermore, central ideas of the project are being pursued in cooperations with other institutions and with several visiting scholars, enriching the project's findings with complementary investigations, such as the reconstruction of the process of transformation of ancient culture during the early modern period.

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In the case of mechanics, knowledge structures can be reconstructed in terms of a variety of mental models which partly fulfilled functions in specific contexts of application, later covered by abstract concepts such as weight or force. The overarching vision of the project is realized following a series of different phases ranging from the emergence of theoretical mechanics in antiquity, via its elaboration in the scholastic framework, to the further transformations of this knowledge in the Renaissance and the subsequent creation of classical mechanics. This vision includes the investigation of the crucial role that practical knowledge played in all these historical phases as well as the relation between individual and shared knowledge. Taking these dimensions into account, the project has been able to show how social conditions and material culture shaped the large-scale structures of scientific development.

The Ancient Origins of Theoretical Mechanics

The use of mechanical tools predates any theoretical attempt to explain their function. The oldest known of these attempts date to the time of ancient Greece. The early Greek treatises not only changed the conditions for the construction of mechanical

devices but also provided a model case for the structure of scientific theories: experiences of practitioners are traced back to principles from which they can be deduced as necessary implications. Paradigmatically, the work of Archimedes on the equilibrium of planes embodies this notion of a deductive theory.

The investigation of the emergence of this notion of a deductive theory in ancient Greece and the study of its impact on the later development of mechanics is a central activity pursued to understand the emergence of theoretical mechanics (Peter Damerow, Peter McLaughlin, Jürgen Renn). The *Mechanical Problems* of Aristotle (or of one of his disciples) played a crucial role in the early development of theoretical mechanics. Traditionally this treatise has been studied either with philological methods to evaluate the authenticity of attribution to Aristotle as its author, or from the viewpoint of later mechanics as an early application of the law of the lever. In contrast to such investigations, the treatise has been analyzed here against the background of the multilayered knowledge system of mechanics as a transformation of existing knowledge into a new form. In applying this method, it was shown that the treatise is not based on any theoretical explanation of the law of the lever, but rather on a principle that represents a general experience of practitioners and that is best interpreted as a precursor of the law of the lever. This principle can therefore be interpreted as the missing link between the long tradition of mechanical practices and the foundation of theoretical mechanics. On the one hand, it can be traced back to experiences of practitioners. On the other hand, its application is based on the Aristotelian notion of syllogism and not yet on the proof techniques of mathematical deduction as applied to mechanical theorems by Archimedes. In this respect the treatise represents a missing link in yet another sense, namely between the rules of philosophical discourse and the rules of mathematical proofs. It is this crucial position between the first-order knowledge of practitioners and the higher-order knowledge created in Greek philosophy that explains the impact of this treatise in the European Renaissance.

This is confirmed by a comparative analysis of the first early modern theories of the strength of materials. These theories were presented in the context of early modern commentaries on Aristotle's *Mechanical Problems*. The Aristotelian commentators developed such theories while sharing the practical rules concerning resistance and stability that were embodied in pre-modern building methods established over centuries by architects, shipwrights and machine-makers (Matteo Valleriani). This investigation has shown how novel theorems were formulated on the basis of a process of transformation of ancient theories in view of contemporary practical activities.

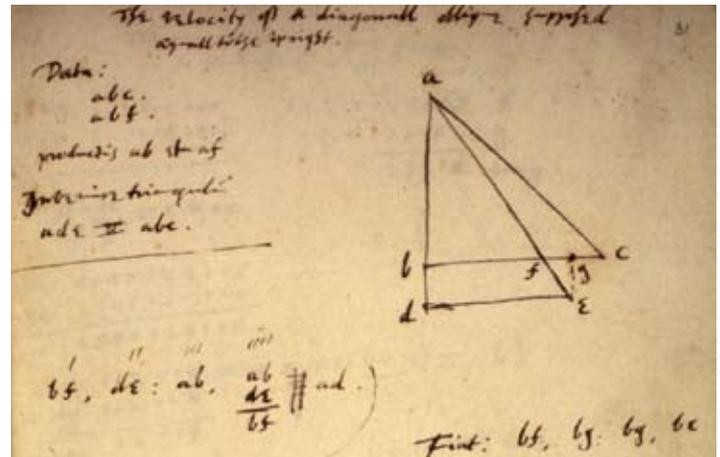
Scholastic Elaborations of Ancient Mechanics

Aristotelian mechanics remained dominant in Medieval times but was enriched in the 14th century by the work of the Oxford *calculatores*, who expanded the ancient theory of proportions, and by the Parisian School, which supplemented the Aristotelian theory of qualities with diagrammatic representations that went beyond the ancient means of representing functional dependencies. To investigate the process of scholastic elaborations of Aristotelian mechanics the *Liber de triplici motu*, published in 1509 by Alvarus Thomas, an early modern Portuguese natural philosopher, is being

translated, analyzed, and interpreted (Stefan Trzeciok). This book about the theory of proportions and the Aristotelean theory of motion represents the culmination of the scholastic dispute about motion before the rise of preclassical mechanics and was directly relevant to Thomas Harriot's studies on mechanics. As a first result, a full-text electronic edition of Thomas Alvarus' book is being published within the ECHO infrastructure.

The Use of Scholastic Tools in Early Modern Mechanics

The mathematical tools that were further developed or originated in the medieval scholastic tradition, such as the theory of proportions or the diagrammatic representation of change usually associated with the name of Nicolàs Oresme, constituted an important precondition for the mathematical treatment of various subjects of early modern science. In the case of early modern treatments of the motion of fall, the combined application of these two tools resulted in new interpretations of the diagrams themselves and eventually in the transformation of fundamental mechanical concepts like that of velocity. The hitherto unpublished working notes of the English mathematician and philosopher Thomas Harriot (1560–1621) contain the most systematic exploration of the implications of the medieval diagrams for the understanding of motion known to us. They clearly reveal the new practical contexts of early modern applications of medieval tools, such as the increasing importance of artillery in early modern warfare, as well as the conceptual difficulties that had to be overcome, such as the interpretation of diagrams in terms of proportions relating space traversed, time elapsed, and velocity. A comprehensive edition and detailed analysis of Harriot's manuscripts on motion has been published as a two-volume set in the Department's series on *The Historical Epistemology of Mechanics: The English Galileo: Thomas Harriot's Work on Motion as an Example of Preclassical Mechanics* (Matthias Schemmel). The book contains facsimile reproductions and transcriptions of the 180 folio pages as well as a thorough interpretation which sets Harriot's work in the context of early modern mechanics.



Thomas Harriot's use of medieval diagrams of change in his notes on the motion of fall, motion along inclined planes, and projectile motion. On this particular folio Harriot determines the ratio of the velocities of two downwards motions, one along a vertical line of given length and one along an inclined plane of the same length (British Library Add MS 6789, f. 31r, excerpt).

The Impact of Practitioner's Knowledge on Early Modern Mechanics

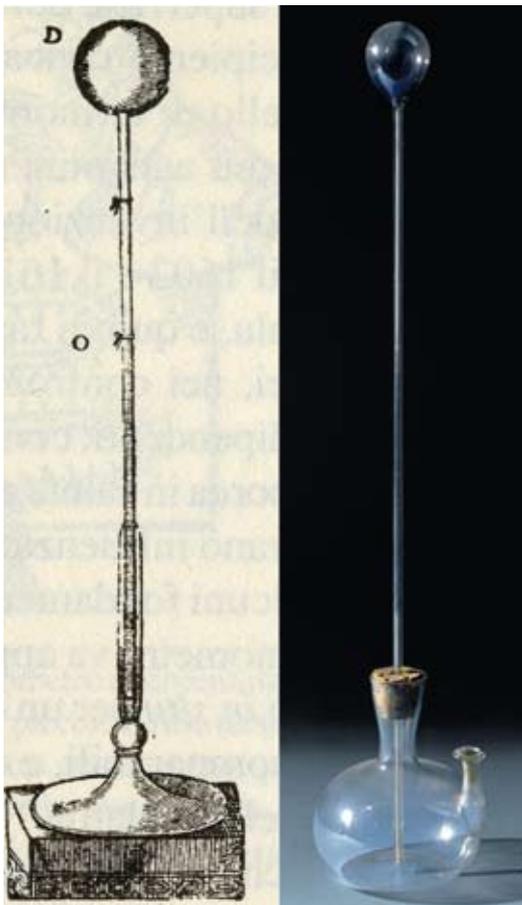
A series of research activities examined the role of practical knowledge in the development of theoretical mechanics during the early modern period. These activities deal with three questions. What are the relations between practical and theoretical knowledge? What is the structure of practical knowledge as far as it influences the development of theoretical knowledge? What are the socio-economic conditions of the development of practical knowledge?

The work of Galileo Galilei is particularly suited as a model case for addressing the first question. In order to understand the practical background of his theoretical achievements, his apprenticeship as an artist-engineer between 1584 and 1589 and the practical activities performed during his stay in Padua between 1592 and 1610 were analyzed. It was thus shown that his profile was comparable to that of a contemporary military engineer. Practical concerns had an immediate impact on Galileo's theoretical achievements. During his stay in Padua, Venetian authorities led an official enquiry concerning practical issues such as the maneuverability of large galleys. As it turned out, it was in reaction to this enquiry that Galileo developed his theory for analyzing the resistance to fracture of materials, later published in the *Discorsi* in 1638.

During his apprenticeship Galileo also became an expert in pneumatics. In particular he worked on an ancient pneumatic device, mentally re-configured into what is now called thermoscope and used for the first time to determine temperatures. The search for an explanation of the functioning of the thermoscope led Galileo to the formulation of the hypothesis of the discrete nature of heat, published in 1623 in *Il Saggiatore*.

The starting point of such investigations by Galileo was constituted by a set of mental models rooted in Aristotelian natural philosophy, which were transformed in the course of confrontation with practical experiences (Matteo Valleriani). The results of this research are published in a book entitled *Galileo Engineer*, the second volume in the series *The Historical Epistemology of Mechanics*.

Example of an early thermoscope, from Sanctorius, 1646 (left); Replica of Galileo's thermoscope, IMSS Florence (right), photo by Franca Principe, inv. N° 2444.



In order to address the question of the impact of practical on theoretical knowledge in the context of another, closely related field, the role of early modern hydraulic and pneumatic technology for the development of hydromechanics was examined (Matteo Valleriani). Within the framework of the collaboration with the Research Center—*Transformations of Antiquity*, it could be shown, in particular, that hydraulic engineers, who constructed the Garden of Pratolino near Florence—one of the greatest achievements of early modern technology—relied on ancient sources which they interpreted in the context of Renaissance technology. This research was based on a newly established virtual archive of relevant sources accessible on the ECHO website and via a virtual reconstruction of the garden <pratolino.mpiwg-berlin.mpg.de>. The wider historical background of hydromechanics was studied focusing on the analysis of texts related to clepsydra, water-clocks, the shaduf and Archimedes' screw (Elio Nenci). The relation between practitioners' and scientific knowledge was furthermore examined by investigating the history of the design and construction of complex two- and three-dimensional shapes in architecture and ship geometry. Before 1800, the task of conceiving, documenting and fabricating such shapes constituted an important interface between practical and theoretical knowledge. A volume has been published that comprises comparative results in both naval and civil architecture from classical antiquity to the Renaissance (Wolfgang Lefèvre, Horst Nowacki). Another study has shown that the theoretical reflection of mechanical practices are

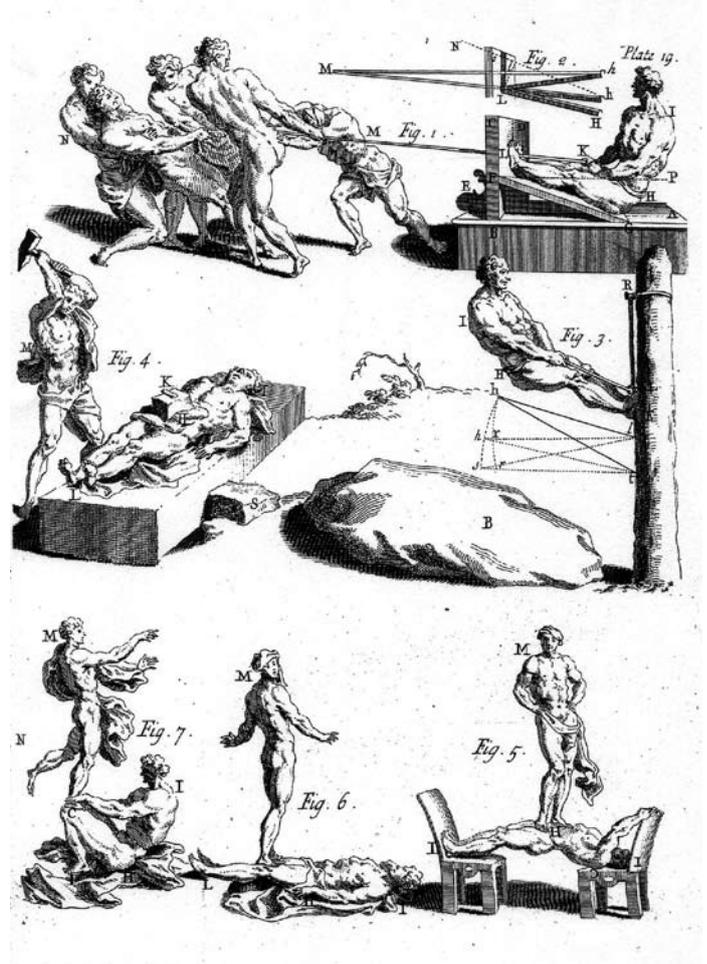
not necessarily confined to the realm of mechanics. This becomes particularly evident by the role that anatomy played in the interpretation of the stability of buildings (Antonio Becchi).

Work on the role and structure of practical knowledge was supported by a database of machine drawings. Extending earlier work, these drawings have been systematically analyzed with regard to technical components and pictorial language in social context. They have been made available as part of the Archimedes digital research library, including rare manuscripts from the 15th and 16th centuries (Wolfgang Lefèvre, Marcus Popplow).

The influence of the socio-economic conditions on the development of practical knowledge is revealed by a case study that examines the life and works of the mathematician, architect and engineer Mutio Oddi of Urbino (1569–1639), a contemporary of Galileo and pupil of Guidobaldo del Monte (Alexander Marr). This study has identified the growing overlap between mathematics, instrumental practice, bookish knowledge, and visual culture in the Late Renaissance through close examination of a voluminous archive of manuscript material, comprising some 1000 letters, notebooks, and unpublished treatises.

The development of mechanics as the result of an interaction of practical knowledge with other forms of knowledge ranging from antiquity to the early modern period finds its parallels in the evolution of optics and music theory as fields of scientific knowledge similarly dependent on the accumulated experiences of practitioners. Work on a critical edition and translation of Isaac Newton's *Opticks* has continued (Volkmar Schüller). Further work has also been dedicated to the investigation of the process of arithmetization of the theory of proportions in early modern music and its consequences on the contemporary development of theoretical music (Oscar Abdounur).

The analysis of the social contexts of science in the 17th century and the investigations on the origins of “externalism” in science studies has motivated a reconsideration of classical papers (Peter McLaughlin, Gideon Freudenthal). A collection of papers by Boris Hessen and Henryk Grossmann was published with an introduction explicating and analyzing the classical Marxist approach to an explanation of the Scientific Revolution developed in these writings. It was shown that Hessen and Grossmann, far from arguing that science was pursued in order to improve technology, focussed on the role of technology as the precondition and subject matter of theoretical knowledge.



The 'Mystery of the feats done by Sampsons, or strong men' described by J. T. Desaguliers in *A Course of Experimental Philosophy*, 1734. Courtesy of the library of the Max Planck Institute for the History of Science.

The Impact of Challenging Objects

In the context of the technological development of the early modern period, certain devices, material objects and processes assumed the role of challenging objects for traditional conceptual frameworks of mechanics. Examples are the pendulum, fly-wheel, and projectile trajectory. The concepts of the extant theoretical frameworks of mechanics were probed by their application in the investigation of these novel challenging objects. The new results thus account for the inherent potential of the challenging objects to trigger and advance conceptual developments. This mechanism contributed decisively to the revolution of the theoretical knowledge of mechanics in the early modern period.

A central case study explores the reorganization of knowledge taking place in the course of Galileo's research process, which is documented by a vast collection of correspondence and research notes. It has revealed the challenging objects that motivated and shaped Galileo's thinking and closely followed the knowledge reorganization that these engendered. The problem of reducing the properties of pendulum motion to the laws governing naturally accelerated motion on inclined planes have thus been shown to have served as the mainspring for the formation of Galileo's comprehensive theory of naturally accelerated motion. These insights have made it possible to rewrite the

System of pneumatic automata representing Vulcan's Forge. Drawing by Giulio Parigi, *Gabinetto di Disegni e Stampe*, Uffizi Gallery, Florence.



history of Galileo's theory of motion as a transformation of the shared knowledge of preclassical mechanics, which is comparable to other intellectual trajectories. The focus on challenging objects has thus enabled an understanding of congruent theoretical developments—so characteristic for the period—which cannot be accounted for by oral and textual transmission alone. Another stimulus for the development of the theoretical knowledge of mechanics was the fact that the theoretical accounts given for these challenging objects often sought to mirror and account for the complex relations of these objects in their technological context to other objects and phenomena outside this context. In Galileo's case this led to the integration of established theoretical results that were previously considered to be unrelated. One example is Galileo's integration of knowledge concerning the motion of fall, the pendulum and the inclined plane. This is evidently an important mechanism for the unification of mechanical knowledge. The results of the case study is now being prepared as the third book of the book series *The Historical Epistemology of Mechanics, Galileo's Challenges: The Origin and Early Conceptual Development of Galileo's Theory of Naturally Accelerated Motion on Inclined Planes* (Jochen Büttner).

Further studies pursued in the framework of the Research Center—*Transformations of Antiquity* have deepened the historical understanding of challenging objects in their historical contexts. It has thus turned out, for instance, that the introduction of the fly-wheel as a machine part in the late Middle Ages served as a source for early modern reflections on rotational motion, challenging Aristotelian notions. In the frame of the Network History of Scientific Objects a workshop was organized to explore and elaborate a historiographical approach to the role that a particular type of object played in a particular period for the development of a particular body of knowledge—the challenging objects of early modern mechanics.

→ Conference, p. 214



Archimedes' burning mirror. Fresco by Giulio Parigi, ca. 1600, 'Stanza delle Matematiche' Uffizi Gallery, Florence.

Expansion of Preclassical Mechanics in the Early Modern Period

The preclassical mechanics of the 16th and early 17th centuries was characterized by an elaboration of the available mechanical theories in view of challenging objects. Preclassical mechanics, defined in this way as a historical stage in its own right in the development of mechanics, was pursued by engineer-scientists who addressed the technical challenges by drawing on heterogeneous bodies of knowledge—the increasing number of available ancient scientific and technical texts. As a consequence, a multiplicity of pathways developed, sometimes leading to the same insights about a given problem, sometimes to diverging views. At the same time, intrinsic tensions within a given traditional body now emerged in fuller clarity due to the fact that it was no longer, as was typically the case in antiquity, a single author or a string of authors separated by generations who were involved in its elaboration. Alternatively, one and the same problem was now often addressed from distinctive perspectives, thus becoming a borderline problem of different knowledge traditions, catalyzing their conflictual integration. The heterogeneity as well as the fragmentary nature of the shared knowledge of early modern science, in particular with regard to the heritage of

ancient science and its subsequent transformation, has been investigated by analyzing the conflictual integration of Aristotelian and Archimedean knowledge resources on mechanics, as it can be traced in the works of Guidobaldo del Monte, Giovanni Battista Benedetti, Galileo Galilei, Francesco Maurolico, Bernardino Baldi, Henri de Monantheuil, Simon Stevin, and Isaack Beeckman. In particular, an in-depth study was dedicated to a copy of Benedetti's *Diversarum speculationum mathematicarum et physicarum liber* containing hand-written marginal notes by Guidobaldo, the leading expert on mechanics of the generation before Galileo and himself the author of the most influential early modern text on mechanics (Peter Damerow, Jürgen Renn). Guidobaldo's views on mechanics were also compared to those of Maurolico, Baldi, Stevin and others in light of the different roles that mathematics played in physical explanations (Maarten van Dyck).

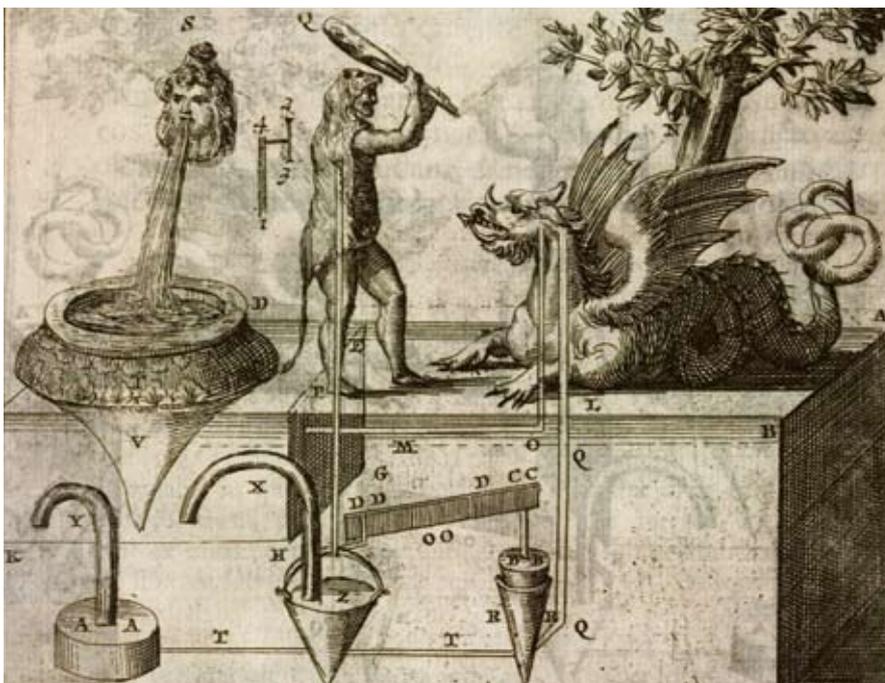
Knowledge and Belief in Early Modern Science

The development of early modern practical and theoretical mechanics was also shaped by religious constraints. In the framework of collaboration supported by the German-Israeli Foundation, it is being investigated how such constraints left their mark on the large-scale structures of scientific development. This will add a further dimension to the understanding of the evolution of mechanics in the 17th century and enrich the account of the Scientific Revolution.

It has been claimed in the past for instance that due to dogmatic constraints the Jesuits did not essentially contribute to the development of the new mechanics in the 17th century. Against this view the study has been able to show that Jesuits did make substantial contributions to the emergence of classical mechanics. The Jesuits, for example, more than anyone else took on the role of providing a growing body of students with new knowledge in

astronomy and the science of motion and machines, and some even with a highly advanced level of physico-mathematical knowledge. Although Jesuit physico-mathematicians were constrained by the Society's pro-Aristotelian and anti-novelty programmatic position, their teachings had unintended consequences that contributed to the dissolution of the Aristotelian worldview, as has been shown in a comprehensive survey (Rivka Feldhay).

Description of a new pneumatic device by Giovambattista Aleotti. From Federico Commandino, *Heronis Alexandrini Spirituum Liber*, 1680. Courtesy of the library of the Max Planck Institute for the History of Science.



In addition, it was shown how Jesuit teaching was interwoven with practices of transmission of scientific knowledge that concerned wider audiences among the urban elites of early modern Europe.

A special case study has addressed the theory of motion of the Jesuit scientist Honoré Fabri and its relation to the Eucharist doctrine (Michael Elazar). The section “Jesuit Sciences” in ECHO currently displays 85 rare books and several manuscripts by Jesuit scholars. Two workshops were held in the report period, one in February 2008, the other in March 2009, the proceedings of which are being prepared for publication.



Frontispiece of Athanasius Kircher's *Romani Collegii Societatus Jesu* showing Jesuit scholars of the Collegium Romanum in the Museum's 'Cabinet of Curiosities'. Courtesy of the library of the Max Planck Institute for the History of Science.

Project 2

Reorganizing Knowledge in Developed Science: The History and Foundations of Quantum Physics

General Goals of the Project

The goal of the project is the study of the emergence and transformation of core groups of concepts that structure the vast knowledge embodied in the mechanical worldview as a result of processes of knowledge integration and disintegration. In the context of the project, the emergence of such a core group of foundational concepts is conceived as a restructuring of the cognitive organization of previously acquired knowledge. Core concepts of the mechanical worldview such as space, time, force, motion, and matter achieved their privileged position in the organization of knowledge only after a long process of knowledge integration in a material, social, and cognitive sense. Such concepts proved to be extremely stable in the face of an enormous growth of knowledge in the course of the further development of science. Nevertheless, physics, like many other scientific disciplines, has witnessed in the past century fundamental changes of precisely such core groups of foundational concepts. These fundamental changes were preceded by more or less extended periods of knowledge disintegration, in which the established cognitive organization of knowledge became problematic. Processes of integration and disintegration of knowledge are studied in close connection to each other within the project, since it has turned out that the essential mechanisms at work in periods of destabilization were of a similar nature as those in the original processes of the emergence of core concepts of a discipline.

The project is focusing on the history of the central mental models which shaped scientific thinking in the transitional period from classical mechanics to modern physics. The results already achieved for the emergence of the new concepts of space and time in the context of the two relativity theories are being complemented by similar research on the emergence of new notions of matter, field and causality established in the context of quantum theory.

The History and Foundations of Quantum Physics

The quantum revolution emerges from a series of crises of the classical mechanical worldview from the late 19th century to the 1920s. These crises were caused in part by conflicts between theoretical expectations and experimental results, but also importantly by the difficulty of integrating recently established physical theories such as electrodynamics and thermodynamics into the mechanical worldview. Similar to the

case of relativity theory, conflicts between theories necessitated a reorganization and re-evaluation of controversial concepts.

Central to this process of re-evaluation was not only a large amount of uncontroversial empirical knowledge accumulated over a long period of time but also the persistence of certain theoretical structures and methods. Theoretical physicists were therefore confronted with critical decisions about which concepts and theoretical structures could be maintained in the emerging theory and could thus serve as a guide for the development of the theory. As in the case of relativity, it turned out that it was often high-level and abstract structures that survived, although frequently with a new physical interpretation.

Differently from the case of relativity, a consensus about the physical reinterpretation of the abstract structures was not easily attained. Famous dissenters, such as Einstein and Schrödinger, while accepting the new theoretical structure, disagreed about its meaning and its connection to the traditional mechanical worldview. Later on, the establishment of quantum field theory, including the unification with the theory of relativity, has turned out to be at odds with the traditional demands on an interpreted physical theory. These disagreements have persisted up to this day, even though quantum mechanics by all counts is a highly successful predictive theory.

The research project on the history and foundations of quantum physics began work in October of 2006 (Christoph Lehner, Jürgen Renn). It is a joint initiative with the Theory Department of the Fritz Haber Institute and has been funded for five years by the Strategic Innovation Fund of the President of the MPG. The project attempts to arrive at a deeper understanding of the genesis and the development of quantum physics, using the tools of historical epistemology that have been developed in Department I over the last years. The project thus focuses on the long-term history of the process of theory change, stressing the continuity of methods and structures.

The experience in writing the history of relativity has demonstrated the strength of this method: It leads to results that have been outside the view of approaches limiting themselves to an account of historical developments narrower in a temporal and contextual sense.

Unlike the relativity revolution, the development of quantum physics was a communal effort whose nature cannot be captured by a biographical approach that focuses upon a few central figures: careful attention must be paid to the broader community of researchers and to the network that allowed them to achieve what no single researcher could do alone. Work in this direction draws upon extensive archival records of correspondence, manuscripts, and notebooks that are investigated and made accessible in an electronic form to other researchers worldwide.

Another important element of the project is the focus on mathematical arguments in the primary source material, a topic not much dealt with in the existing literature. For this aim, the project is conceived as a close collaboration of a large and varied group of historians and philosophers of science with working physicists exchanging ideas and viewpoints through frequent meetings (dedicated conferences, workshops and reading groups).



X-ray apparatus depicted on the cover of the popular science journal *Koralle*, 1932.

It is obvious that the history of quantum physics cannot be understood without an appreciation of the radical conceptual changes that it brought. Debates about interpretation played a central role in the development of quantum physics. Therefore, the project investigates the history of the interpretation of quantum mechanics not as a separate “philosophical” subject but as part of a wider debate in physics.

The project aims at fostering the study of the history of quantum physics by facilitating the exchanges between physicists and historians, but also by drawing new scholars into the field through graduate and postdoc fellowships. In addition, one of the main tasks of the project is the maintaining of an electronic infrastructure within the ECHO environment for the publication of primary sources, archival material as well as results of ongoing research by members of the network.

As the central publication of the project, a working group volume in preparation describes the development of quantum mechanics as a long-term process of theory change (Christoph Lehner, Christian Joas, and Jürgen Renn). It emphasizes the continuity of scientific methods and structures through the fundamental changes in the mechanical world picture since the 19th century. This book bundles the individual research programs of the members of the group into a coherent whole, at the same time achieving a legible survey of the development of quantum mechanics, and filling a void between thematically focused technical accounts and popular presentations that do not represent the current historical state of the art. It is being written in close collaboration by all the members of the project, who meet every week for presentations and discussions. In close connection with the working group volume, two edited volumes are also in preparation: One volume (Giuseppe Castagnetti, Michael Eckert, Hubert Goenner, Dieter Hoffmann, Alexei Kojevnikov, Jürgen Renn, Arne Schirrmacher) addresses the role of scientific institutions in the development of quantum theory and comprises, e.g., case studies on the Kaiser Wilhelm Institutes of Physics and Physical Chemistry and the Physikalisch-Technische Reichsanstalt in Berlin, the Sommerfeld school in Munich, Bohr’s institute in Copenhagen, and Göttingen University. The second volume (Massimiliano Badino, Jaume Navarro) analyzes early textbooks of quantum theory and their role in establishing and promoting the theory. For both edited volumes, workshops with the external contributors were organized in 2009. Contributions to the textbook volume were presented in two special sessions at the 2009 HSS meeting in Phoenix, U.S.A..

Besides a biweekly reading group for physicists and historians from local institutions, and a colloquium with invited speakers, a series of conferences was launched by the project in 2007 to strengthen the international network of researchers working in the history of quantum physics. The second conference in this series took place in Utrecht in July 2008. Its proceedings were published as a special issue of *Studies in History and Philosophy of Modern Physics* (2008, 40: 4). A satellite meeting of the project took place in May 2008 at the University of Sidney. The project also contributed a session entitled “Quantum Physics at the Crossroads” to the 2008 “Three Societies Meeting” in Oxford, and was featured in a special session “Eighty years of quantum mechanics. A new international project” at the April 2008 meeting of the American Physical Society.

The project contributed the texts for the exhibition “Max Planck: Revolutionär wider Willen” organized by the Max Planck Society at the Deutsches Technik Museum in

honor of the 150th birthday of Max Planck. These texts formed the basis for a special issue of *Spektrum der Wissenschaft* (Biographie). Planck's birthday was also the occasion for a symposium, organized by the project, of the History of Physics Division of the Deutsche Physikalische Gesellschaft in February 2008 in Berlin. The proceedings of this meeting were published in an edited volume entitled "Max Planck und die moderne Physik" (Dieter Hoffmann).

Old Quantum Theory

The old quantum theory was a period of transition between classical and quantum mechanics. Successive crises led to a gradual disintegration of the mechanical world-view. At first, attempts were made to capture quantum phenomena by ad hoc modifications of the description in classical mechanics, such as quantum conditions. The problems of these attempts led to an increasing awareness that a more fundamental revision of mechanical concepts was necessary.

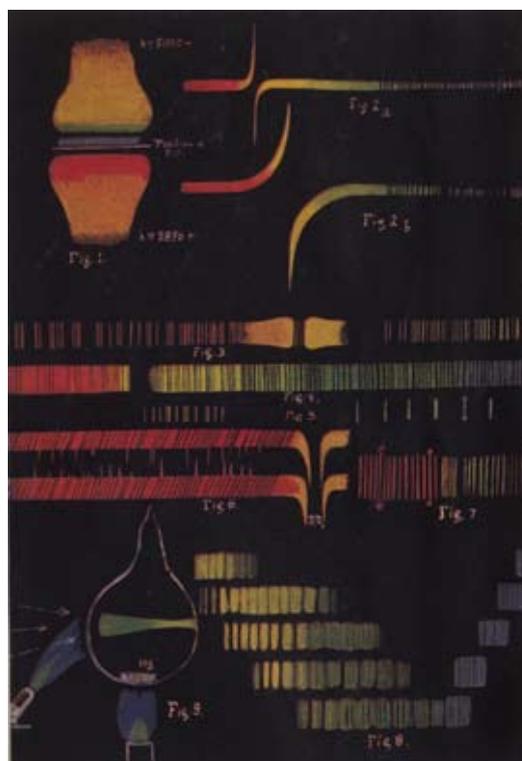
Research on the life and work of Max Planck as a pioneer of quantum physics concentrates on his institutional, social and personal environment (Dieter Hoffmann). It includes a comprehensive scientific biography of Planck and a new edition of his writings on thermodynamics. Further, a study of his role as an editor of the *Annalen der Physik*, the transcription of the correspondence between Planck and his co-editor at the *Annalen*, Wilhelm Wien, as well as an extensive annotated collection of Planck's *Annalen* papers, were published in 2008.

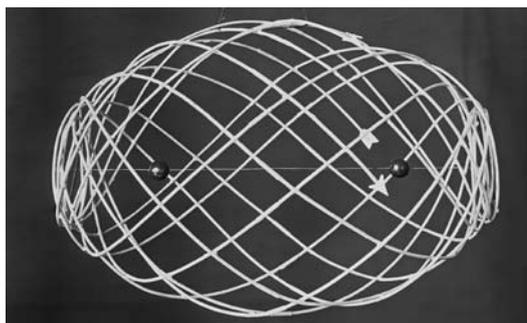
Another founding father of quantum theory was Albert Einstein whose papers on quantum physics are the subject of a study based on correspondence and manuscripts available at the Einstein Papers Project (Tilman Sauer). A Cambridge Companion to Einstein, which studies all facets of Einstein's work and its impact on philosophy, is in preparation (Michel Janssen, Christoph Lehner).

A previous study of the project had pointed out the central role of optical dispersion in the genesis of matrix mechanics (Anthony Duncan, Michel Janssen). For a better understanding of the historical context, a long-term study is conducted on the history of theories and experiments of optical dispersion from 1870 to 1925, and especially on the challenge of reconciling the classical theories of dispersion with quantum theory (Marta Jordi).

A study of the interactions between statistical mechanics and old quantum theory from 1911 to 1925 (Massimiliano Badino) focuses on the way in which the quantum hypothesis changed the understanding and the application of the conceptual tools of statistical mechanics to the description of matter. Related is a study on Erwin Schrödinger's 1912 work on solid dielectrics, which reflects early signatures of Erwin Schrödinger's approach to physical theory and displays the wide range of possible conceptions about the structure of solids before it became accessible experimentally through X-ray diffraction (Christian Joas, Shaul Katzir). An interesting case of

Reproduction from Robert Wood, *Physical Optics*, 1911 showing the optical dispersion by sodium vapour (fig.2).





Model of a hydrogen molecule ion according to the old quantum theory, built for the Deutsches Museum, Munich using calculations by Wolfgang Pauli, ca. 1923.

transfer of knowledge from pure science to technology is the history of piezoelectricity, leading to such applications as the sonar and frequency control in electronic circuits (Shaul Katzir). Research on the history of radioactivity and early nuclear physics is devoted to the investigation of the relationships between persons and institutions in Germany, and their international connections; it also treats the correlations between experiment and theory in this area (Horst Kant). The investigation concentrates on the research groups at the Kaiser Wilhelm Institutes of Chemistry and Physics (Berlin) and Medical Research (Heidelberg).

Early atomic physics and the reception of quantum physics in Britain in the 1920s is the subject of a study on J. J. Thomson and G. P. Thomson (Jaume Navarro). The impact that drawings and three-dimensional models of the atom (originally conceived to make atoms and their structure accessible to a broad public) had on the development of atomic physics and its methods is the subject of a study on the emergence of modern physics in the public sphere (Arne Schirmacher).

The Genesis of Quantum Mechanics

A second group of studies is concerned with the genesis of modern quantum mechanics, which was established in the mid-1920s as a foundational theory of modern physics involving substantial conceptual modifications compared to classical physics. The research program aims at analyzing how these conceptual changes emerged from a transformation of the knowledge of classical physics.

Research activities on the development of wave mechanics (Christian Joas, Christoph Lehner, Jürgen Renn) are dedicated to the historical roots of wave mechanics and in particular to a study of the research notebooks of Erwin Schrödinger. A detailed account of Schrödinger's formulation of wave mechanics, using the notebooks extensively for the first time, has been published. The study of Schrödinger's research notebooks continues with a focus on the further development of wave mechanics and Schrödinger's debates about the interpretation of quantum mechanics.

Walther Bothe studied the wave-particle dualism of light both from the experimental and from the theoretical side and contributed to the understanding of energy fluctuations of black-body radiation. His little-studied work is analyzed in a collaboration between a physicist and a historian (Dieter Fick, Horst Kant). Another study about the connection between experiment and theory in wave mechanics focuses on Charles G. Darwin's electron diffraction experiments and his work on a wave equation for the electron (Jaume Navarro).

An investigation into the early history of Bose-Einstein condensation and the emergence of quantum statistics has been carried out (Daniela Monaldi). It analyzes the emergence of new concepts related to the new quantum-mechanical formalism, e. g., the concepts of indistinguishable particles and of cooperative phenomena.

Pascual Jordan's 1927 transformation theory, an early unification of wave and matrix mechanics relevant both for the consolidation of quantum mechanics and for the development of quantum field theory is studied in another collaboration between a

physicist and a historian (Anthony Duncan, Michel Janssen). Pascual Jordan was the earliest visionary of the possibilities of quantum field theory as a “theory of everything.” His role is examined in a study on the rather unknown early development of quantum field theory from its first appearance in the 1925 Heisenberg-Born-Jordan paper until its crisis in the 1930s because of the problem of infinities and rising skepticism about its fundamental character (Christoph Lehner, Michel Janssen).

The redefinition of traditional mechanical notions, such as angular momentum, and the development of new types of symmetry arguments is the subject of a study on selection rules and symmetry arguments in quantum mechanics (Arianna Borrelli). From late 1926 onward, group-theoretical considerations were employed to interpret spectroscopical selection rules in terms of symmetries, which in turn came to be connected to a new, specifically quantum-theoretical notion of conservation law. Eventually, both in quantum mechanics and in quantum field theory, selection rules—i. e. the failure of specific events to take place—came to be regarded as the observable signature both of symmetries and of conserved quantities.

Erwin Schrödinger and friends at the “baptism of the ‘wave packet,’” June 21, 1931. Reprinted with permission of Ruth Braunizer



Consolidation, Extension, and Reception

A third group of studies deals with the consolidation, extension, and reception of quantum mechanics from the 1930s onwards, as well as the continuing debates about its interpretation. A study investigates how quantum physics developed in China during the 20th century, paying special attention to the relationship between scientists and institutions in China, and their international connections (Xiaodong Yin).

The conceptual and the institutional history of solid-state physics in connection with other emerging fields is the subject of another study (Christian Joas). A special focus is the transfer of quantum-field theoretic concepts and methods between theoretical high-energy physics and theoretical solid-state physics in the postwar era. A study on the history of computation in solid-state physics examines how solid-state theorists’ research practices have evolved from the late 1920s to the present (Edward Jurkowitz, Volker Blum). It is particularly interested in the role that changing computational capacities may have played in the different focuses and standards that leading theorists brought to their research on solid-state topics in diverse institutional settings.

A monograph on the history of quantum chemistry was produced in collaboration and with the support of the quantum history project (Kostas Gavroglu, Ana Simões).

The problematic relationship between the two major fundamental theories of physics in the 20th century is the topic of a collaboration on the history of quantum field theory and quantum gravity (Jürgen Renn, Donald Salisbury, Matthias Schemmel, Kurt Sundermeyer). The current focus of this research endeavor is the historical study of efforts to incorporate gauge and coordinate freedom into quantum theory.

One study concentrates on the emergence of the theory of decoherence and is based on numerous interviews with living physicists (Fabio Freitas). It places special emphasis on the local environments and how the work on decoherence and the foundations of physics affected the careers of the physicists involved. Another study on contemporary physics studies visions of nuclear breeder reactors, and inquires how these utopian images of future reactors interplayed with important decisions in the Swedish nuclear program (Maja Fjaestad).

Erwin Schrödinger playing chess with his daughter Ruth Braunizer, who is now the executor of his estate. Reprinted with permission of Ruth Braunizer.



A further study analyzes historically important positions and debates concerning the interpretation of quantum mechanics. As mentioned above, it attempts to understand these debates as negotiations about which elements of the classical theory should be preserved in the new mechanics and which elements need to be jettisoned. Individual topics that have been treated so far are the debates about *Anschaulichkeit* between Heisenberg and Schrödinger (Martin Jähnert), Einstein's critique of quantum mechanics (Christoph Lehner), and the debates about "heterodox" interpretations of quantum mechanics after World War II (Fabio Freitas, Olival Freire). Another study deals with the tension between dialectical materialism and the interpretation of quantum mechanics (Christian Forstner, Olival Freire, Dieter Hoffmann, Anja Skaar Jacobsen, Martin Jähnert, Christian Joas, Christoph Lehner).

Institutions and Quantum Physics

Further studies were dedicated to the reorganization of physical research as a reaction to the emergence of quantum problems in the early 20th century. Of central interest was the extent to which such a reorganization took place as the result of an explicit program to transform the mechanical worldview. The research focused on the effect of contemporary scientists' recognition of quantum problems and how this related to the shifting of their research foci, the reallocation of their resources, and the reorganization of research structures and policies. Several studies were conducted on specific institutions such as the University of Göttingen (Arne Schirrmacher), the Sommerfeld school in Munich (Michael Eckert), and the Berlin physics institutes (Dieter Hoffmann). The results will be presented in the above-mentioned volume on the role of scientific institutions in the development of quantum theory.

In preparation for the 100th anniversary of the KWG/MPG, its history is being studied with the aim of a general overview (Jürgen Renn and Horst Kant). In cooperation with the Fritz Haber Institute (one of the two first Kaiser Wilhelm Institutes to be founded in 1911), a research endeavor on the history of this institute has been started and a colloquium series established with invited speakers addressing various aspects from its history (Dieter Hoffmann, Bretislav Friedrich, Jeremiah James, Thomas Steinhauser). A study of the history of physics at the Humboldt University is being undertaken in collaboration with the university for the occasion of its 200th anniversary in 2010 (Dieter Hoffmann).

In reaction to an international public discussion, research was conducted on Peter Debye and his role as a prominent physicist in Nazi Germany. One study concentrated on Peter Debye as director of the Kaiser Wilhelm Institute for physics in Berlin during the Third Reich (Horst Kant). Another study aimed for a more differentiated picture of Debye's role by comparing his situation with that of other foreign researchers in Nazi Germany (Dieter Hoffmann). A conference was held in Göttingen in 2008, "Fremde' Wissenschaftler unter Hitler. Die Debye-Affäre im Kontext," and a proceedings volume is forthcoming.



Alexander McLean Nicolson in The Western Electric research department (AT&T) c. 1920. Nicolson observes crystal motion on the box in the table with a Fabre Perot interferometer. The white disc just over Nicolson's hands is the paper cone of a piezoelectric crystal driven load-speaker of his design. From AT&T archive.

Digital Infrastructure

To support the individual researchers, a coordinated effort has been made in close cooperation with the IT group to collect, digitize, and make available a wide array of sources for the history of quantum physics in the ECHO environment (Carmen Hammer). Part of this endeavor is the digitization by the MPIWG library of the complete Archives for the History of Quantum Physics, an extensive collection of sources compiled and microfilmed at the American Philosophical Society. This work nears completion and the digitized material is accessible to cooperating researchers on the project's website. Another activity is the cataloging and digitization of Erwin Schrödinger's papers which are in the possession of his daughter, Ruth Braunizer.

Cooperative Venture: The Concept of Scientific Philosophy and the Revolutionary Developments in the Natural Sciences from 1870 to 1950

The Department continued its close cooperation with the Moritz Schlick Research Institute at the University of Rostock. The study investigates the relationship between the works of scientists-philosophers such as Hermann von Helmholtz, Ernst Mach, Alois Riehl, Wilhelm Wundt, Pierre Duhem, Henri Poincaré, Moritz Schlick, and Hans Reichenbach and the revolutionary developments in the natural sciences, especially in modern physics but also in experimental psychology and Gestalt psychology during the period from 1870 to 1950. Ongoing activities include the publication of selected parts of the literary estate of Moritz Schlick through the ECHO platform, and research on the relations between modern physics and scientific philosophy in the early 20th century, focusing on two central figures of scientific philosophy: Moritz Schlick and Hans Reichenbach (Olaf Engler).

Project 3

TOPOI—Historical Epistemology of Space: Experience and Theoretical Reflection in the Historical Development of Spatial Knowledge

General Goals of the Project

The project on *Historical Epistemology of Space: Experience and Theoretical Reflection in the Historical Development of Spatial Knowledge* is conducted by a TOPOI Junior Research Group jointly organized by the TOPOI Cluster and the MPI. The group is headed by Matthias Schemmel and integrated into the work of Department I.

The project aims at a long-term history of basic structures of spatial thinking, ranging from prehistory to the most recent and ongoing scientific revolutions. It focuses on the question of how the emergence and the development of spatial concepts is shaped by experience and how, in turn, these concepts influence the acquisition of further experiential knowledge. In this project, experience is understood in a broad sense, ranging from the interaction of biological organisms with their environment to the systematic acquisition of knowledge by means of the complex experimental systems of modern science. The experiential spaces that one may thus distinguish have traditionally been investigated by different disciplines, such as developmental psychology, anthropology, ethnology and psycholinguistics, archeology, and the history of science and technology. In the framework of the project, these are set in relation to each other with respect to their research potentials and results concerning the historical development of spatial knowledge. In order to achieve an integration of research results from different disciplines pertinent to the understanding of the long-term development of spatial knowledge, the group has worked on a shared theoretical framework which shapes and correlates the concrete research activities. In this endeavor the project group built upon results of the project on *Mental Models in the History of Knowledge*.

One of the basic results of the group was that the development of spatial knowledge is closely linked to external knowledge representations such as coordinated actions, landmarks for orientation, lexical and grammatical properties of spoken and written language used to express spatial relations, instruments for measurement, navigation, and surveying, geographical maps, and geometrical formalisms from Euclid's *Elements* to the field equations of general relativity and quantum field theory. The investigation of the role of external representations allows for an understanding of the development of knowledge structures as a result of manipulating them and reflecting upon the outcome. This model of explanation pertains not only to individual human cognition. External representations also serve the communication of knowledge and its transmission from one generation to the next and also from one culture to another.

Thus, in the project, the analysis of representations became the central method for reconstructing the social reproduction of knowledge. For understanding the long-term development of spatial knowledge from antiquity to the present this social dimension of external knowledge representation turned out to be of crucial importance. Results of the group's research will be integrated and published in a volume which is in preparation under the title *Spatial Thinking and External Representation*. → p. XXX

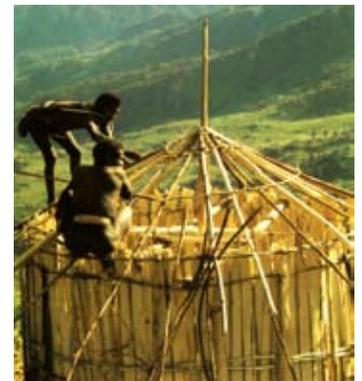
Spatial Concepts in Non-Literate Societies: Language and Practices in Eipo and Dene Chipewyan

The most basic forms of spatial knowledge that are studied in the project are those represented by spatial concepts in non-literate societies. Obviously, certain aspects of spatial cognition are universal owing to the shared biological constitution of the human body and mind and to universally shared experiences. Other aspects of spatial cognition are culturally specific, being shaped, for instance, by particular practices of spatial orientation and organization. The question of how to empirically verify this distinction is a matter of controversial debate. Taking into account the results of research pursued by the Max Planck Institute for Psycholinguistics at Nijmegen and based on discussions with the *Language and Cognition Group* at this institute the question has been taken up again by the present project under the specific perspective described above.

On the basis of the study of spatial practices in two non-literate cultures and (utterances in) their languages, certain aspects of spatial cognition that are candidates for universals (although they may find different expressions in different languages), and aspects that are truly culture specific in the sense that different cultures develop different cognitive structures have been identified (Wulf Schiefenhövel, Martin Thiering). The two cultures that have been thoroughly studied are the Eipo living in the highlands of Indonesian New Guinea and the Dene living in the North American plains. It has turned out that, while the peculiarities of the two cultures' environments did shape their spatial language and practices (importance of mountains vs. lakes; practices of gardening vs. hunting), similar practices of spatial orientation such as the use of landmarks can be discerned in both cultures. Although the semantic and grammatical resources provided by the two languages differ substantially, no differences in spatial abilities have been identified that could be attributed to language peculiarities. In the context of the long-term historical perspective of the project, the results will be evaluated with respect to what can be inferred from them concerning the spatial knowledge of prehistoric humans in order to complement what can be known through archeological finds.



Seemingly chaotic construction (left) and finishing (right) of a sacral men's hut by the Eipo tribe in West New Guinea. From Gerd Koch, *Malingdam*, 1984.



The Impact of Notation Systems: From the Practical Knowledge of Surveyors to Babylonian Geometry

Pre-Euclidean geometry in Mesopotamia. Calculation of the area of a field in a surveyor's document, 21st cent. B. C. (left), and of the area of a trapezoid in a geometrical school text, ca. 17th cent. B. C. (right). Courtesy of the Schoyen Collection.



Mesopotamian proto-cuneiform and cuneiform clay tablets written in the time period from the invention of writing (around 3200 B. C.) to the development of Babylonian mathematics in the Old Babylonian period (around 1900–1600 B. C.) document the development from elementary spatial knowledge to an esoteric art of formulating complex geometrical problems and solving them using sophisticated arithmetical tools applied to geometrical intuition. It is evident that the spatial cognition under these circumstances differs considerably from what has been identified in non-literate cultures. The representation of this new form in the documents of surveyors, school texts, and the problem-texts of Babylonian mathematics have been studied (Peter Damerow). It turned out that the emergence of the new kind of spatial cognition

documented in these sources was primarily based on the growing knowledge of surveyors and the scholarly reflection on their means and practices. The resulting mental constructions remained implicit but can be partly reconstructed from the arithmetical operations of Babylonian mathematics. They turn out to show “non-Euclidian” peculiarities such as the neglect of the role of angles, resulting from the practices of surveyors which they reflect.

Writing and Reflection on Elementary Actions and Professional Practices: The Chinese Mohist Canon and Its Counterparts in Greek Science

A new kind of spatial knowledge is characterized by explicit definitions and inferences in written form. This knowledge is documented, in particular, in philosophical and mathematical texts in ancient China and Greece. The work on these texts has focused on the analysis of a unique source of ancient Chinese thinking, the so-called *Mohist Canon*, written around 300 B. C. In a series of working meetings continuing earlier work in the context of the project on *Mental Models in the History of Knowledge* it was attempted to reinterpret the *Mohist Canon* from a comparative and contextual perspective (William G. Boltz, Matthias Schemmel). It turned out that the text can be understood as documenting the reflection on elementary and practical forms of knowledge, such as intuitive knowledge on spatial arrangements and natural processes, and knowledge obtained in the handling of mechanical and optical devices or instruments for measurement and astronomical observation. Theoretical reflection is documented in the text through the definition of general terms, the consistent use of terminology, and the resolution of apparent paradoxes or explanation of unexpected phenomena.

Texts handed down from Greek antiquity, such as Aristotle's *Physics* or Euclid's *Elements* equally document a reflection on elementary and practical spatial knowledge. The comparison of the Chinese and the Greek cases suggests that the existence of a culture of disputation and the related emergence of argumentative text traditions is a general precondition for this kind of theoretical reflection. While the Mohist tradition ceased with the rise of the Qin Empire at the end of the third century B. C., the later tradition of the Greek texts reveals the different potential of theoretical reflections on elementary experiences, as exemplified by Aristotle, on one hand, and on the use of drawing instruments (compass and ruler), as exemplified by Euclid, on the other.

The Impact of Geographical Knowledge on the Generalization of Spatial Concepts: From Ancient to Modern Maps

A further step in the development of spatial knowledge was initiated by the growth of geographical knowledge due to the expansion of the spaces certain societies inhabited, controlled or explored. As a consequence, a new kind of representation of spatial knowledge occurred, i. e., the representation by geographical maps. The development of this new kind of representation was at the center of a further study (Peter Damerow, Jacqueline Jugl, Matthias Schemmel, Irina Tupikova). It turned out that the great variety of maps show a common developmental pattern. Maps of a basic type represent primarily the relation between landmarks such as major paths between named locations, rivers, mountains, coastal lines, lakes, etc. However, ancient sources such as Ptolemy's *Geography* show that there were early attempts to embed landmarks into context-independent frameworks such as coordinates constructed by projecting celestial coordinates to the spherical earth. The results of the analysis of such attempts suggests that this kind of representation is one of the roots of the Newtonian concept of space as a container.

The Ebstorf World Map, 13th century, shows a flat round world surrounded by water, representing a Medieval worldview. Knowledge about the edge of the world was poor; it was believed that the people who lived there had strange afflictions, such as sealed mouths (top), huge body sizes, no ears, four eyes, or extremely prominent lips to give shelter from the sun (bottom).



Ongoing work aims at developing an elaborate classification system for all kinds of plots, plans, and maps. In particular, in order to classify the great variety of geographical maps within the developmental scheme from the representation of relations between landmarks to coordinate systems, preliminary categories of their properties have been defined and applied to a representative selection of maps which reflect the change of the concepts of space involved.

Another particular focus of the research activities has been the relation of astronomical knowledge, cosmological theories and geographical knowledge in ancient times (Matthias Schemmel, Irina Tupikova). From the study of the prehistory of Ptolemy's *Geography*, the close connectedness between the cosmological hypotheses of a spherical earth and the transfer of celestial to terrestrial coordinates became obvious. The comparison with Chinese cosmology and cartography suggests that the absence of a concept of spherical earth explains, at least in part, the absence of similar uses of coordinates in ancient Chinese cartography in favor of plane coordinates.

The Transformation of Ancient Spatial Knowledge in its Intercultural Transfer: The Early Modern Translation of Euclid's *Elements* into Chinese.

First proposition of the first book of Euclid in the influential Christopher Clavius' edition (1607, first published in 1574) and the Chinese adaption and translation by the Jesuit Matteo Ricci and his Chinese collaborator Xu Guangqi (1865, first published in 1607).

A further research activity analyzed the intercultural transmission of geometrical knowledge and its impact on culturally-specific notions of space (Jens Braarvig, Peter Damerow, Matthias Schemmel, Tian Miao). This transversal study of knowledge transformation, which is closely related to the project on the *Globalization of Knowledge*, complements the more numerous longitudinal studies that exist on the transformation of ancient geometrical knowledge within the Western tradition. In 1607 the Jesuit Matteo Ricci and the Chinese scholar-official Xu Guangqi translated

the first six books of Euclid's *Elements* into Chinese. Their endeavor demanded the transfer of ancient Western knowledge on geometry into a different mathematical tradition which inevitably implied the transformation of that knowledge. As a first step, a detailed comparative analysis of parts of the Chinese version of the *Elements* and its European source, Christopher Clavius' edition of the *Elements*, has been launched. Furthermore, different versions of the Chinese *Elements* have been compared and the reception of Euclid's *Elements* in 17th and 18th-century China has been studied (Tian Miao).



The Impenetrability of Matter: Space and Matter in Early Modern Science

Besides the introduction of geographical coordinate systems, the epistemological problem of the relation between the concepts of matter and space had an impact on the Newtonian concept of space as a container. This problem had been intensively studied in the context of the project on *Mental Models in the History of Knowledge*. It has been taken up again here with a focus on alternative conceptualizations of the relation of space and matter in early modern science and philosophy (Peter Damerow, Jürgen Renn, Matthias Schemmel).

Aristotelian physics and the Peripatetic tradition negated the possibility of empty space and instead concentrated on the concept of place. In opposition to this tradition ancient atomism was based on the idea of atoms moving through empty space. In the Renaissance, a transformative development of spatial concepts was triggered by cosmological concerns, namely attempts to replace the Aristotelian world system by alternative systems which were often based on ancient atomistic ideas including the concept of empty space, which implicitly involves the notion of space as a container. The growing corpus of empirical knowledge on mechanics and astronomy eventually stabilized Newton's concept of a universal space. In Newton's conception, gravitation is decoupled from the structure of space, which allows for space to be homogeneous and isotropic. Nevertheless this conception was not altogether convincing, so that the debate about space and matter continued. An advanced version of the attempts to distinguish between space and matter resulted from Kant's criticism which tried to remove metaphysical presuppositions. As a consequence, Kant's solution to the problem departed from atomism altogether, proposing an early version of matter as an appearance of repulsive and attractive forces.

The Transformation of Cosmological Space in the Course of the 18th Century

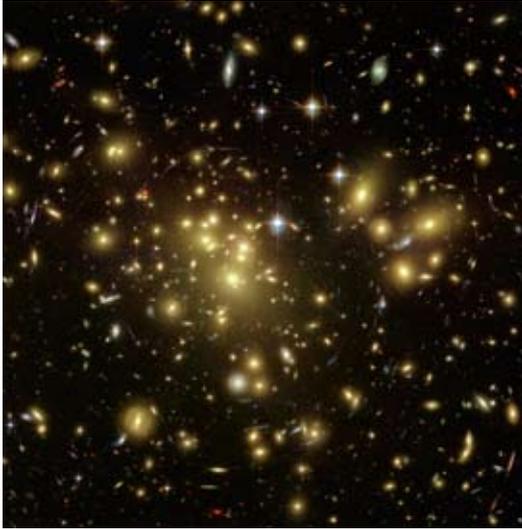
A particular aspect of the development of the concept of space in early modern science is the influence of cosmological models, which is the subject of a dissertation project focusing on the change of the cosmological worldview between 1550 and 1800 in the context of the Copernican Revolution (Anna Holterhoff). Contrary to what the term "revolution" might imply, the change from a geocentric to a heliocentric worldview was not achieved in a short period of time. The establishment of Copernicanism reflects a complex interaction between different forms of knowledge within the contradictory epistemological contexts of science and religion. The ongoing investigation shows how and by which processes of knowledge transformation the heliocentric theory became more and more accepted and finally canonical.

Beyond the Myth of Universal Space and Impenetrable Matter: The Overlapping Worlds of General Relativity and Quantum Theory

A further research activity following-up on a specific aspect of research pursued in the context of the project *Reorganizing Knowledge in Developed Science* concerns the transformation of the Newtonian concept of space in the relativity and quantum revolutions of the early 20th century (Jürgen Renn, Donald Salisbury, Matthias Schemmel, Kurt Sundermeyer).

A first survey of the current epistemological situation in physics has revealed the crucial role of the concept of space in the ongoing attempts to unify relativity theory and quantum mechanics. Many decades following Einstein's representation of gravity as geometry, and then the introduction of the counterintuitive notion of quantum superposition by Heisenberg and Schrödinger, we still do not possess a fully coherent notion either of space, or of the matter that we traditionally hold to occupy it. The concepts of space and of matter have co-evolved through the relativity and quantum revolutions. A dynamical spacetime is conventionally considered the centerpiece of general relativity, while matter is commonly understood to be the principal actor in quantum mechanics. Each area has developed its own highly successful experimental procedures and analytical tools, building on ostensibly contradictory understandings of the nature

of space and matter. But a closer look within each theory reveals that the pretensions of both are not fully justified. The ongoing work on the modern concept of space aims at outlining the fundamental changes in the concepts of space and matter that the two fundamental theories of 20th-century physics brought about, and at determining the overlapping realms of their applicability that hint at future developments.



Space warped by a galaxy cluster producing a mess of distorted images of astronomical objects illustrating the falsification of the Newtonian concept of invariable, absolute space by modern cosmology. (Source: NASA, <http://apod.nasa.gov/apod/ap040627.html>).

of space and matter. But a closer look within each theory reveals that the pretensions of both are not fully justified. The ongoing work on the modern concept of space aims at outlining the fundamental changes in the concepts of space and matter that the two fundamental theories of 20th-century physics brought about, and at determining the overlapping realms of their applicability that hint at future developments.

Infrastructure: A Bibliographical Database on Sources and Literature on Spatial Knowledge and a Digital Collection of Sources on Spatial Knowledge

A database collecting references to sources and literature pertinent to spatial language and cognition and the history of spatial concepts has been set up and is continuously expanded (Sascha Freyberg, Matthias Schemmel, Martin Thiering, Irina Tupikova). The database, currently contains 800 items and is openly accessible on the internet under <http://echo.mpiwg-berlin.mpg.de/content/space>.

A digital collection of scanned images and transcriptions of sources pertinent to the history of spatial concepts has been prepared in the framework of the ECHO environment and will be further expanded (Sascha Freyberg, Simone Rieger, Matthias Schemmel). Presently, it contains around 250 texts. It is also openly accessible via the ECHO website at <http://echo.mpiwg-berlin.mpg.de/content/space>.

Project 4

The Globalization of Knowledge and its Consequences: The Transfer and Transformation Processes of Knowledge across Different Cultures

General Goals: Globalization Processes and the Role of Knowledge

The aim of this project is to focus on a hitherto neglected dimension of globalization processes, the globalization of knowledge. The much discussed globalization process of the present mainly refers to the economic processes of the globalization of the markets for goods, capital, and labor, whereas the global diffusion of technical innovations and bodies of knowledge is often merely considered as either a presupposition or a consequence of economic, political, and cultural processes. But globalization is not only a phenomenon of the present and it involves knowledge in more significant ways. In this project, the globalization of knowledge is being analyzed by integrating diverse studies of the conditions, pathways, and consequences of historical processes of the production, the transmission and the transformation of knowledge, relating them to present processes of globalization.

The main goal of the research project is to explain this geographic diffusion of knowledge throughout history in terms of historical-epistemological concepts. The project aims at a unified and systematic account of the globalization of knowledge by means of large-scale comparative research grounded in empirical detail. Individual investigations contribute the breadth of empirical detail that the research initiative requires. In order to gain the critical breadth, the project draws necessarily on contributions from visiting-scholars.

The theoretical framework developed in the course of the project comprises a core set of concepts which will necessarily be extended and revised in the course of further research. The basic concepts include a typology of knowledge forms, knowledge representation structures, and knowledge transfer processes.

The network established at a Dahlem Conference in 2007 has since been expanded. The participating scholars have collaborated in a variety of meetings and exchanges on producing a series of volumes dedicated to an integrated and coherent history of the globalization of knowledge.

Bactrian camel being presented as a gift to the Achaemenid king, as depicted on the Apadana staircase reliefs, Persepolis (Iran).



The four research foci of the project are chosen such that theoretical claims can be validated with reference to outstanding historical phases in which knowledge production, transmission and transformation was critical for advancing processes of intercultural transmission.

Focus 1: From Technology Transfer to the Origin of Science

The first focus explores a series of processes in the very early phases of globalization from the transmission of practical knowledge to the emergence of science. These processes are layered, in the sense that the introduction of a new process does not lead to the eclipse of earlier processes. The first process considered is the transfer of technology in prehistory such as metallurgy, ceramics, agriculture, and animal husbandry. Processes of technology transfer are also necessarily processes of knowledge transfer. With the rise in Mesopotamia of the technologies of writing and arithmetic, which have a shared origin, new means for the globalization of knowledge were created. Although writing was initially tied to local contexts, there was a general trend in the evolution of writing towards decreased context dependence. Ancient Near Eastern and Greek science produced a corpus of written texts documenting systematic higher-order knowledge in such domains as cosmology, astronomy, mathematics, and medicine. Since this knowledge was explicitly written down, it was in later phases able to travel and eventually exerted a worldwide influence that continues to the present day.



Assyrian celestial planisphere found in the library of the Assyrian king Ashurbanipal at Nineveh. Kuyunjik Collection K.8538, © Trustees of the British Museum.

One research venture pursued in this context studied technological transfer and innovation in ancient Eurasia (Daniel T. Potts), and analyzed numerous instances—particularly in the realm of metallurgy, agriculture and technologies like wheeled transport—where knowledge probably did spread through human agency. The case of Near Eastern metallurgy in the Bronze Age and its possible influence on China has been examined in some detail. A second area of research on the development from technology transfer to the origin of science concerned the preconditions and the consequences of the invention and spread of writing (Peter Damerow, Manfred Krebernik). The invention of writing not only changed the conditions of the geographical transfer and historical transmission of knowledge, but in addition to these basic functions extended the human cognitive facilities by stimulating reflection processes and the creation and articulation of previously unknown mental constructions.

The relation of scientific activities and magic was investigated in two different fields. Recently accomplished work on Babylonian medicine in theory and practice (Mark Geller) challenges the usual notion that Babylonian medicine completely lacked theory. This can most clearly be seen in the close (but still distinct) relation between Babylonian medicine and magic, since magical texts often provided the theoretical assumptions upon which medicine operated. In a similar way it has been shown that the prominent distinction between scientific activities and speculative or mystical activities like divination, magic or meteorology is not tenable for the development of early astronomy in Mesopotamia (Gerd Grasshoff).

The importance of political and social developments in creating the preconditions for the diffusion of knowledge was analyzed in a survey of the emergence of Greek and Hellenistic science as a result of transformation processes of earlier knowledge traditions within the Near East, the Mediterranean and neighboring regions (Mark Schiefsky).

Focus 2: Knowledge as a Fellow Traveller

The second focus deals with the dissemination of knowledge in the sequel of that of power and belief structures on the Eurasian continent. The focus here is on processes in which knowledge spreads across long distances or over vast areas as an incidental effect of other diffusion processes such as the expansion of empires or the spread of religions. These processes may be of transregional and cross-cultural character, but they may also be corridor-like, connecting distant regions by a thin and fragile chain of transmission, for instance, a trade route like the Silk Road or the Jesuit mission to China. As knowledge is but a fellow traveller in these processes, the results of transmission are often only of a transitory nature but have the possibility of the long-lasting sedimentation of at least some achievements, such as practices of writing and calculating that later became relevant to the appropriation of scientific knowledge. This kind of knowledge globalization began with the emergence of institutions bundling cultural activities such as centers of trade and production, states, and world religions. As a consequence, also transmission processes themselves became institutionalized. Commercial, military, and missionary activities provided new stimuli for knowledge transmission.

Within this focus the kinds of knowledge are communicated during the spread of Buddhism in the first millennium A.D. were investigated as well as the transformative processes involved (Jens Braarvig). An outcome is that the adoption of Buddhism had a great impact on some of the receiving societies. It created not only new knowledge and religious activities, but also important institutions, such as the monastic community, and stimulated further intellectual and educational activities in fields such as grammar, lexicography, logic, philosophy and psychology.

One investigation addressed the transmission by Jesuit missionaries of European scientific knowledge to China in the early modern period (Matthias Schemmel). It was confirmed that this transmission led to a partial integration of European knowledge into the Chinese tradition without however bringing about the revolutionary developmental dynamics European scientific knowledge experienced at the same time in its culture of origin.

→ Independent Research Group, p. 46

A complementary research endeavor deals with educational journeys in Europe and Asia in early modern times taking the example of the travel diaries of the polyhistor Martinus Fogelius Hamburgensis (1634–1675), a correspondence partner of Gottfried Wilhelm Leibniz (Simone Rieger). In preparation for the reconstruction of a worldwide network in the early modern period, 1500 pages of Fogel's travel diaries have been digitized in cooperation with the Gottfried Wilhelm Leibniz-Bibliothek Hannover and the Niedersächsische Landesbibliothek and made available via the ECHO environment.



The Mongols cross the River Tigris and conquer Bagdad. From the Saray-Alben, 1258. © bpk-images.

Research concerned with the spread of early modern science in Europe has shown that the spread of advanced knowledge from the centers to less-developed scholarly traditions at the European periphery was not a simple transfer (Kostas Gavroglu, Manolis Patiniotis). By exploring the case of the establishment of Newtonian science in the Greek-speaking regions of the Ottoman Empire it has been shown that new ideas introduced to the so-called periphery were not placed in a void; they rather interacted with and displaced other, usually strongly entrenched systems of knowledge closely associated with religion. Research on folk religion in South-Eastern Europe provided further insights into the socio-cultural background of knowledge diffusion at the turn of the 20th century (Florentina Geller). A further study of transmission from the center to the so-called periphery concerns the spread of French models of textbooks on mathematics to Spain in the 19th century (José M. Pacheco).

The production and dissemination of scientific knowledge as a fellow traveller of colonization, can, by active accommodation to new circumstances, become a powerful motor of decolonization, as the example of 20th-century India illustrates (Dhruv Raina). The transmission of new technological and scientific knowledge under the conditions of external pressure often provoked an immune response mobilizing or newly inventing local knowledge traditions. In India such a mobilization led, for instance, to attempts to revive and reinterpret traditional Ayurvedic medicine in terms of Western medical and pharmaceutical knowledge.

Focus 3: The Place of Local Knowledge in the Global Community

Focus three concentrates on the encounters between culturally specific knowledge and globalized knowledge. All knowledge traditions are local traditions in the sense of depending, at least at their origin, on specific contexts, specific groups, specific ranges of knowledge, as well as on a specific history determining its architecture in an ultimately contingent way. The globalization of local knowledge traditions involves intrinsic as well as extrinsic developments, potentially enhancing their social dominance, their range of application, and their degree of reflexivity or, alternatively, destroying their autonomy and reducing their complexity. The globalization of local knowledge has thus to be conceptualized as a cross-over phenomenon, resulting from the integration of local knowledge traditions whose initial encounter primarily depends on a specific constellation of dominance, resources, and knowledge potentials, that is, on

an extrinsic dynamics, while their subsequent co-development is also shaped by an intrinsic dynamics. The globalization of local knowledge is typically accompanied by a localization of globalized knowledge in the sense of the recontextualization of an alleged universal system of knowledge that may trigger its restructuring.

First explorations of the fate of local knowledge under the influence of intruding globalized knowledge have made evident that such an encounter can have quite different consequences. In some cases, local knowledge systems have been irrecoverably extinguished in a rather short time. Alternatively there are cases in which local knowledge has been synthesized with or at least partly defended against the influences of the global community. A more detailed study has been pursued in order to clarify the mutual influences of local and global knowledge among two indigenous cultures in the state of Espírito Santo of Brazil, the Tupinikim and the Guarani. Due to the influence of the Brazilian constitution, a set of political and educational activities have been launched to investigate the changes that certain traditional knowledge of Tupinikim and Guarani cultures, as well as non-indigenous peoples, have undergone and what measures can make it possible to reconcile local and external knowledge and to compensate the social deprivation of indigenous people caused by the clash of local and global knowledge systems (Circe Silva da Silva, Ligia Sad).



A further case of confrontation of local knowledge with external influences is the situation of Mongolian culture and science at the crossroads between East and West. Several research trips were made to develop the cooperation between German and Mongolian researchers and to establish the working conditions for an extended research network (Jürgen Renn, Simone Rieger, Urs Schoepflin, Gerhard Wolf, Rüdiger Wolfrum).

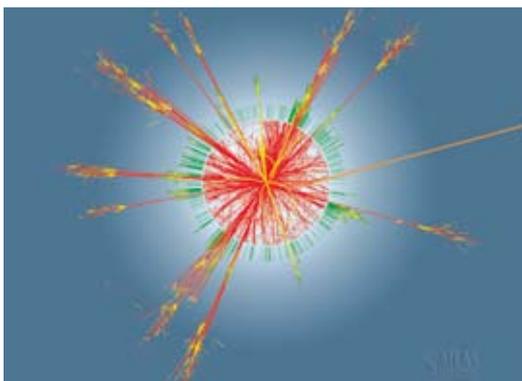
Rare books collected by L. Damdinsuren, held at the Mongolian Academy of Science in Ulaanbatar, with detail photos (left) showing the spine titles (above) and the contents (below).

Focus 4: The Globalization of Knowledge and Modern Science

To assess the relevance of an investigation of historical processes of globalization for the present situation, a fourth focus of the globalization network is dedicated to the great challenges that humanity faces today when dealing with knowledge. These challenges are partly consequences of socio-cultural evolution, such as the climate and energy challenges, and in particular of the powerful knowledge that has accumulated during this evolution, such as the exploitation of fossil fuels. Dealing with the consequences of such unplanned, global experiments with our planetary system requires more knowledge than can be produced by the dominant modes of knowledge production of socio-economic evolution, such as state-supported basic research or market-driven applied research. We thus face an emergent process in which the global production of ever more and increasingly diversified knowledge about humanity's interaction with nature becomes crucial for human survival. Within the framework of the globalization project, this emergent process is analyzed as an epistemic evolution. In this process, political developments do not merely shape the conditions of knowledge diffusion, but policy-making regarding these global challenges critically depends on the generation of new knowledge and knowledge-based assessments. In this focus, a variety of modes of epistemic evolution are analyzed with regard to the coupling of social and political developments and the diffusion of knowledge.

A special investigation has been dedicated to the knowledge that is transmitted with the establishment of nuclear programs both at the national and international level. The associated transmission processes have been analyzed in relation to their transnational elements, their characteristics in various national contexts and the intervention of individual actors. A central outcome of this research has been that standard models for knowledge diffusion can hardly be applied in this case. The proliferation of nuclear programs often followed local patterns and was shaped by the interaction of specific political, economic and technical conditions which require case-specific adaptations of diffusion models (Angelo Baracca, Albert Presas i Puig).

Photo taken from an ATLAS collision event in which a microscopic-black-hole was produced in the collision of two protons. Reproduced by kind permission of CERN.



A further research endeavor dealt with CERN as an example for a particular mode of epistemic evolution by means of an unbiased international large-scale research organization (Hans Falk Hoffmann). CERN demonstrates the possibility of knowledge production under the boundary conditions of an absence of immediate political, military or economic implications. The results of the investigation have raised the question of whether the CERN model can be transferred to other areas, for instance, to the domain of energy supply and climate change, where—in contrast to high-energy physics—strong political and economic interests may condition or even constrain the necessary knowledge production.

Another area of research focused on current developments towards a global information infrastructure based on the new information technologies. In principle, for the first time in history, the Web enables a global, dynamic representation of human knowledge with a strong, self-organizing potential. The ways in which the Web can provide a completely new way of representing and disseminating knowledge have been investigated (Malcolm Hyman, Jürgen Renn).

Additional research related to this focus ventured into the collaboration and transfer of knowledge on industrial management and the interface between humans and their technical environments. The investigation was centered on knowledge transmission within the USSR, between the USSR and other COMECON countries, and between the USSR and the West (Margareta Tillberg). Another study has investigated the transfer of economic knowledge to developing countries during the 20th century analyzing the reception, localization and appropriation of economic knowledge within the local context (Arie Krampf). A research endeavor undertaken in cooperation with the University of Havana focused on the history of the development of physics in Cuba from its origins until the present day. The study has investigated not only the influence of the USSR and the European Socialist countries on the development of physics, but also traced the active participation of several Western physicists and technicians during the 1960s (Angelo Baracca). A dissertation project is focusing on the role of *linguae francae* in experimental psychology (Anna Perlina). → p. 212

Workshops and Conferences

A number of workshops and conferences were organized within the project's framework. The first follow-up conference to the Dahlem conference was devoted to a specific aspect of the globalization of knowledge: multilingualism and *lingua francae*. It was co-organized by the MPIWG and the Norwegian Research Council, and held in 2009 in Athens under the title "Multilingualism, *Linguae Francae*, and the Global History of Concepts." Contributions ranged from an investigation of Sumerian as a *lingua franca* in the ancient Near East to a study of contemporary multilingualism in the former Soviet republics of Central Asia. A second meeting was held at the beginning of 2009 in Einsiedeln, Switzerland on the writing and the transmission of knowledge. In 2010, a third conference on multilingualism, *linguae francae* and the globalization of knowledge will be held in Berlin. → p. 60

Perspectives

Two directions of the globalization project will be strengthened in the future: the globalization of knowledge in the ancient world and in recent times. It is planned to establish a cross-sectional group within the Excellence Cluster TOPOI that should combine research results from various areas of the TOPOI project under the perspective of their contribution to understanding processes of knowledge migration in antiquity. The investigation of the globalization of knowledge in recent times will address the epistemic and political dimensions of scientific uncertainty and decision-making in regard to global challenges such as climate change and the energy crisis (Milena Wazeck).

History of Science in Action: Alternative Forms of Dissemination

General Goals

Based on the insights that scientific knowledge evolves as part of a comprehensive system of knowledge and that external and cognitive representations of knowledge are closely intertwined in this evolution, the Department explores alternative forms of dissemination in order to probe the potential of research-driven technology development for opening up new horizons for the humanities and their place in society, and in order to investigate the potential of the history of science as a mediator between science and society.

The Epistemic Web

New technologies and the Internet offer innovative forms of publications of scholarly data and results. Against this background, the idea of an Epistemic Web has emerged. Such a Web will enable the creation of dynamic representations of knowledge, integrate research and dissemination, accommodate recursive processes in knowledge formation, integrate both conceptual models and data, and build “intelligence” into scholars’ working environments.

→ p. 62

Department I in cooperation with the MPIWG library and the IT group initiated the creation of a research-driven infrastructure for the humanities, which is now the basic infrastructure for all Internet-based working environments and presentations of the research projects. Together with the IT group and the library researchers make digitized cultural heritage—the primary sources for the projects—publicly accessible and sustainable on the Internet and develop tools for an Internet-based scholarly analysis of the sources.

Traditional and Virtual Working Environments: working with sources in cooperation with the Stiftung Bibliothek Werner Oechslin, Einsiedeln

The Werner Oechslin Library in Einsiedeln/Switzerland chiefly assembles source texts on architectural theory and related areas in original editions extending from the 15th to the 20th century. Over 50,000 volumes document related developments in the context of humanities and science. The Department hosted three workshops at this location which offered a unique opportunity to access this wealth of rare books. Complemented by a digitization program, the workshops made a selection of these sources accessible to the scholarly community. More than 70 different volumes representing the major editions of Vitruvius’ “Ten Books of Architecture” were digitized and made publicly available on the ECHO website. Furthermore, a database was developed to facilitate access to the holdings of the library.

→ Library, p. 224

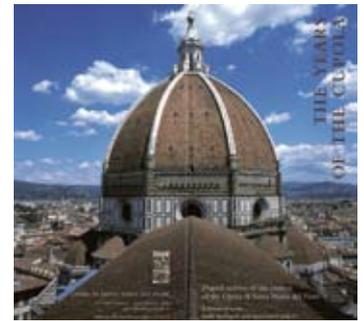
The first workshop centered on case studies that elucidated the impact of practitioners' knowledge on the development of scientific theories. The second workshop was dedicated to "Writing and the Transmission of Knowledge". The third workshop investigated the interactions of the various editions of Vitruvius' "Ten Books of Architecture" with the specific social and scientific contexts of their publication.

→ Globalization of Knowledge, p. 53

Digital Edition of the Sources on Florence Cathedral: The Years of the Cupola

The work on *The Years of the Cupola*, a digital edition of the surviving administrative documentation in the historic archive of the Opera of Santa Maria del Fiore for the period 1417–36, has been completed. The inauguration of the digital edition, established in cooperation with a group of scholars at the Opera, was celebrated in June 2009 in Florence.

The edition now contains over 21,000 transcribed and analyzed documents and incorporates a modulated system of indices and guided research functions that facilitate navigation in the *mare magnum* of data with clear and scientific criteria. It offers various consultation tools: document summaries that provide convenient syntheses of the content of the acts, active links between records, reference to the 'shadow' archive whose composition is evoked by citations of other original sources, bibliography for the publication history of the known documents. Finally, it is possible to search the transcribed documentary texts directly, a function available in the online representation of the data through word indices for vernacular and Latin texts. *The Years of the Cupola* is therefore a proper edition in the classic sense, yet it exploits the capacity of digital systems to facilitate retrieval and comprehension of its contents (Jochen Büttner). It thus represents a powerful tool for a new approach to the study of a great construction site and the world of its contexts as it has been pursued in the project *The Epistemic History of Architecture* <http://www.operaduomo.firenze.it/cupola/home_eng.html>.



Inauguration brochure of The Years of the Cupola.

Bringing Together Virtually Distributed Collections: The Cuneiform Digital Library Initiative (CDLI)

The CDLI is a common initiative of the Department of Near Eastern Languages and Cultures of the University of California at Los Angeles (UCLA) and the MPIWG (Jacob Dahl, Peter Damerow, Robert Englund, Jörg Kantel, Sarah Köhler, Manfred Kребnik, Imad Samir, Marcel Sigrist, Christina Tsouparopoulou). On the websites of these institutions, more than 230,000 of the estimated more than 500,000 excavated tablets distributed over museums and archives of the whole world have currently been cataloged. For most of them standardized transliterations are provided, complemented by about 75,000 images (scans, scanned copies, or photos). Considerable efforts are presently being made to improve the searching facilities for retrieving the data. In the period of the report the work of the project was influenced by some major organizational and personal changes. The CDLI acquired a major grant from the Andrew Mellon Foundation in the United States to fund the digitization of major collections in Europe and the US: University of Pennsylvania Museum, British Museum, as well as Syrian collections, and smaller collections in the US and Europe (i. e. Leiden).

The Electronic Text Corpus of Sumerian Literature (ETCLS) provides an online searchable corpus of about 400 compositions of 'classical' Sumerian literature, with

Members of the working group of CDLI inspecting cuneiform tablets to be scanned together with the curator of the collection of the Vorderasiatischen Museum Joachim Marzahn. Photo by Ernst Fessler.



bibliographies and English translations. The data is now being integrated into the CDLI dataset. In the report period, a database to complement the CDLI datasets with data about physical seals, seal impressions, and composite reconstructions of the complete seal motifs has been created. Work has also been undertaken on the Liagre Böhl collection, housed at The Netherlands Institute for the Near East (NINO) in Leiden. Furthermore, work in Syria in the context of the Syrian Digital Library of Cuneiform project (SDLC) has been carried out (Christina Tsouparopoulou).

In cooperation with the SCLC, an interactive Arabic/English/French presentation of a rich and indigenous cuneiform tradition dating back five millennia is in preparation.

The cuneiform tablet collections kept in the museums of Damascus, Aleppo, Deir ez-Zor, Raqqa, Lattakia, Idlib and Homs, originate from close to 30 different archaeological sites. In the summer of 2009, about 800 cuneiform tablets were digitized and catalogued from the archaeological sites of Tuttul (Tell Bi, Äöa) and Tell Beydar, housed in the archaeological museums of Raqqa and Deir ez Zor respectively. These digitized images will shortly be freely available online.

In the frame of the CDLI project, research was carried out on year names in the period of the third dynasty of Ur (Marcel Sigrist) and on administrative documents of the excavated archive of the city of Ebla (Imad Samir).

Open Access Research Infrastructure: “European Cultural Heritage Online” (ECHO)

In 2002 the initiative “European Cultural Heritage Online” (ECHO) was established to create a research driven infrastructure for the humanities. It is coordinated by Simone Rieger. In cooperation with the MPIWG library, part of the ECHO infrastructure is dedicated to the installation and documentation of workflows for the digitization of cultural heritage.

In cooperation with the IT group developments of research driven tools and workflows for analysis and publication of scholarly data linked to primary sources were supervised and integrated in the common and expanding open access working environment. In addition, work focused on the development and documentation of XML-full text production and its possibilities for linguistic analysis and comparison of large text corpora.

In the report period, the content of the ECHO environment has been greatly expanded and its technical infrastructure and accessibility improved. ECHO now features more than 150 collections from more than 20 countries worldwide. Its basic infrastructure has been adopted for all internet-based projects of the MPIWG and has also provided a model for the development of a common research infrastructure by the MPDL (Scholarly Workbench).

The ECHO initiative is characterized by its strict open access policy. It has been presented at many international forums, such as UNESCO, various Open Access conferences, advisory boards for funding organizations (DFG, Gerda-Henkel-Stiftung, NSF, Getty Foundation), as well as advisory boards for national and international initiatives for creating research infrastructures (DDB, Europeana, DFG, DARIAH) as a best

→ p. 63

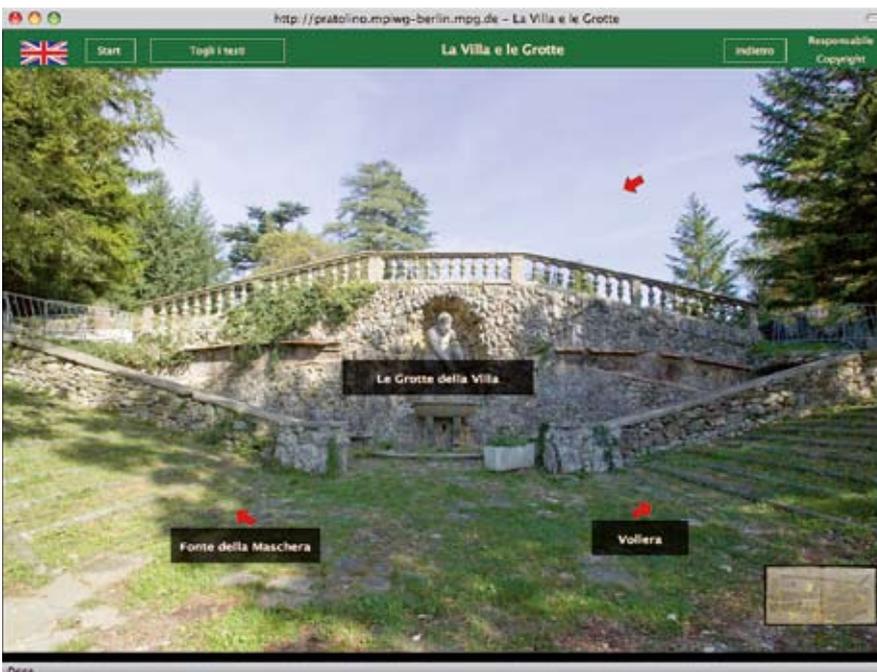
practice example of an open access environment. It now includes more than 600,000 digitized images of historical source material in high-quality resolution, about 240 video sequences, and 57,000 full-texts in several languages, 70 seed collections in several disciplines and thematic fields, in particular in the history of science.

Working with Full-Texts in the History of Science: Development of XML-Workflow and Content-based Web Access

During the report period work has been undertaken on the implementation of some of the key Epistemic Web concepts. A group has been established on the basis of a cooperation with the MPDL in order to complement the generic infrastructure of the MPDL with an application layer and interface to serve the specific purposes of scholars working with sources in the humanities (Jochen Büttner, Falk Knauff, Malcolm Hyman, Wolfgang Schmidle, Klaus Thoden, Josef Willenborg). This application layer consists of a content-based access mechanism for texts that incorporates language technology and thus enables semantic access to their content. In order to prepare historical sources for ingestion into this infrastructure, a workflow is being developed to structure texts in an XML-format, a presupposition for the integration of texts with various tools. As a testbed for this development, sources from a variety of the Department's projects written in different languages—such as Chinese, Greek, Italian and Latin—have been used, opening up new approaches for computer-assisted analysis of their content. Upon completion of the project, the application layer will be freely accessible. It is conceived as a prototype that can be further generalized within the MPDL and made available to a broad scholarly community.

Virtual Spaces

In 2005, the MPIWG created the virtual Albert Einstein exhibition. This virtual exhibition made the content of the “real” 2005 Albert Einstein exhibition available



Virtual walk through the Garden of Pratolino comparing the historical garden with the modern park.

online. The software used to create the virtual Albert Einstein exhibition was redesigned in the context of a diploma thesis written in 2008 in cooperation with the MPIWG (Julia Damerow). Released as “Virtual Spaces 2008,” this redesigned software has a broader range of possible applications. It is open source software implemented in Java and has an easy-to-use graphical user interface for creating 2D graphs that represent real, fictive or knowledge spaces. From 2D graphs, virtual tours through such virtual spaces can be generated. The current version of Virtual Spaces 2008 creates HTML pages, a PDF or RTF file of a virtual tour. Its modular architecture facilitates the export functionality by implementing new components that create other file formats. The technology used for the Internet representation of a Virtual Space can therefore be kept up-to-date with modern Web standards. Virtual Spaces 2008 is freely available at <http://virtualspaces.sourceforge.net/>.

Public Dialogue about Science and its Historical Roots

Department I adopted various forms of disseminating insights from the history of science, often combining scholarly communication with public outreach. For example, in order to foster interest in the history of science in schools, lectures have

been given, as well as guided tours of the Institute and scholarly discussions involving classes and teachers on a variety of research topics, ranging from Renaissance studies to the history of quantum mechanics. Another example is the cooperation of the Institute with the 2008 exhibition “Max Planck: Revolutionär wider Willen” organized by the Max Planck Society in cooperation with the Deutsches Technikmuseum in Berlin. In addition to such outreach activities, the investigation of historical approaches and themes of the public understanding of science forms part of the research of Department I. The epistemological role of science communication is investigated in detail by looking at fundamental innovations in science and technology from the 20th century (Arne Schirmacher). Specifically, the public presentation and



Entrance to the 2008 exhibition at the Deutsches Technikmuseum in Berlin “Max Planck: Revolutionär wider Willen”.
→ p. 233

discussion of the scientific understanding of the structure of matter (atomic structure, chemical bonding, crystals, quantum models...) around the beginning of the 20th century has been analyzed, complementing insights of the project on the *History of Quantum Physics*. In this way it could be shown, for example, that the conception of the Rutherford-Bohr nuclear atom built on widely discussed public knowledge claims.

International Year of Astronomy 2009

In the International Year of Astronomy 2009, Department I joined forces with the Max Planck Institute for Astronomy in Heidelberg to explore how the invention of the telescope recast our view of the universe; the results were published in a special issue of the German astronomy journal *Sterne und Weltraum*, directed at both profes-

sional scientists and amateurs (circulation 14,500 copies). The research investigated astronomical knowledge existing before the invention of the telescope (Giorgio Strano, Matthias Schemmel) and the relation between the numerous antecedents of the telescope (Sven Dupré) to the available observational data and ancient sources, such as the works of Plutarch and the medieval reports on sunspots (Horst Bredekamp). The conflict between science and the dogmas of the Catholic Church (Rivka Feldhay, Elio Nenci) and the figure of Galileo as an engineer-scientist (Matteo Valleriani) were contextualized in the process of the transformation of ancient knowledge and the reorganization of its internal structure (Jürgen Renn). The work concluded with the analysis of how Galileo's physical ideas nevertheless remained anchored in Aristotelian natural philosophy, constituting the starting point from which classical Newtonian mechanics emerged (Jochen Büttner).

Children as Researchers: “Wunderforschung” and the “Werkstatt des Wissens”

Ongoing scholarly cooperations since 2003 between the Comenius Garden Berlin-Neukölln and Department I are reflected in common endeavors with the “Werkstatt des Wissens” set up by the Comenius Garden. In collaboration with the Museum für Naturkunde in Berlin and the Monash University in Melbourne, children's perceptions of wondrous everyday phenomena were confronted with historical forms of scientific knowledge about these phenomena (Carmen Hammer, Katja Bödecker, Henning Vierck). An exhibition displayed in 2008 at the Museum für Naturkunde in Berlin and an accompanying book have concluded the initiative.



Young researcher at work in the Comenius Garden, Berlin.

Department II

Johann Bernhard Wilbrand, *Gemälde der organischen Natur in ihrer Verbreitung auf der Erde*, 1810, detail. 2 vol., Gießen/ Darmstadt 1809–10. Courtesy Leiden University Library



ACAD *Gemälde der organischen Natur in ihrer Verbreitung auf der Erde.* LYON
v. GÖTTE U. HANSEN WANDERER
gewidmet von B. Wilbrand und L. Rütgen Prof. in Gießen.

Department II

Ideals and Practices of Rationality

Director: *Lorraine Daston*

Introduction: Histories of the Self-Evident

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 “observation” (*History of Scientific Observation*), “self” (*The Cerebral Subject*), “gender” (*Gender Studies of Science*), and the division between the “natural” and “human” realms (*Between the Natural and Human Sciences*). A new project to start in 2010 will examine the histories of “data” and “information” in the sciences (*Sciences of the Archive*). Since 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 projects in Department II embrace one or more Working Groups, which aim toward a collective publication, as well as the projects of individual scholars who are writing doctoral dissertations, monographs, book chapters, and journal articles on topics related to the main theme. A bibliography of publications listed by researcher’s name may be found at the end of this volume. Past Working Group publications of Department II include: *The Moral Authority of Nature* (2004), *Things that Talk: Object Lessons from Art and Science* (2004), and *Natural Laws and Laws of Nature in Early Modern Europe* (2008). *Histories of Scientific Observation* will appear in 2010. 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 well as information on institutional cooperation partners.

At any given time, there are approximately twenty-five resident scholars in Department II: pre- and postdoctoral fellows, visiting scholars, and research scholars. Their backgrounds are international and multi-disciplinary; 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 pre-circulated works-in-progress, starting with the all-day departmental workshop in September.

Approximately three-quarters of the colloquium presentations are by resident scholars of the department; the remaining quarter are by invited guest speakers—both from within and outside the Institute—selected for the relevance of their work to departmental research projects. Informal seminars and reading groups also offer venues for discussion of shared research interests by resident scholars, often joined by colleagues of other departments and research groups.

The reporting period 2008–9 brought several welcome additions to Department II. Two new, externally-financed independent research groups, led by Nikolaus Bacht (*The Intellectual and Cultural History of Listening*) and Suparna Choudhury (*Constructions of the Brain: Critical Neuroscience and the Adolescent Brain*), widened the scope of the Department's research. Thanks to a major grant to McGill University, the generosity of the Staatsbibliothek Berlin, and the support of the MPIWG Library and IT Group, it has been possible to digitize and make available to scholars rare medieval astronomical manuscripts (*Islamic Scientific Manuscripts Initiative*). Finally, a new predoctoral fellowship program, *Writing-Up Fellowships*, advertised internationally to provide outstanding doctoral candidates with six months of support for the final stages of their dissertations, has enlivened the Department with new faces and new ideas.



Departmental Colloquium, September 2009
Photo: Kirsti Anderson

Project

History of Scientific Observation

DURATION 2005–2010

MPIWG ORGANIZERS *Lorraine Daston, Andreas Mayer, Tania Munz, Kelley Wilder*

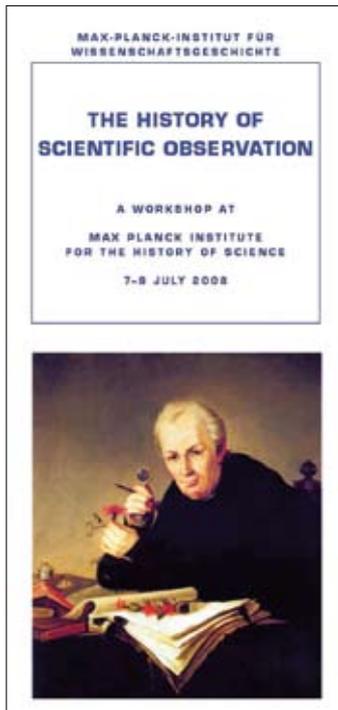
COOPERATION PARTNERS Freie Universität Berlin, Germany; Universiteit van Amsterdam, The Netherlands (additional external funding of individual scholars noted below).

Observation is the most pervasive and fundamental practice of all the modern sciences, both natural and human. It is also among the most refined and variegated of these practices. Observation educates the senses, calibrates judgment, picks out objects of scientific inquiry, and forges communities. Its instruments include not only the naked senses, but also tools such as the telescope and microscope, the questionnaire, the photographic plate, the glassed-in beehive, the Geiger counter, and a myriad of other ingenious inventions designed to make the invisible visible, the evanescent permanent, the abstract concrete. Where is society? How blue is the sky? Which way do X-rays scatter? Over the course of centuries, scientific observers have devised ways to answer these and many other riddles—and thereby redefined what is under investigation by the way in which it is investigated. Observation discovers the world anew.

Yet scientific observation lacks its own history: why? Countless studies in the history and philosophy of science treat one or another aspect of observation: observation through telescope and microscope, observation in the field or in the laboratory, observation versus experiment, theory-laden observation. But observation itself is rarely the focus of attention and almost never as an object of historical inquiry in its own right. Observation seems at once too ubiquitous, too basic, and altogether too obvious to merit a history. One might well wonder whether a history of observation wouldn't simply be the history of science in its vast entirety—or the still more vast history of experience.

This project challenges these assumptions by showing what a history of scientific observation might look like, at least in its broad outlines, from the fifth to the late-twentieth century: how a vernacular practice became an epistemic category. It is the history of how experience has been shaped and sharpened to scientific ends: how the senses have been schooled and extended; how practices for recording, correlating, and displaying data have been developed and refined; and how the private experiences of individuals have been made collective and turned into evidence.

→ see also: *Knowledge in the Making*, p. 136



Working Group on the History of Scientific Observation

June 27–29, 2006; July 3–6, 2007; July 7–9, 2008; November 5, 2008

ORGANIZERS *Lorraine Daston* (MPIWG), *Kelley Wilder* (MPIWG/ De Montfort University, Leicester, U.K.), *Elizabeth Lunbeck* (Vanderbilt University, U.S.A.)

The volume produced by this Working Group, *Histories of Scientific Observation*, edited by Lorraine Daston and Elizabeth Lunbeck, will be published by the University of Chicago Press in fall 2010. It features engaging episodes drawn from a wide variety of sciences, ranging from meteorology, medicine, and natural history to economics, astronomy, and psychology. The contributions spotlight how observers have scrutinized everything—from seaweed to X-ray radiation, household budgets to the emotions—with ingenuity, curiosity, and perseverance verging on obsession. This book makes a compelling case for the significance of the long, surprising, and epistemologically significant history of scientific observation, a history full of innovations that have enlarged the possibilities of perception, judgment, and reason.

Members

- *Domenico Bertoloni-Meli** (University of Indiana at Bloomington, U.S.A.)
- *Charlotte Bigg** (MPIWG/CRNS, Paris, France)
- *Daniela Bleichmar* (University of Southern California, Los Angeles, U.S.A.)
- *Jimena Canales** (Harvard University, U.S.A.)
- *Lorraine Daston** (MPIWG)
- *Otniel Dror** (Hebrew University, Israel)
- *Michael Gordin** (Princeton University, U.S.A.)
- *Elizabeth Lunbeck* (Vanderbilt University, U.S.A.)
- *Harro Maas** (Universiteit van Amsterdam, The Netherlands)
- *Andrew Mendelsohn** (Imperial College London, U.K.)
- *Mary Morgan* (London School of Economics, U.K.)
- *Katharine Park** (Harvard University, U.S.A.)
- *Gianna Pomata** (Università di Bologna, Italy)
- *Theodore M. Porter** (University of California, Los Angeles, U.S.A.)
- *Anne Secord** (University of Cambridge, U.K.)
- *Mary Terrall** (University of California, Los Angeles, U.S.A.)
- *Kelley Wilder** (MPIWG/De Montfort University, Leicester, U.K.)

(* members of Working Group also involved as resident scholars in the MPIWG research group on the History of Scientific Observation)

History of Scientific Observation

Conferences**The Educated Eye: Photographic Evidence in Scientific Observation**

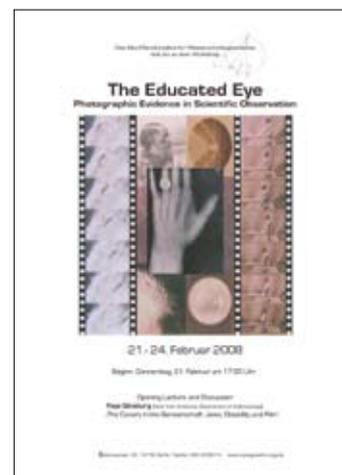
February 21–24, 2008

ORGANIZERS *Kelley Wilder* (MPIWG), *Gregg Mitman* (University of Wisconsin-Madison, U.S.A.)

Where do photography and film stand in the larger picture of scientific observation's history? And how exactly does their use in observation translate into evidence? Presentations on topics, ranging from the earliest photographs in 1839 to images from the Mars Rover mission in 2004, addressed these questions. The negotiation and renegotiation of documents made with photographic media stood at the center of discussion, bridging the methodological approaches of scholars from anthropology, film, and media studies, history of science, and the history of art and visual culture. The organizers have formed a working group on the archiving of photography and film, called "Documenting the World" (see below under section "Sciences of the Archive"), which aims to produce a collaborative book and website.

Participants

- *Jordan Baer* (Columbia University, U.S.A.)
- *David Benin* (University of California, San Diego, U.S.A.)
- *Jimena Canales* (Harvard University, U.S.A.)
- *Lisa Cartwright* (University of California, San Diego, U.S.A.)
- *Scott Curtis* (Northwestern University, U.S.A.)
- *Elizabeth Edwards* (University of the Arts, London, U.K.)
- *Peter Geimer* (ETH Zürich, Switzerland)
- *Faye Ginsburg* (New York University, U.S.A.)
- *Tal Golan* (University of California, San Diego, U.S.A.)
- *Anna Grimshaw* (Emory University, U.S.A.)
- *Robin Kelsey* (Harvard University, U.S.A.)
- *Stefanie Klamm* (MPIWG/Paul Getty Research Institute, Los Angeles, U.S.A.)
- *Gregg Mitman* (University of Wisconsin, U.S.A.)
- *Amos Morris-Reich* (University of Jerusalem, Israel)
- *Tania Munz* (MPIWG)
- *Michael Pritchard* (DeMont University, U.K.)
- *Sarah de Rijcke* (University of Groningen, The Netherlands)
- *Gareth Syvret* (DeMont University, U.K.)
- *Fatimah Tobing Rony* (University of California, Irvine, U.S.A.)
- *Janet Vertesi* (Cornell University, U.S.A.)
- *Kelley Wilder* (MPIWG/DeMont University, U.K.)

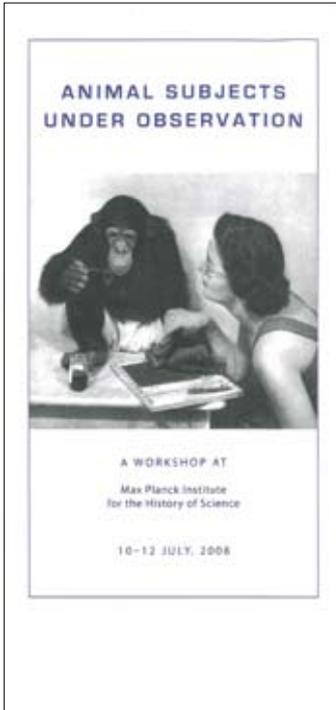


Animal Subjects Under Observation

July 11–13, 2008

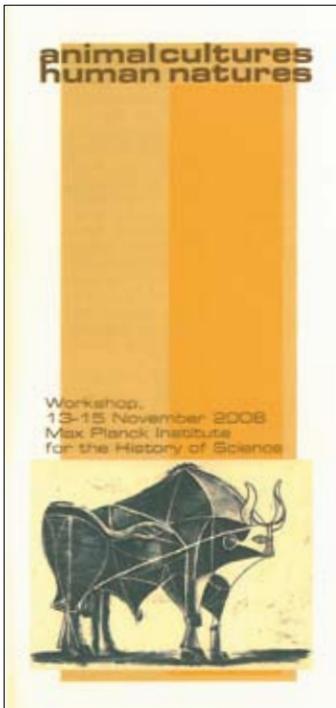
ORGANIZER *Andreas Mayer* (MPIWG)

The workshop traced the emergence of the notion of the “animal subject” in the late-nineteenth century. In the discussion of various historical examples (ranging from ornithology to animal hypnosis), the participants discussed the problems of anthropomorphism and empathy by focusing on the interaction of humans and animals in practices of scientific observation.



Participants

- *Jonathan Burt* (Ferry House, Bottisham, U.K.)
- *Lorraine Daston* (MPIWG)
- *Vinciane Despret* (Université de Liège, Belgium)
- *John Forrester* (University of Cambridge, U.K.)
- *Erica Fudge* (Middlesex University, U.K.)
- *Robert Kirk* (Manchester University, U.K.)
- *Dominique Lestel* (CNRS, Ecole Normale Supérieure Paris, France)
- *Ruth Leys* (Johns Hopkins University, U.S.A.)
- *Lydia Marinelli* (Sigmund Freud Museum, Austria)
- *Andreas Mayer* (MPIWG)
- *Alexandre Métraux* (Universität Mannheim, Germany)
- *Erika Milam* (MPIWG/University of Maryland, U.S.A.)
- *Gregg Mitman* (University of Wisconsin, U.S.A.)
- *Tania Munz* (MPIWG)
- *Alison Winter* (University of Chicago, U.S.A.)



Animal Cultures – Human Natures: Participant Observation in the History of the Natural and Social Sciences

November 13–15, 2008

ORGANIZER *Erika Lorraine Milam* (MPIWG)

This workshop brought together scholars from a variety of disciplinary backgrounds to reconsider the material and social interactions of animals and humans, expand our shared methodological toolbox, explore approaches for questioning our sources, and discuss techniques for analyzing the shifting relationships of human-animal, self-other, and domestic-wild. By investigating the intimate connections we share with non-human animals, we sought to move beyond the construction of human and animal as “nothing else but opposites.”

Participants

- *Pamela Asquith* (Gabriola, Canada)
- *Avigdor Edminster* (University of Minnesota, U.S.A.)
- *Jean-Baptiste Gouyon* (MPIWG/University of York, U.K.)
- *Maria Kronfeldner* (MPIWG/Universität Bielefeld, Germany)
- *Andreas Mayer* (MPIWG)
- *Erika Milam* (MPIWG/University of Maryland, U.S.A.)
- *Tania Munz* (MPIWG)
- *Christian Reiß* (MPIWG)
- *Harriet Ritvo* (Massachusetts Institute of Technology, U.S.A.)
- *Charlotte Sleight* (University of Kent, U.K.)
- *Katrin Solhdju* (Zentrum für Literaturforschung Berlin, Germany)
- *Marianne Sommer* (ETH Zürich, Switzerland)
- *Brett Walker* (Montana State University, U.S.A.)
- *Markus Wild* (Humboldt-Universität zu Berlin, Germany)

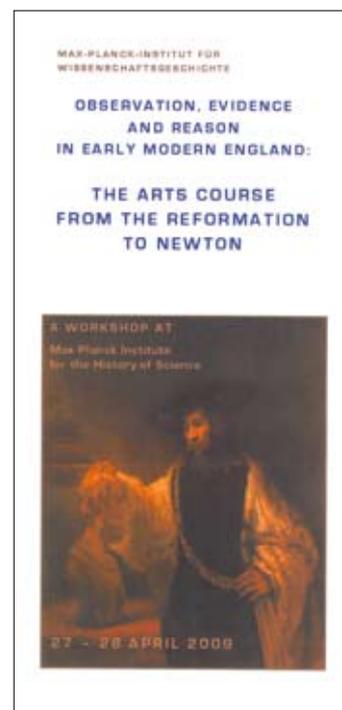
Observation, Evidence, and Reason in Early Modern England: The Arts Course from the Reformation to Newton, April 27–28, 2009

ORGANIZERS *Daniel Andersson* (MPIWG), *Richard Serjeantson* (Cambridge University, U.K.)

This workshop attempted to answer some fundamental questions in the study of the intellectual history of early modern England. What is the best and most academically responsible way of gaining “hermeneutic control” over the texts that we study? To what extent does the informal assumption of the unity of knowledge affect the notion of disciplinary formation and the scholarly career? How widely diffused were the practices of the arts course outside of the academy? What is the relation of university learning to the alternative, usually scientific, think-tanks of the period, such as the Royal Society of London? Individual texts in the Renaissance curriculum were examined against the background of the larger concepts that are the building blocks of the course: observation, analysis, evidence, reason, proof, persuasion.

Participants

- *Daniel Andersson* (MPIWG)
- *Andreas Blank* (Universität Paderborn, Germany)
- *Michael Edwards* (University of Cambridge, U.K.)
- *Guido Giglioni* (The Warburg Institute, U.K.)
- *Doug Jesseph* (North Carolina State University, U.S.A.)
- *Jill Kraye* (The Warburg Institute, U.K.)
- *Rhodri Lewis* (University of Oxford, U.K.)
- *Peter Mack* (Warwick University, U.K.)
- *Edward Paleit* (University of Exeter, U.K.)
- *Jean-Louis Quantin* (Sorbonne, Paris)
- *Fred Schurink* (University of Newcastle, U.K.)
- *Richard W. Serjeantson* (Cambridge University, U.K.)



History of Scientific Observation
Planned Conference

Sciences of Communication in the Twentieth Century

March 18 –20, 2010

ORGANIZERS *Tania Munz* (MPIWG), *Veronika Lipphardt* (MPIWG)

→ p. 197

History of Scientific Observation
Individual Projects



Daniel Andersson

Daniel Andersson (Postdoctoral Fellow, MPIWG)

Styles of Observation and Experience in Renaissance Aristotelianism

Scholars have too readily assimilated the concepts of “empiricism” and “observation,” eliding the differences between the two. With a suitably expanded concept of observation, one may begin to arrive at a rather different and more variegated account of the cognitive styles that the forms of Renaissance natural philosophy enabled than has hitherto been possible. How might such a task be accomplished? Chiefly by looking at the appeals to an “intuitive observation,” which is one of the many forms of analogical reasoning hallowed in and developed by Aristotelian natural philosophy. The concept of “experience” would also benefit from a more intensive historicization than it has received.



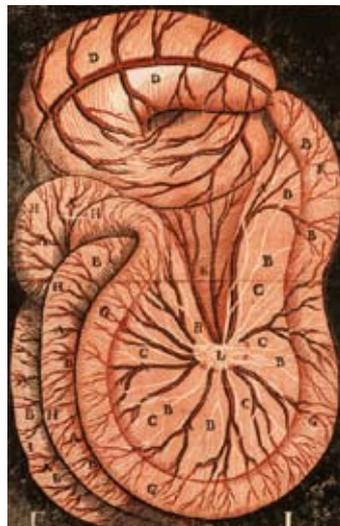
Domenico Bertoloni-Meli

Domenico Bertoloni-Meli (Visiting Scholar, Indiana University Bloomington, U.S.A)

The Role of Vivisection in the Seventeenth Century

Unlike other forms of investigation, such as microscopy, vivisection was not new in the seventeenth century. Nonetheless, it was developed in new ways and led to a number of strikingly original results. The study examines eight especially prominent cases ranging from William Harvey and Gasparo Aselli to Anton Nuck and Johann Jakob Wepfer. A special focus is on the relation to practices of scientific observation. These

two forms of investigation may seem antithetic, since vivisection is the archetypal example of an interventionist technique, whereas observation is considered to be passive and non-interventionist; in many cases, however, the analysis has shown that vivisection co-existed with observation and with techniques drawn from natural history.



White milky veins, discovered through vivisection. Gasparo Aselli, *De lactibus*, Milan 1627

Charlotte Bigg (MPIWG/Centre Alexandre Koyré, CNRS, Paris, France, funded by the Deutsche Forschungsgemeinschaft, DFG)

Observing Brownian Motion

The eruption of new microscales on scientific research agendas contributed to a profound transformation in scientific practices and social organization in the early-twentieth century. Focusing on Brownian motion research in early-twentieth century France, Charlotte Bigg examined the investigations carried out by the physical chemist Jean Perrin, the physicist Paul Langevin, and the mathematician Emile Borel, focusing on how theory and experiment were deployed in the study of Brownian motion to produce for the first time “visual” evidence of the existence of atoms and of the statistical nature of the second law of thermodynamics. Through a close analysis of the relatively circumscribed field of Brownian motion research c. 1900, the momentous scientific, disciplinary, and social stakes at play in this period can thus be investigated for the French context and compared to the better known British and German cases.



Charlotte Bigg

Displacement of individual particles. Jean Perrin, “Mouvement Brownien et réalité moléculaire”, *Annales de Chimie et de Physique*, ser. 8, vol. 18, p. 81, 1909

Marie-Noëlle Bourguet (Visiting Scholar, Université de Paris VII, France)

The Scientific Traveler’s Notebook

Through a close scrutiny of a set of manuscript notebooks by naturalists and scientific travelers such as Aimé Bonpland, Leopold von Buch, L. J. Gay-Lussac, Alexander von Humboldt, André Michaux, Horace-Benedict de Saussure, and Dominique Villars, this study explored the gestures and cognitive practices at work in the routine writing of a scientific traveler’s journal. Two main sets of questions were investigated: first, the recording process itself, which explored the relationship between paying attention (“taking note”) and recording (“taking notes”); and second, the uses of notebooks and their role in the production and construction of scientific knowledge, which show the scientific observer using notes as a kind of *camera obscura*, at once a reduction and a substitute for the world.

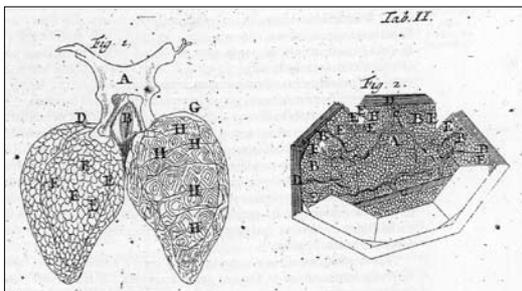


Marie-Noëlle Bourguet

Marco Bresadola (Visiting Scholar, University of Ferrara, Italy)

The Virtues of Observational Practice in Italian Scientific Culture, ca. 1660–1700

During the second half of the seventeenth century, observation was often portrayed as a diligent, patient, and dispassionate investigation into natural particulars. The project analyzes the meaning and use of these terms in the practice and discourse of Italian life sciences, focusing on Marcello Malpighi’s work in microscopic anatomy and the debates in which he was involved. What was the relationship between epistemology and morals in the early history of



Marco Bresadola

Frog’s lungs seen through the microscope. M. Malpighi, “De pulmonibus observationes anatomicae,” 1661. In *Opera omnia. Lugduni Batavorum: Apud Petrum Van der Aa*, p. 330, 1687

scientific observation, as it was performed and discussed by the historical actors? To explore this question, the project takes up recent scholarly work on the “passions of inquiry” (e.g. curiosity and wonder) and on scientific “personae” in early modern history.



Lorraine Daston

Lorraine Daston (Director, MPIWG)

Collective Observation

Natural philosopher Edmond Halley’s 1686 map of the world winds is emblematic of a new scientific predicament that emerged in the mid-seventeenth century: how to coordinate, compile, and integrate the contributions of many different observers, scattered over time and space. Individual savants who routinely repeated their own observations of stellar positions or plant genera or human bronchia were confronted with the same dilemma: how to synthesize many views of the same object, each differing slightly or strikingly from the others, into a single observation? One solution was to edit numerous observations from hither and yon into a “synopsis,” verbal or visual, as Halley did with the reports of mariners and travelers in his map. Another, often used in botany, was to try to calibrate the senses of the multiple observers beforehand,

A map of the world winds. Edmond Halley, “An Historical Account of the Trade Winds, and Monsoons, observable in the Seas between and near the Tropicks, with an attempt to assign the Physical cause of said Winds.” *Philosophical Transactions of the Royal Society of London* 16 (1686)



so as to standardize assessments of color, texture, taste, and smell. Still another, increasingly frequent in astronomy, averaged the values of divergent observations of the same celestial object. All these techniques of collective observation posed problems of ontology and social organization: a general object had to be consolidated out of multiple observations; authority had to be exercised to consolidate a collective out of multiple observers. New kinds of visualization and community made collective empiricism possible.



Elizabeth Edwards

Elizabeth Edwards (Visiting Scholar, University of the Arts, London, U.K.)

The Photographic Survey Movement

As part of a larger project on the photographic survey movement in England 1885–1918, Elizabeth Edwards worked on how ideas of scientific “objectivity” the “systematic,” and networks of amateur science, especially those of geology, anthropology, and archaeology, were understood and absorbed by amateur photographers making survey archives for the future. These values, at the blurred boundaries between amateurs and emerging disciplinary professionals, were used to both organize and legitimize their activities. The study explored in particular the ways in which amateur photographers engaged in “survey work” drew their values and structures from the British

Association for the Advancement of Science which, at the period, instigated a number of survey and visual projects largely dependent on amateur observers, including photographers.



Photographers of the Warwickshire Photographic Survey 1894
© Birmingham City Library

Erna Fiorentini (Visiting Scholar, Freie Universität Berlin, Germany, funded by SFB 626 “Aesthetic Experience and the Dissolution of Scientific Limits,” Deutsche Forschungsgemeinschaft, DFG)

Protomodern Observers and the Camera Lucida, 1806–1850

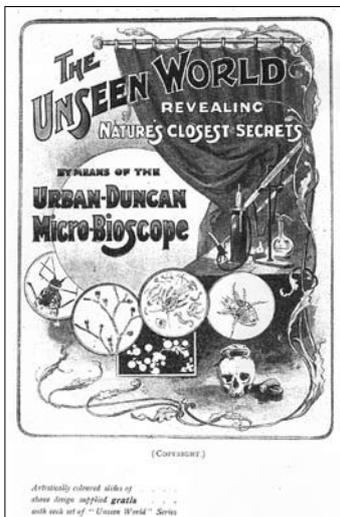
The project studied an early-nineteenth century visual habit, the use of the *camera lucida*, in relation to contemporary practices of observation and representation and corroborated the thesis that this new mode of seeing implied the conciliation of individual perception with the demands of images expected to convey “objective” observational data. In the fields of landscape sketching, natural history, and microscopy, the relationship between sensory, cognitive, and emotional experience and their translation into images became the object of practical as well as theoretical reflections. The results will appear in *Prismatisches Sehen. Die Camera Lucida als Metapher des Visuellen im frühen 19. Jahrhundert* (Göttingen: Wallstein Verlag, 2010).



Erna Fiorentini



Reverend Calvert Jones (?) sketching with a Wollaston *camera lucida*. Pencil *camera lucida* drawing. The National Library of Wales, ca. 1830



Oliver Gaycken (Visiting Scholar, Temple University, Philadelphia, U.S.A., funded by Temple University, Philadelphia)

Devices of Curiosity: Early Cinema and Popular Science

The book project uncovers a largely uncharted area of early cinema history: the popular science film. This genre developed out of the general efflorescence of popular science in the second half of the nineteenth century, so one aspect of understanding these films requires locating them in the contexts of previous practices of visualization. The recovery of this lost film genre also reframes better-known fictional genres by arguing for stylistic and thematic similarities that indicate the wider impact



Oliver Gaycken

Illustration of a promotional lantern slide for *The Unseen World* (F. Martin Duncan, 1903), Charles Urban papers, 10–1, National Media Museum, Bradford, England

of the popular scientific aesthetic, which influenced the history of special effects, the creation of the non-theatrical film market, and the intersection of the avant-garde and the documentary. The book manuscript is currently under review at University of California Press.



Michael Gordin

Michael Gordin (Visiting Scholar, Princeton University, U.S.A., funded by Princeton Bicentennial Preceptorship)

International History of the Atomic Monopoly, 1945–1949

Michael Gordin finished a book on the practices of epistemology in the arena of atomic weapons—what one might call “nuclear observation.” The book focuses on the period of the American atomic monopoly—the period between the atomic bombing of Hiroshima and Nagasaki in early August 1945, and the Soviet detonation of their own atomic device in late August 1949. Both the Soviets and the Americans invested tremendous resources in “detecting” aspects of the other side’s nuclear program, and the level of attention, the high stakes, and the extreme efforts by both sides to maintain secrecy highlight the epistemological problems that historians of science have observed in many other, less geopolitically fraught situations. The project was published as *Red Cloud at Dawn: Truman, Stalin, and the End of the Atomic Monopoly* (New York: Farrar, Straus & Giroux, 2009).



Nils Güttler

Nils Güttler (Predoctoral Fellow, Humboldt Universität zu Berlin, funded by the Studienstiftung des Deutschen Volkes)

The Role of Maps in Nineteenth-Century Plant Geography

The dissertation deals with new strategies used to visualize spatial knowledge in late-eighteenth and nineteenth-century botany, especially “plant geography”—a discipline founded by Alexander von Humboldt and others around 1800 that aimed to investigate the distribution of plants (and plant communities) on the surface of the earth. Plant-geographical maps were among the earliest so-called “thematic maps,” which represented the earth not as a politically, but naturally structured space with naturally



Pflanzengeographische Eintheilung der Erdoberfläche/Östliche Hemisphäre. Joakim Frederik Schouw, *Grundzüge einer allgemeinen Pflanzengeographie*, Atlas, Tafel XII, Berlin 1823

restricted regions. At the end of the nineteenth century, botanical maps again played a prominent role in contemporary discussions about the interaction between plants and their environment in the nascent science of ecology. They also revealed that the maps influenced the institutional organization of botanical knowledge, holding together a heterogeneous scientific community at the academic periphery, e. g., gardeners and cartographers at publishing companies.



Ludmila Hyman

(Postdoctoral Fellow, MPIWG)

Clinical Observation and the Making of Cultural-Historical Psychology

L. S. Vygotsky, A. R. Luria, and A. N. Leontiev pioneered cultural-historical psychology—a research program that they developed during the radical social upheavals in Russia that followed the socialist revolution. They developed new methods of psychological research, including

observation of people in naturalistic contexts. This project explores how these psychologists' ideas flourished in the socio-cultural context of the new Soviet society and in connection with their personal experience. The study also addresses how they used language to represent their concrete experiences and observations, and how they reasoned from observations to conclusions. The ultimate goal of the study is to test the theories of the Soviet psychologists against their practice.



Ludmila Hyman

Image employed in studies of eidetic memory in children. L. S. Vygotsky and A. R. Luria, *Etyudy po istorii povedeniia: Obeziana. Primitiv. Rebenok*. Moscow, 1930

Theresa Kelley (University of Wisconsin, Madison, U.S.A., funded by the University of Wisconsin, Madison)

Color Beginnings

Color was long excluded from the “characters” or “differentiae” used to describe organic species and differentiate them. For late-eighteenth and early-nineteenth-century artists working in watercolor and related media, color looked like an instance of what Hans-Jörg Rheinberger describes as the “unstable,” “strange and facile reality of scientific objects,” something akin to an epistemic thing whose nature and usefulness European artists and theorists of this era repeatedly redefined, in the midst of debates about the relationship of prismatic color to so-called “natural” colors. In German, French, and English treatises, claims about color shift unsteadily from material pigments to accounts of prismatic colors. Across these works, the object-ness of color, its putative materiality, is consistently at issue in ways that specify a shifting, ongoing history of objects of knowledge.



Theresa Kelley

Matthias Klotz, *Gründliche Farbenlehre*, Munich (self published) 1816

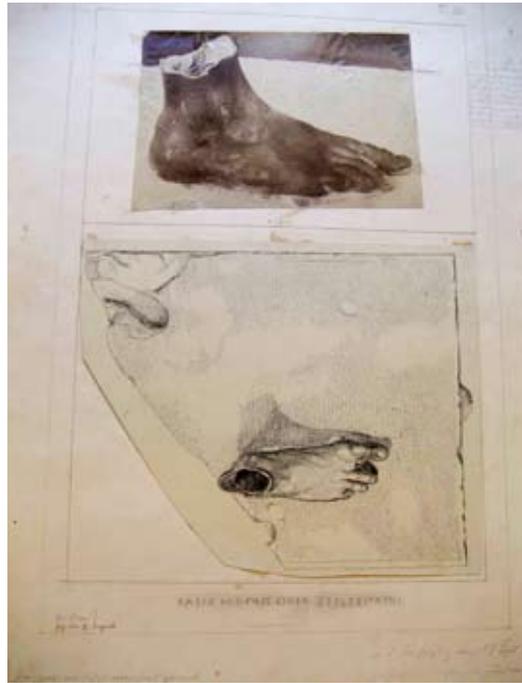


Stefanie Klamm

Stefanie Klamm (Predoctoral Fellow, Humboldt Universität zu Berlin, Germany, funded by Gerda Henkel Stiftung, Germany, as of September 2009 Predoctoral Research Scholar, Paul Getty Research Institute, Los Angeles, U.S.A.)

Strategies of Visualization in Nineteenth and Twentieth Century German Archaeology

In the mid-nineteenth century, when classical archaeology took shape as an academic discipline, the new photographic technology seemed a useful means for the reproduction of objects. But other instruments like drawings, prints, and plaster casts were at the same time both time-tested and available. The choice of illustrative techniques depended not only on the status of the technical development but also on epistemological reasons. Situated within a broader discussion of the historicity of scientific images and practices, the study explores these matters through different contexts of archaeological practice—especially Olympia and Pergamon—and follows the transformation of archaeological objects into images.



Mastercopy of a bronze foot on a stone basis in photography and drawing. Archive of the Antikensammlung, Berlin

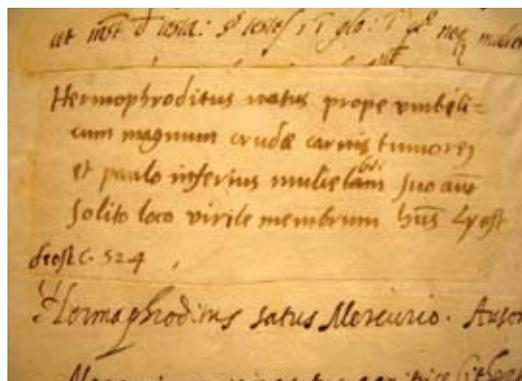


Fabian Krämer

Fabian Krämer (Predoctoral Fellow, Ludwig-Maximilians-Universität München, Germany)

Reference Structures in the Study of Nature, Seventeenth and Eighteenth Centuries

Building on detailed and scholarly *Quellenforschung* of sources both visual and textual from ca. 1550 to 1750 published in the Holy Roman Empire and the adjacent territories, the dissertation investigates what counted as knowledge in natural history



Manuscript note in Ulisse Aldrovandi's commonplace book on a case of hermaphroditism that was frequently related in the sixteenth and seventeenth centuries. Conrad Lycosthenes, *Prodigiorum ac ostentorum chronicon etc.* Basel: Petri, 1557, p. 534. Biblioteca Universitaria di Bologna, MS. Aldrovandi 105, vol. H-HIRUN, fol. 504r, (1522–1605)

and medicine, and what internal gradations existed in this “knowledge.” Focusing on accounts of monsters and building on Gianna Pomata’s and Nancy G. Siraisi’s concept of “less learned empiricism,” the project aims at overcoming the dichotomy between early modern erudition and enlightened empiricism. The project argues that there was a distinctly early modern type of empiricism that had a strong learned component. This learned component can explain the presence of reports and visualizations of phenomena that appear unbelievable to the modern reader.

Daryn Lehoux (Visiting Scholar, Queen’s University, Kingston, Canada)

What Did the Romans Know?

The Roman world was a strange one. Human bodies were made up of humours that could shift around and unbalance themselves causing illness; distant lands were populated by strange races of people, some with no heads, some with giant feet that could block out the whole sun; the offal of animals foretold the future; garlic interfered with magnets, and goat’s blood with both. The Romans really thought that they *knew* these things to be true. But why? How? On what evidence and with what standards for “knowledge”? Roman observations on the natural world—for all the care with which they were collected, for all the careful scrutiny to which they were put by some very diligent and intelligent Romans—still frequently look to be impossible or fanciful on our modern understanding (knowledge) of how nature works. By looking very closely at the Romans’ standards for observation and their criteria for acceptance, we see how the multiple contexts in which those observations were happening *made sense* of particular ways of seeing the world.



Daryn Lehoux



Garlic: antipathy incarnate?
From: Pietro Andrea Mattioli, *Kreutterbuch*
dess hochgelehrten unnd weitberuemten
Herrn D. Petri Andreae Matthioli,
Frankfurt a. M. 1590



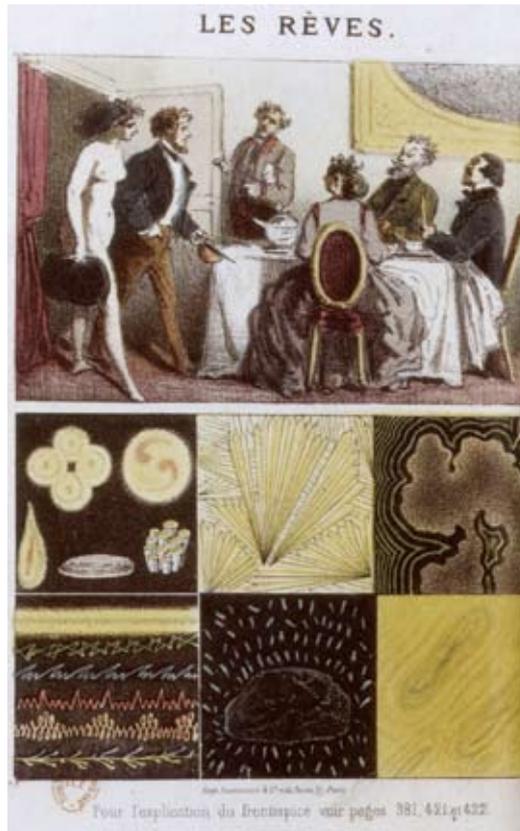
Andreas Mayer

Andreas Mayer (Research Scholar, MPIWG)

Dream Watchers. A History of Modern Dream Research

Attempts at the systematic observation and control of the dreaming process emerged during the nineteenth century. Within a new scientific culture of objectivity, dreams posed a challenge: since they appear in the sleeper's mind as fleeting phenomena and can only be known after awakening, they could hardly be considered as observable objects; and more disturbingly, their irregular, immoral, and irrational aspects threatened the unity of the observing self. This two-fold uncertainty gave rise to a regime in which dreams and similar mental phenomena were being objectified, a process

in which the use of epistemic vehicles such as photography and later film was of key importance. By reconstructing the genealogies of the practices by which dreams were objectified in the past one hundred and fifty years, the project aims not only to bring to the fore the specificities of a field which has received little interest within the history of the human sciences, but also to offer historical and epistemological elucidations of the current ambitions voiced by the exponents of new subdisciplines, most notably cognitive or neuroscientific approaches to psychoanalysis.



Hervey de Saint-Denys, *Les rêves et les moyens de les diriger*, Paris 1867.
From: R. Rosenberg, M. Hollein, Turner, Hugo, Moreau. *Entdeckung der Abstraktion*, p. 171, Fig. 56, München 2007



Erika Milam

Erika Milam (Postdoctoral Fellow, MPIWG; as of January 2009 Assistant Professor, University of Maryland, U.S.A.)

Animal Models of Human Behavior: Anthropomorphism, Zoomorphism, and Cultures of Observation

This project explored two techniques by which natural and social scientists have generalized their knowledge across the animal-human boundary. The first is to anthropomorphize animal actions as simplified versions of human behavior. The second is to zoomorphize human behavior as animalistic or instinctual in basis. By analyzing scientists' uses of zoomorphism in twentieth-century



behavioral sciences (and both the acclaim and critical eye with which their peers received this research), this project sought to understand how and why social and natural scientists turned to the study of non-human (often non-primate) behavior as a tool for understanding human social and cultural problems.



Irenäus Eibl-Eibesfeldt, *Love and Hate: The Natural History of Behavior Patterns*. Translated by Geoffrey Strachan. Aldine de Gruyter, New York 1970; Fig. 46. previous page: Balinese women; here: rhesus monkeys.

Gregg Mitman (Visiting Scholar, University of Wisconsin, Madison, U.S.A., funded by the Alexander von Humboldt Stiftung, Germany)

America's Rubber Empire: Ecology, Disease, and Commerce in the Making of the Firestone Plantations Company



During the twentieth century, the United States developed a unique kind of empire, one bound together less by military conquest and direct political administration than by the expansion of markets, corporate influence, and cultural exchange. The political and economic ties between the United States and the Republic of Liberia, cemented in the 1920s when the Firestone Tire and Rubber Company successfully established a major rubber plantation in the country, exemplify this new imperial relationship. Yet the transformation of Liberia into the United States' rubber empire depended on new tools of seeing and new forms of scientific and medical expertise. Through a focus

on the Harvard African Expedition to Liberia in 1926, the motion-picture record it gathered, and the place of rubber as a precious commodity in the global economy, this project explores the relationships among science, business, and the state in the economic transformation of nature and a nation. How the practices of seeing and valuation in the sciences of ecology, medicine, anthropology, and economics were instrumental in that transformation are questions at the center of this book-length project.

Tania Munz (Research Scholar, MPIWG)

Karl von Frisch, the Honeybee Dances, and Twentieth-Century Sciences of Communication

The Dancing Bees is a dual biography that explores the life and work of the experimental physiologist Karl von Frisch (1886–1982) *vis à vis* his favored research animal, the honeybee, in the context of twentieth-century studies of animal behavior and communication. Von Frisch's findings that the bees communicate the distance and direction of food sources by means of their dances earned him international attention and a shared Nobel Prize in Physiology and Medicine in 1973. The news that an animal as lowly as the honeybee would use symbolic communication challenged existing



Gregg Mitman

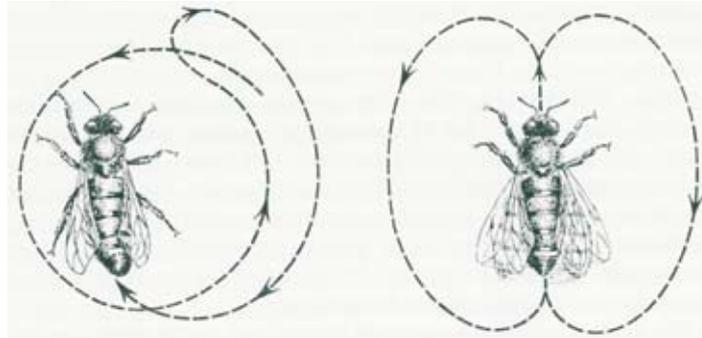
Rubber tree, *Hevea brasiliensis*, showing method of tapping at Firestone's Mt. Barclay plantation in Liberia, 1920s. Courtesy of Randal Whitman



Tania Munz

notions of the animal-human boundary. From dolphin and whale song to signing chimpanzees, by the mid-1960s, a flurry of interdisciplinary activity surrounded animal communication. The project examines von Frisch's work and its reception and traces how the honeybee emerged during the twentieth century as one of the most fascinating and challenging problems of communication and behavior.

Left: The round dance alerts hive mates to nearby foods. Right: The tail-waggle dance indicates the distance and direction of more distant food sources. Karl von Frisch, *Erinnerungen eines Biologen*, p. 126, Berlin 1957

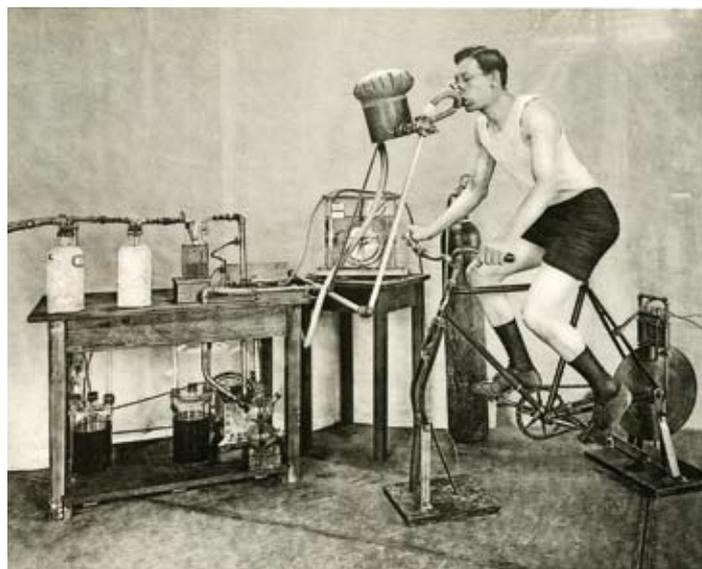


Elizabeth Neswald (Visiting Scholar, Brock University, St. Catherines, Canada, funded by the Canadian Institute of Health Research)

Thermodynamics, Social Technologies, and the Practice of Nutrition

In the 1850s, nutrition emerged as a special area of physiological study. Humans at work and at rest, female and male, of different ages and states of health were put in calorimeters, hooked up to respiration apparatus, and fed carefully planned and analyzed diets in order to determine the metabolism and nutritional needs of the human body. Surveys, household budgets, prisons, and poor houses provided information on dietary practices in different social, ethnic, and national groups. From its early years, nutritional physiology was closely intertwined with the interests of the state and of social reformers. At the same time, physiologists looked to the exact sciences, to physics, chemistry, engineering, and thermodynamics for their experimental methods and models. This project studies the history of nutritional physiology in the late-

Francis G. Benedict and Edward P. Cathcart, *Muscular Work. A Metabolic Study with Special Reference to the Efficiency of the Human Body as a Machine*, Fig. 1, Washington DC, 1913

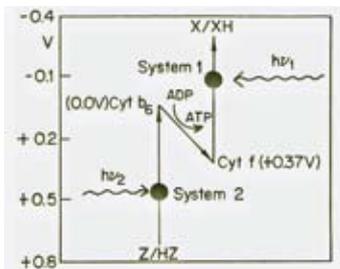


nineteenth and early-twentieth centuries at the intersection of laboratory science and social concerns, focusing in particular on its experimental objects, practices, and apparatus.

Kärin Nickelsen (Visiting Scholar, Universität Bern, Switzerland, funded by the Universität Bern)

Modelling Photosynthesis 1840–1960

The project examines the discovery of the biochemical processes of photosynthesis in the years 1840 to 1960. Photosynthesis is fundamental to life on earth, and the process has intrigued scientists for a long time, with an enormous acceleration of success after 1945. By 1960, the basic model of photosynthesis, involving two photochemical



reactions and a light-independent series of dark reactions, was established. It required the collective effort of many research teams from all over the world, working in the most diverse fields of science. Tracing the step-by-step contributions by different actors to this model and explaining why and in which respect they advanced the collective goal are the key issues of this project.



Kärin Nickelsen

Eugene Rabinowitch, "The Mechanism of Photosynthesis". *Studies on Microalgae and Photosynthetic Bacteria* 373, p. 114, 1963

Gianna Pomata (Visiting Scholar, Johns Hopkins University, U.S.A.)

Practices of Observation of Early Modern Physicians

This project examines the development of the genre of medical *observations* (collections of case-histories), a new form of writing that emerged in the late Renaissance. The interest in case-writing and case-collecting, which was the primary motivation behind the publishing of the *observations*, was related to the recovery of the ideas of the ancient Empiric physicians, which were part and parcel of the legacy of ancient Scepticism and newly influential in early modern Europe. During her stay at the MPI-WG, Gianna Pomata completed and submitted for publication the following articles on this topic: "Sharing Cases: the *Observationes* in Early Modern Medicine" (accepted for publication in *Early Science and Medicine*, forthcoming 2010); "Observation Rising: Birth of an Epistemic Genre," accepted for publication in Lorraine Daston and Elizabeth Lunbeck, eds., *Histories of Scientific Observation* (Chicago: University of Chicago Press, forthcoming 2010); and "A Word of the Empirics: the ancient concept of observation and its recovery in early modern medicine," under review at *Annals of Science*.



Gianna Pomata

Theodore Porter (Visiting Scholar, University of California, Los Angeles, U.S.A.)

Scientific Observation as a Tool for Conservative Social Reform

This project examined the *méthode d'observation* of the mining engineer and prominent conservative Frédéric Le Play, who began his career emphasizing careful observation as a tool of economic planning and management, and later exalted it as an antidote to speculative, deracinated revolution. His monographs involved a remarkable



Theodore Porter

mix of bureaucratic investigation, exemplified by British parliamentary Blue Books, and the writing of fiction. By the time his observational project was flourishing as a collective enterprise, he had become convinced that France needed to be regenerated by the perspective of places far from European civilization, and that the wisdom of the sage, with lifelong experience of societies uncorrupted by modern customs and habits, was more valuable than any systematic empirical study. And yet he maintained to his dying day a program of investigation that was summed up in quantitative reports of family budgets.



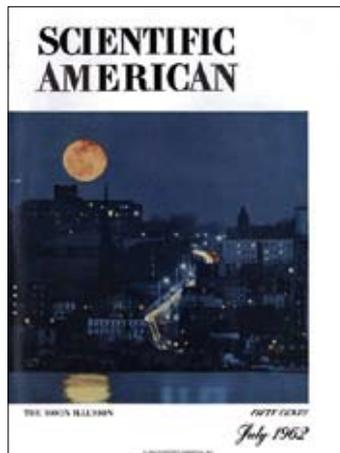
Thomas Sturm

Thomas Sturm (Research Scholar; as of November 2009 Ramón y Cajal Researcher at the Department of Philosophy at the Universitat Autònoma de Barcelona, Spain)

Perceptual Illusions and their Role in Epistemology

The empirical sciences must constantly strive to distinguish reliable from unreliable observation. A concept that plays an important role here is that of a perceptual illusion. For philosophers, such illusions have often been a reason to mistrust the senses. They were also treated in optics, astronomy, and other disciplines. A division of scientific labor seems natural here: empirical sciences in general consider these illusions for methodological and theoretical reasons. In contrast, for philosophical

epistemology and—in different ways—cognitive psychology, illusions have also been part of their very subject matter. They investigate them in order to understand and control the basis of empirical knowledge. The project deals with a complex philosophical and historical problem: How has the conceptual distinction between perception and judgment been used in conceptions and theories of perceptual illusions? How do these shifts affect the relation between philosophy and psychology, and the goal of these disciplines to safeguard empirical knowledge claims?



Cover Illustration of *Scientific American*, No. 207 1962



Mary Terrall

Mary Terrall (Visiting Scholar, University of California, Los Angeles, U.S.A.)

Practices of Natural History in the Eighteenth Century

This study examines the various practices that went into making natural historical knowledge in francophone eighteenth-century Europe. Through diverse manuscript letters, research notes, and drawings, as well as printed texts and engraved images, it reconstructs working relationships among naturalists, and looks especially at the ways people incorporated natural history observation into the daily routines of their households. The project challenges received views about classification as the defining feature of natural history in this period, and about the clear distinction of physical sciences from natural history. The central figure is René-Antoine Ferchault de Réaumur, author of many volumes on insects, among other things, and the definitive authority on natural history in France the middle decades of the eighteenth century.

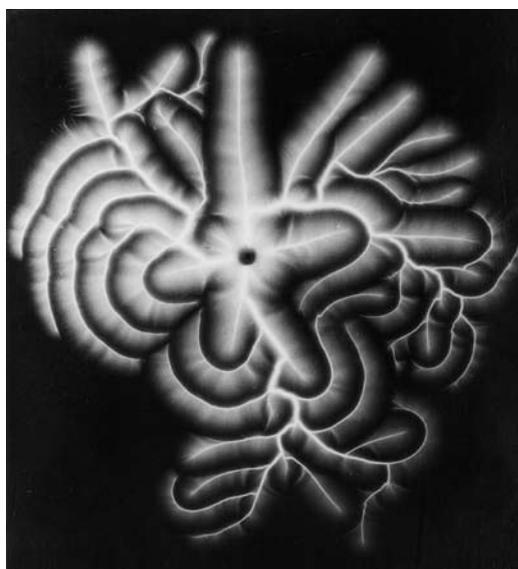
While the project addresses many aspects of Réaumur's own work in detail, his papers and letters also make possible an exploration of a dispersed and diverse community of observers and collectors spread across Europe and around the world.

Kelley Wilder (Visiting Scholar, De Montfort University Leicester, U.K.)

The Nature of Photographic Evidence

By the late-nineteenth century, the photochemical trace in addition to more modern photographic techniques provided scientists with innumerable insights into the natural world. Photography recorded things that were, to the human eye and human memory, too small, too fast, invisible, too far away and far too ephemeral. Kelley Wilder explored the perceived framework of photography in experimental and observational settings ever since Sir John Herschel first used a photograph to explain the result of an experiment in March 1839.

Her project involved not only examining the ways in which photographs were seen to generate facts, but also how different types of photographs were used to generate different types of facts; how photographic methods were deployed; how photographic materials altered the way in which these methods were structured; and finally, but certainly not least, how photographic desiderata were treated, discussed, and disseminated to a public audience as evidence.



Kelley Wilder

Arthur von Hippel, Lichtenberg Figure. Digital image made from a scanned glass plate negative (and reversed) 1936. Courtesy von Hippel family

Joseph Ziegler (Visiting Scholar, Haifa University, Israel, funded by the Yad Hanadid Foundation)

The Rise of Physiognomy, 1200–1500

During his six-month stay at MPIWG, J. Ziegler wrote two chapters of a forthcoming monograph on the rise of physiognomy, 1200–1500. Both chapters heavily rely on Bartolomeo della Rocca Cocles's *Chiromantie ac physionomie anastasis* (Bologna, 1504), the last medieval-style commentary of "Aristotelian" physiognomy. The first of these chapters analyses the physiognomic portraits in Cocles's *Anastasis* and suggests that in the long history of scientific observation, this eccentric physician provides us with one of the earliest examples of scientific observation in the Latin West. The second chapter, "Observing religious inclinations and behaviour: Physiognomy and Religion 1200–1500," traces the nexus physiognomy-religion.



Joseph Ziegler

Project

Between the Natural and the Human Sciences

MPIWG ORGANIZERS *Lorraine Daston, Fernando Vidal*

COOPERATING ORGANIZERS *Francisco Ortega* (Universidade Do Estado Do Rio de Janeiro/UERJ, Brazil)

COOPERATION PARTNERS Universidade Do Estado Do Rio de Janeiro/UERJ, Brazil; University of Chicago, U.S.A.; Centre Alexandre Koyré, Paris, France

The questions about what 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 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 what the natural and human sciences divided disciplines once linked by common histories and practices. The two projects conducted under this rubric investigate the historical and contemporary interactions between the human and natural sciences, as well their shared epistemic values, practices, and institutions.

Project One

The Cerebral Subject: Brain and Self in Contemporary Culture

DURATION 2004–2009; funded 2005–2008 by the DAAD (German Academic Exchange Service)

MPIWG ORGANIZER *Fernando Vidal*

COOPERATING ORGANIZER *Francisco Ortega* (Universidade Do Estado Do Rio de Janeiro/UERJ, Brazil)

COOPERATION PARTNER Institute for Social Medicine, Universidade Do Estado Do Rio de Janeiro/UERJ, Brazil

The goal of this project is to study in history and contemporary culture the idea, epitomized by the expression “cerebral subject,” that the human person is constituted essentially by the brain, or that the brain is the only part of the body one needs to have in order to be herself or himself. Since the 1990s, several disciplines, such as neurotheology, neuroeducation, neuroesthetics, neuropsychanalysis, neuromarketing, or neuroeconomics have advanced bold plans to reform the human sciences on the basis of knowledge about the brain. Driven by the availability of brain imaging technologies, these fields tend to focus on the quest for neural correlates of behaviors and mental processes. The media has given much room to these emergent fields; it has also reported on new forms of sociability incarnate in the growing “neurodiversity” movement, and has decisively contributed to turn brain scans into modern icons of personhood. Parallel to academic approaches, but interacting with them, there is an expanding galaxy of beliefs and practices that go from learning how to draw or feel with one side of the brain, to various forms of neurohealthism, neuroascetics, neuro-esotericism, and neuroeschatology. The project approaches these phenomena from different angles, and in reference not only to science and medicine, but also to extra-scientific ideas and practices that ultimately concern the self and the definition of the human being.

Brain and Self in Contemporary Culture

Conferences

Neurocultures,

February 20–22, 2009

ORGANIZERS *Nicolas Langlitz* (MPIWG/New School of Social Research, New York, U.S.A.), *Fernando Vidal* (MPIWG)

COOPERATION PARTNERS BIOS Centre, London School of Economics,
www.lse.ac.uk/collections/BIOS/

The workshop examined “neurocultures”—a term intended to emphasize the construction of norms, values, meanings, and identities through the new “neuro” discourses and practices, both scientific and popular. How has neuroscientific knowledge penetrated and fashioned neurocultures, and how have the neurosciences been affected by the latter? How substantial are the changes introduced by “neuro” methods and perspectives into areas traditionally covered by the human sciences? Have these areas as well as our conduct of life and views about the human undergone the major transfigurations announced by many “neuro” specialists? Is there a common denominator to the emerging “neuro” disciplines? Is it merely ideological or have the practices of these fields been transformed as well? What purposes does their alignment with the neurosciences serve?

Participants

- *Suzanne Anker* (School of Visual Arts, New York, U.S.A.)
- *Ariane Bazan* (Université Libre de Bruxelles, Belgium)
- *Martijn van Beek* (University of Aarhus, Denmark)
- *Uljana Feest* (Technische Universität Berlin, Germany)
- *Giovanni Frazzetto* (London School of Economics, U.K.)
- *Michael Hagner* (ETH Zürich, Switzerland)
- *Hauke Heekeren* (MPI for Human Development Berlin, Germany)
- *Sita Kotnis* (University of Aarhus, Denmark)
- *Ludmila Hyman* (MPIWG)
- *Andrew Lakoff* (Harvard University, U.S.A.)
- *Nicolas Langlitz* (MPIWG/New School of Social Research, New York, U.S.A.)
- *Thomas Lemke* (Universität Frankfurt/M., Germany)
- *Sabine Maasen* (Universität Basel, Switzerland)
- *Hans Markowitsch* (Universität Bielefeld, Germany)
- *Emily Martin* (New York University, U.S.A.)
- *Andreas Mayer* (MPIWG)
- *Thomas Metzinger* (Universität Mainz, Germany)
- *Francisco Ortega* (State University of Rio de Janeiro, Brazil)
- *Michael Pauen* (Humboldt Universität zu Berlin, Germany)
- *Alain Prochiantz* (Centre national des recherches scientifiques, Paris, France)
- *Tobias Rees* (McGill University, Canada)
- *Andreas Roepstorff* (University of Aarhus, Denmark)
- *Nikolas Rose* (London School of Economics, U.K.)
- *Irina Singh* (London School of Economics, U.K.)
- *Thomas Sturm* (MPIWG/Universitat Autònoma de Barcelona, Spain)
- *Fernando Vidal* (MPIWG)
- *Scott Vrecko* (London School of Economics, U.K.)
- *Allan Young* (McGill University, Canada)

Brain and Self in Contemporary Culture

Individual Projects



Suparna
Choudhury

Suparna Choudhury (Research Fellow, MPIWG, as of August 2009 MPG Minerva Junior Professor, funded by the MPG W-2 Minerva Program for the Advancement of Outstanding Female Scholars)

COOPERATING PARTNERS *Arno Villinger* and *Daniel Margulies* (Institute for Mind and Brain, Humboldt Universität zu Berlin, Germany)

COOPERATION PARTNER Institute for Mind and Brain, Humboldt Universität zu Berlin, Germany

Critical Neuroscience and the Adolescent Brain

The goal of this project is to develop meaningful interactions between the history of science, anthropology, and cognitive neuroscience. Using the framework of Critical Neuroscience (www.critical-neuroscience.org) and intersecting with the Cerebral

Subject project (all above), *Constructions of the Brain* seeks to examine the cultural contexts and social functions of recent research in the neurosciences, including questions about the social brain, cultural differences, and cognitive development. Currently, a particular focus of the project is the adolescent brain. The adolescence project studies how ideas and practices related to mental and moral development during adolescence



L. Ebensperger, *Storm and Stress in the Adolescent Brain*, 2009

developed from the late-nineteenth century to current frameworks in neuroscience and psychiatry. It also explores the ways in which brain-based explanations of adolescence are appropriated in clinical, educational, and popular domains, and among adolescents themselves in diverse cultural contexts. Firstly, therefore, the adolescent project will contribute to social studies of neuroscience. Through its collaborative structure, a second aim is to advance reflexive and interdisciplinary approaches to the study of behavior and development.

Nicolas Langlitz (Postdoctoral Fellow, MPIWG, as of January 2010 Assistant Professor at the New School of Social Research, New York, U.S.A.)

Neurophilosophers, Neuroscientists, and the Dreaming Brain

Philosophy was among the first disciplines in the humanities to adorn itself with the prefix of “neuro.” Emerging as a branch of analytic philosophy during the 1980s, neurophilosophy has since then attempted to solve philosophical questions with the aid of empirical knowledge acquired in the field of brain research. At the intersection of dream research and neurophilosophy, this anthropological-historical study explores how philosophical questions scholars have wrestled with for centuries are addressed in novel ways through laboratory experiments. This field research in the anthropology of science examines, among other questions, how those working at the borders of science and philosophy respond to ignorance of their subject. What roles do “theoretical metaphors” play in an empirically oriented philosophy of the mind? How are science-fiction-like thought experiments used to overcome the limits of scientific knowledge in philosophical arguments? And what happens to philosophical questions once the attempt has been made to “operationalize” them in experiments?



Nicolas Langlitz



Neuroimaging: How do physiological measurements of the dreaming brain inform the philosophy of mind?
Photo: Courtesy Dr. Felix Hasler, Zurich



Fernando Vidal

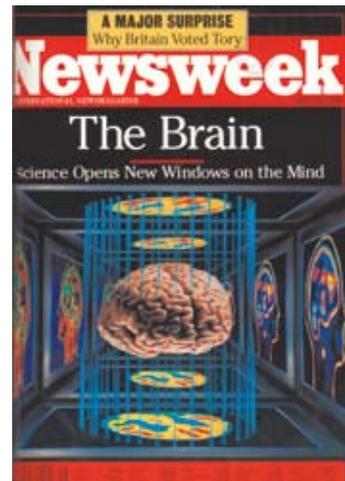


Francisco Ortega

Francisco Ortega (Visiting Scholar, Universidade Do Estado Do Rio de Janeiro/UERJ, Brazil), *Fernando Vidal* (Research Scholar, MPIWG)

Being Brains

Are we our brains? The leading American neuroscientist Michael Gazzaniga explicitly said so. More subtly, French philosopher Stéphane Ferret wrote that “Person P is identical with person P* if and only if P and P* have one and the same functional brain.” Humans have been thus redescribed as cerebral subjects. How have we come to the point that such statements seem natural and obvious? What do their verbal and nonverbal forms and consequences imply for the individual and society? This co-authored book project places these questions in historical and critical perspective. *Being Brains* will include chapters on the history of the cerebral subject from John Locke to brain scans; the development since the 1990s of various “neuro” fields (neuroethics, neuroeconomics, neuroaesthetics, neurotheology, and several others); neuroethics and how it defines and deals with the challenges the neurosciences supposedly pose for society; the cerebralization of psychological distress; the growth of the neurodiversity movement; the emergence of discourses and practices of cerebral self-help; and the embodiments of the cerebral subject in literature and cinema.



Cover of *Newsweek*, January 1992

Project Two

The History of the Human Sciences

MPIWG ORGANIZERS *Lorraine Daston, Andreas Mayer, Thomas Sturm*

COOPERATING ORGANIZERS *Robert J. Richards* (University of Chicago, U.S.A.),
Alison Winter (University of Chicago, U.S.A.)

COOPERATION PARTNERS University of Chicago, U.S.A.; Centre Alexandre Koyré,
Paris, France

The History of the Human Sciences

Conferences

Crisis Debates in Psychology: Causes, Contexts, and Consequences,

October 10–12, 2008

ORGANIZERS *John Carson* (University of Michigan, Ann Arbor, U.S.A.),

Uljana Feest (Technische Universität Berlin, Germany), *Ludmila Hyman* (MPIWG),

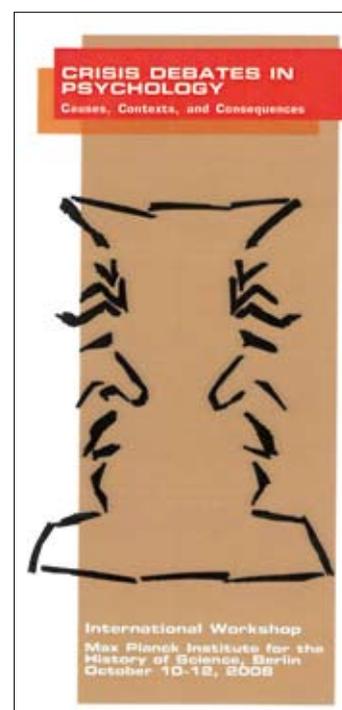
Annette Mühlberger (Universitat Autònoma de Barcelona, Spain), *Thomas Sturm* (MPIWG/Universitat Autònoma de Barcelona, Spain)

Thomas Kuhn claimed that scientific revolutions are precipitated by a crisis of the dominant paradigm, and that every crisis is resolved by a revolution. He also claimed that states of crisis are hardly ever acknowledged by scientists themselves. However, there are cases in which a crisis was diagnosed by contemporary scientists and their commentators. Perhaps the strongest instance of this can be found in psychology from the late-nineteenth century until the 1930s. It began with a reaction against the expectations connected with the new psychological laboratories, institutes, journals, societies, and research practices established since the 1870s. Starting with Rudolf Willy in 1899, many came to doubt that these innovations would bring psychology onto the secure path of a science. The workshop addressed the causes of and reasons for the experience of a crisis in psychology as well as the effects on the subsequent development in this field. Sessions were also held at conferences in Dublin (ESHHS/Cheiron meeting, July, 2007), Pittsburgh (HSS/PSA meeting, November, 2008), and Budapest (ESHHS, July 2009). The results will be published in a special issue of the *Studies in History and Philosophy of Science*.

Participants

- *Christian Allesch* (Universität Salzburg, Austria)
- *Francesca Bordogna** (Northwestern University, U.S.A.)
- *John Carson** (University of Michigan, U.S.A.)
- *Jordi Cat* (Indiana University, U.S.A.)
- *Michael Cole* (University of California, San Diego, U.S.A.)
- *Lorraine Daston* (MPIWG)
- *Cathy Faye* (York University, Canada)
- *Uljana Feest* (Technische Universität Berlin, Germany)
- *Horst Gundlach* (Universität Passau, Germany)
- *Gary Hatfield** (University of Pennsylvania)
- *Ludmila Hyman** (MPIWG)
- *Malcolm Hyman* † (MPIWG)
- *Perrine Marthelot* (Université Sorbonne, Paris, France)
- *Annette Mühlberger** (Universitat Autònoma de Barcelona, Spain)
- *Thomas Sturm** (MPIWG/Universitat Autònoma de Barcelona, Spain)
- *Fernando Vidal** (MPIWG)
- *Ekaterina Zavershneva* (Moscow State Medical University, Russia)

* Participants of this group also in residence at Department II



Origins: The Historical Sciences in the Age of Darwin,

Chicago, June 5–6, 2009

ORGANIZERS *Lorraine Daston* (MPIWG), *Robert J. Richards* (University of Chicago, U.S.A.)

COOPERATION PARTNER University of Chicago, U.S.A.

In the late-eighteenth and early-nineteenth centuries a powerful new framework of inquiry and explanation swept the human and natural sciences: in cosmology and classics, in embryology and philology, in biology and theology, history gripped the imagination of scholars and scientists. The question of the origins and development of languages, species, peoples, and texts became central to the most advanced investigations conducted in the archives, the field, and the laboratory. Charles Darwin's *On the Origin of Species* (1859) erupted into an intellectual world primed to appreciate its questions, if not its answers: how did things come to be as they are now—and what will they become? As part of their ongoing cooperation in the History of the Human Sciences and in celebration of the Darwin Year 2009, the University of Chicago and the Max Planck Institute for the History of Science Berlin co-sponsored a workshop, held in Chicago, on all aspects of the historical sciences from circa 1789–1914. The aim of the workshop was to highlight a program of scientific inquiry that spanned the human and natural sciences as well as learned and lay cultures.

Participants

- *Adam Baim* (University of Chicago, U.S.A.)
- *Daniela Barberis* (Ohio State University, U.S.A.)
- *Naomi Beck* (University of Chicago, U.S.A.)
- *Francesca Bordogna* (Northwestern University, U.S.A.)
- *Henry Cowles* (Princeton University, U.S.A.)
- *Lorraine Daston* (MPIWG)
- *Kasper Eskildsen* (Roskilde Universitet, Danmark)
- *Marcie Holmes* (University of Chicago, U.S.A.)
- *Elizabeth Lunbeck* (Vanderbilt University, U.S.A.)
- *Judith Kaplan* (University of Wisconsin, Madison, U.S.A.)
- *Stefanie Klamm* (MPIWG/Paul Getty Research Institute, Los Angeles, U.S.A.)
- *Lynn Nyhart* (University of Wisconsin, Madison, U.S.A.)
- *Zoe Nyssa* (University of Chicago, U.S.A.)
- *Trevor Pearce* (University of Chicago, U.S.A.)
- *Rachel Ponce* (University of Chicago, U.S.A.)
- *Marshall Sahlins* (University of Chicago, U.S.A.)
- *Phil Sloan* (University of Notre Dame, U.S.A.)
- *Richard Staley* (University of Wisconsin, Madison, U.S.A.)
- *Beckett Sterner* (University of Chicago, U.S.A.)
- *Thomas Sturm* (MPIWG/Universitat Autònoma de Barcelona, Spain)
- *Kathryn Tabb* (University of Pittsburgh, U.S.A.)
- *Fernando Vidal* (MPIWG)
- *Cecelia Watson* (University of Chicago, U.S.A.)
- *Alison Winter* (University of Chicago, U.S.A.)

Epistemic Vehicles in the Human Sciences: A Conference in Memory of Lydia Marinelli,

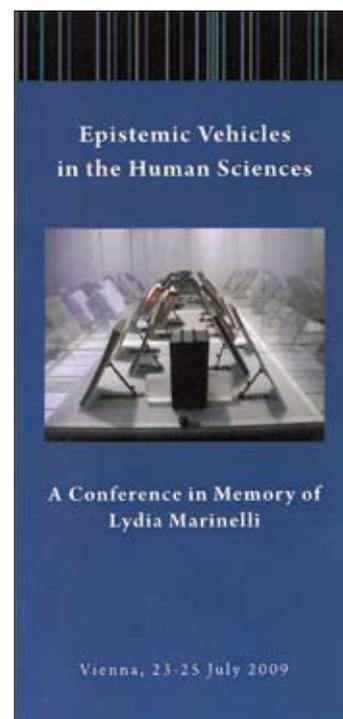
Vienna, July 23–25, 2009

ORGANIZER *Andreas Mayer* (MPIWG)

Collaboration between Departments II and III

COOPERATION PARTNER Institut für Wissenschaft und Kunst, Vienna, Austria

Lydia Marinelli (1965–2008) was one of the finest and most original Austrian historians and curators of her generation. Although scholars will remember mostly her inspiring attempts to renovate the historiography of psychoanalysis and her exhibitions, her work had also wider implications with regard to the ways knowledge is generated and transmitted in the human sciences. At a time when historiographical approaches were mostly discipline-bound and text-oriented, opening up the world of the book and of other media in relation to psychoanalysis involved a major reframing of the historical enterprise in this domain. Marinelli's analyses of the role of visual technologies and of the critical function of the archive and the museum in the transmission of psychoanalytic knowledge constitutes a challenge for traditional intellectual histories. This conference honored her memory by investigating the dynamics of the major knowledge vehicles in the human sciences: books, journals, and other print media, the role of the visual arts and technologies, and the multiple ways museum objects can spur epistemic processes. Special attention was given to those fleeting and recalcitrant objects that haunt especially the sciences dealing with mental phenomena. Studying the often paradoxical attempts to track the ephemeral can yield new ways to think about what seems most evident and familiar to us.



Participants

- *John Burnham* (Ohio State University, U.S.A.)
- *Jaqueline Carroy* (Centre Koyré, EHESS Paris, France)
- *James Chandler* (University of Chicago, U.S.A.)
- *Lorraine Daston* (MPIWG)
- *John Forrester* (University of Cambridge, U.K.)
- *Thomas Hübel* (Institut für Wissenschaft und Kunst, Vienna, Austria)
- *Baudouin Jourdan* (Université Paris 7, France)
- *Ruth Leys* (Johns Hopkins University, U.S.A.)
- *Elizabeth Lunbeck* (Vanderbilt University, U.S.A.)
- *Andreas Mayer* (MPIWG)
- *Angela Mayer-Deutsch* (Berlin)
- *Alexandre Métraux* (Universität Zürich, Switzerland)
- *Hans-Jörg Rheinberger* (MPIWG)
- *Hans-Walter Schmidt-Hannisa* (National University of Ireland, Galway, Ireland)
- *Alison Winter* (University of Chicago, U.S.A.)
- *Barbara Wittmann* (MPIWG)

Performing Voices: Between Embodiment and Mediation,

Rome, December 4–6, 2009

ORGANIZERS *Martin Brody* (American Academy in Rome), *Julia Kursell* (MPIWG), *Andreas Mayer* (MPIWG). Collaboration between Departments II and III.

COOPERATION PARTNER American Academy in Rome

→ see also: Historical Epistemology of Hearing, p. 121

This conference addressed the conundrum of vocal performance in past and present musical practices, providing a platform of confrontation and discussion by bringing together an international group of historians and philosophers of science, musicologists, and stage directors. Central to the conference was a concert by Anna Caterina Antonacci, one of today's most prominent and versatile sopranos, accompanied by pianist Donald Sulzen, followed by a biographical interview on her training and career. The combination of performances and scholarly debate allowed the participants to shed new light on the various forms of embodiment and mediation of singing voices in different historical periods, and to discuss the role of the observational and experimental techniques developed for the study of singing (see <http://www.mpiwg-berlin.mpg.de/workshops/en/Performing-Voices.html>)

Participants

- *Anna-Caterina Antonacci* (Soprano Opera Singer, Paris, France)
- *Martin Brody* (American Academy, Rome, Italy)
- *Lorraine Daston* (MPIWG)
- *Juliette Deschamps* (Compagnie La Scène du Crime, Paris, France)
- *Martha Feldman* (University of Pennsylvania, U.S.A.)
- *Bonnie Gordon* (University of Virginia, U.S.A.)
- *Philip Gossett* (University of Chicago, U.S.A.)
- *Sebastian Klotz* (Universität Leipzig, Germany)
- *Julia Kursell* (MPIWG)
- *Macha Makeïeff* (Compagnie Deschamps&Makeïeff, France)
- *Andreas Mayer* (MPIWG)
- *Hans-Jörg Rheinberger* (MPIWG)
- *Benjamin Steege* (State University of New York at Stony Brook, U.S.A.)
- *Donald Sulzen* (Pianist, Konservatorium München, Germany)

The History of the Human Sciences

Planned Conferences

The Ur Science: Philology since the Renaissance,

January 29–30, 2010

ORGANIZERS *Lorraine Daston* (MPIWG), *Glenn Most* (Scuola Normale Pisa, Italy/
University of Chicago, U.S.A.)

Strangelovean Sciences,

March 15–16, 2010

ORGANIZERS *Michael Gordin* (Princeton University, U.S.A.), *Lorraine Daston*
(MPIWG)

The Human Subject in the Human Sciences,

April 2–3, 2010 (MPIWG-University of Chicago Cooperation in the History of the
Human Sciences)

ORGANIZERS *Alison Winter* (University of Chicago, U.S.A.), *Robert J. Richards*
(University of Chicago, U.S.A.), *Lorraine Daston* (MPIWG)

What Are the Human Sciences? Traditions, Histories, Reflections,

Paris, June 2011

ORGANIZERS *Jacqueline Carroy* (Centre Alexandre Koyré, Paris, France), *Lorraine
Daston* (MPIWG), *Jan Goldstein* (University of Chicago, U.S.A.), *Andreas Mayer*
(MPIWG)

The History of the Human Sciences

Individual Projects

John Carson (Visiting Scholar, University of Michigan, Ann Arbor, U.S.A.)

Mental Ability and the Birth of Medical Jurisprudence

During the first decades of the nineteenth century, an extraordinary transformation took place in Anglo-American adjudications around the issue of mental competency. Challenging strict common law standards minimizing occasions where an actor's ability to make a will, enter into a contract, get married, or the like could be placed in question, physicians and jurists in both nations sought, often successfully, to introduce more capacious understandings of impairments that might render an individual unable to manage his or her affairs. For all the similarity in goals, however, the relations between doctors and lawyers—and more broadly between medicine and the law—were anything but easy, as each profession jealously guarded its own prerogatives and proved suspicious of expertise drawn from other quarters. The goal is to understand the process by which individuals were categorized according to their mental ability, the meaning of such categorizations when applied to specific situations, and the means by which knowledge generated and expertise validated in one context could, or could not, become persuasive within the other.



John Carson



Philip Kitcher

Philip Kitcher (Visiting Scholar, Columbia University, New York, U.S.A., funded by Columbia University)

Naturalistic Ethics

This naturalistic approach to ethics elaborates a very general philosophical stance, pragmatic naturalism, which fuses ideas from the classical pragmatists (particularly James and Dewey) with the opposition to mysterious entities and processes that is the hallmark of naturalism. Central to this approach is the thought that we can understand human practices—the sciences, religion, mathematics, and ethics—by analyzing the historical processes that have produced them in their current forms. Following themes from Dewey, the task is conceived not as developing any complete system of ethics, but of going on from where we are. The current version of the book (about 750 pages) has been sent to Harvard University Press. An article on altruism will appear in *Economics and Philosophy*.



Lydia Marinelli †

Lydia Marinelli † (Visiting Scholar, Sigmund Freud Gesellschaft, Austria)

The Couch. From A Living Room Furnishing to a Site of Observation of the Unconscious

From the beginning of Freud's medical practice, his office featured a piece of furniture for reclining. In the post-Freudian era this treatment bed took on the appellation *couch*, and up to the present day it has remained the professional calling card of the psychoanalyst. This project aimed to investigate the historical context within which this upholstered furnishing developed into a site of observation and treatment of the unconscious. It considered the therapeutic debates surrounding the more or less relaxed position of repose and their involvement in establishing the sofa's role in treatment. These medical and psychological discussions were analyzed in the light of the furnishing's career as an everyday object in the living room.



Annette Mülberger

Annette Mülberger (Visiting Scholar, Universitat Autònoma de Barcelona, Spain, funded by the Universitat Autònoma de Barcelona)

Crisis Declarations in German Psychology

What happens if scientists declare a crisis in their field? This was the case several times in the history of psychology. The first crisis declaration came from empiriocriticist Rudolf Willy, only twenty years after the first psychological laboratory was founded, and was followed by many others. A systematic comparison of crisis declarations and refutations reveals that, first, the texts dealing with crisis usually imply a question about what kind of science psychology should be and, second, that one of the main issues at stake, at that time, was Wilhelm Wundt's legacy. The paper, to be published in the *Studies in the History and Philosophy of Science* under the title "Constructing Histories—Detecting Crises: Wundt's Contested Legacy in Germany (1897/1932)," deals with the contemporary appraisal and historical evaluation of Wundt's contribution in these crisis declarations.

Project

Gender Studies of Science

MPIWG ORGANIZERS *Christine von Oertzen, Annette Vogt*

Research on the history of women and gender in science, technology, and medicine has expanded considerably in the recent past years and has, at the same time, become more and more diverse. On an ongoing basis, Department II supports projects using the category of gender to historicize scientific knowledge production—within and beyond academic confines.

Gender Studies of Science

Conference

Women and Gender in the History of Science, Technology, and Medicine: State of the Arts and Future Perspectives, August 29, 2008

ORGANIZERS *Christine von Oertzen* (MPIWG), *Helga Satzinger* (Wellcome Trust for the History of Medicine, University College London, U.K.)

The workshop aimed to evaluate and synthesize the research on women and gender in the history of science, medicine, and technology of the past decade, and to identify promising avenues for future research. The lively one-day discussion led to the conclusion that the category of gender might be most fruitfully employed in the history of science by adapting an approach that gender historians of technology have successfully used to show how technology, culture, and society are closely intertwined. As in the history of technology, gender could serve as a category to challenge distinctions between the realms of (knowledge) production and (knowledge) consumption, and in some instances erase these boundaries altogether. A workshop in 2010 (see below) will develop this approach.

Participants

- *Mineke Bosch* (University of Groningen, The Netherlands)
- *Joan Cadden* (University of California, Davis, U.S.A.)
- *Lorraine Daston* (MPIWG)
- *Delphine Gardey* (Université de Genève, Switzerland)
- *Sally Kohlstedt* (University of Minnesota, U.S.A.)
- *Erika Milam* (MPIWG/University of Maryland, U.S.A.)
- *Christine von Oertzen* (MPIWG)
- *Maria Rentetzi* (Technical University of Athens, Greece)
- *Helga Satzinger* (Wellcome Trust Centre for the History of Medicine, University College London, U.K.)
- *Annette Vogt* (MPIWG)
- *Karin Zachmann* (Technische Universität München, Germany)

Gender Studies of Science
Planned Conference

Gender Studies of Science: Using and Producing Sciences Beyond the Academy,
June 18–19, 2010

ORGANIZER *Christine von Oertzen* (MPIWG)

Gender Studies of Science
Individual Projects



Aude Fauvel

Aude Fauvel (Postdoctoral Fellow, MPIWG)

Women, Madness, and Psychiatry in France

The aim of this project is to take a fresh look at the French history of psychiatry by exploring how the evolution of theories on gender differentiation have altered the management of the insane in the modern period. Psychiatry mainly targeted women. However, asylum statistics indicate that—at least in France—more men than women were in fact locked up in psychiatric institutions. It is only at the beginning of the twentieth century that the ratio of men and women started to reverse, so that the asylum female population was sometimes 30% larger than the male one in the interwar period. The study seeks to explain this major shift in the psychiatric treatment of men and women in France by following the medical discourse on madness, as well as the treatment of female criminality. Furthermore it takes into account a “female invasion” in the psychiatric profession. In tracing the scientific legacies of the first female French psychiatrists, the study proposes to examine whether female psychiatrists developed new ways of seeing madness, whether women doctors changed the functioning of the asylum institution, and what patients themselves thought of their presence.



A mad woman at the Salpêtrière, 1892.
P. Strauss, *Paris ignoré. 550 dessins inédits d'après nature*, Paris, Ancienne Maison Quantin, p. 441, 1892



Christine von Oertzen

Christine von Oertzen (Research Scholar, MPIWG)

Gender, Science, and Transnational Academic Networking

This book project is an account of the formation and course of a new, international academic community of women, the International Federation of University Women (IFUW). It depicts how the IFUW took shape, and tracks the Federation’s activities across five decades, examining the shifting political, social, and intellectual contexts in which the organization sought to implement its ambitious goals. The study



International Convention of the IFUW 1932 in Edinburgh. Marching to the opening ceremonies, with the Mayor of Edinburgh and the President of the University of Edinburgh. Courtesy International Federation of University Women, Geneva

draws special attention to what the IFUW meant for female academics and scholars across Europe, and particularly for those from Germany. The entangled past of the IFUW and Germany reveals a history of national and international politics through academic networks across borders and academic cultures, scientific disciplines, and generations. The manuscript was accepted as a “Habilitationsschrift” by the Technical University Braunschweig in November 2009 and will be published by Wallstein in Göttingen in 2010.

Helga Satzinger (Wellcome Trust Centre for the History of Medicine, University College London, U.K.)

History of Genetics and Research into Sex Hormones

Three examples from Germany in the years between the 1890s and 1950s show how gender participated in the making of scientific knowledge. The book project investigated the research groups of Theodor and Marcella Boveri, Richard Goldschmidt, and Adolf and Erika Butenandt. The Boveris and Goldschmidt concentrated on the chromosomes and genes as genetic material, while the Butenandts crystallised sex hormones as crucial agents in the development of an organism, and turned to genetics in the 1940s. Women’s work was decisive in these endeavours. One crucial question of the three research groups was how gender difference is inherited and developed in organisms. Not only were sex and gender difference a scientific problem in the research, but they were also deeply intertwined with the contemporary political debates on the social order of society. The book, entitled *Differenz und Vererbung: Geschlechterordnung in der Genetik und Hormonforschung, 1890–1950*, was published by Böhlau Publishers in 2009.



Helga Satzinger



Technical assistants working with Adolf Butenandt on the crystallisation of the “female” sex hormone. University of Göttingen, late 1920s. Butenandt Papers, Archive of the Max Planck Society, Berlin



Ida Stamhuis

Ida Stamhuis (Visiting Scholar, Vrije Universiteit Amsterdam, The Netherlands),
Annette Vogt (MPIWG)

**Women Investigators at the Institute for Heredity Research in Berlin (1912–1928/
1933–1945)**

The Berlin Institute for Heredity Research serves as an example of a research unit where women scientists were employed earlier than in most others, and where they played a greater role than in other institutions. The study seeks to examine why this was so and what factors facilitated women's inclusion in the research. It sheds light on the gendered division of labor within the laboratories and analyzes how men and women worked together within the two main branches of the institute's research: in genetics, a field that was regarded as "pure science," as well as in heredity research which was defined as applied science.



Microscopical class at the Botanical Institute of the Agricultural College Berlin. *Die Königliche Landwirtschaftliche Hochschule in Berlin, Festschrift zur Feier des 25jährigen Bestehens*, Fig. 32, Berlin 1906



Annette Vogt

Annette Vogt (Research Scholar, MPIWG)

Women Scientists in the Kaiser Wilhelm Society and at the Berlin University

New findings on many of the female scientists listed in the dictionary "Women Scientists in Kaiser Wilhelm Institutes, from A to Z" (published in 2008) necessitated a revised and expanded edition. About fifty of the two-hundred and fifty entries needed to be changed, especially to complete entries of such lesser known and "forgotten" women scientists as Lydia Pasternak and Marie Wreschner, as well as of the first female scientific members of the Max Planck Society, Elisabeth Schiemann and Anneliese Maier. The new edition of the dictionary now also includes women scientists at different scientific institutions, especially the Agricultural College in Berlin and the Berlin University. The third edition of the dictionary covers the period from 1900 to 1961. It includes comparisons between male and female scientists, and draws special attention to women scientists who opposed the Nazi Regime.

Project

Science in Circulation: The Exchange of Knowledge among Islam, Judaism, and Christianity, 9th–17th Centuries

MPIWG ORGANIZER *Lorraine Daston*

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

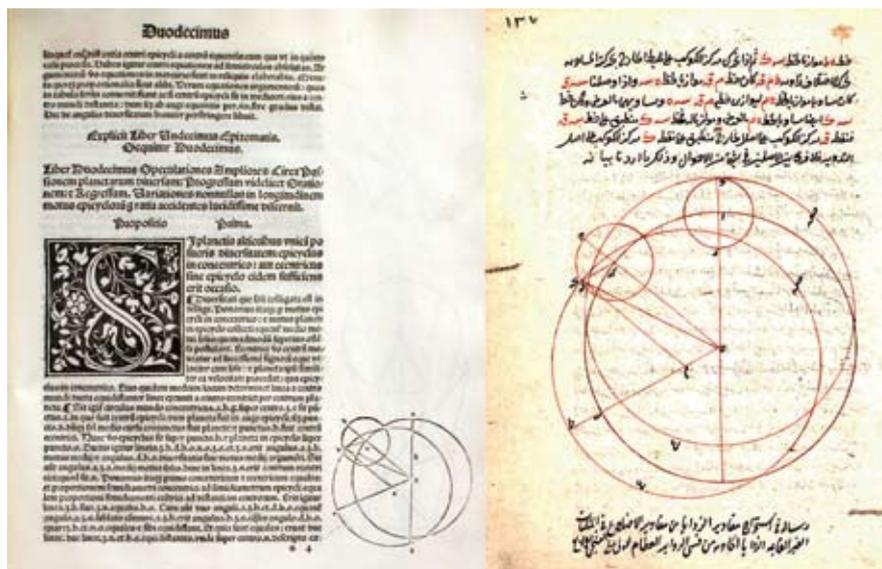
COOPERATION PARTNERS McGill University, Canada; American Council of Learned Societies; Member Institutions of ISMI Board (see below)

Working Group

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

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

This Working Group examines encounter and cross-fertilization among a variety of Eastern and Western learning traditions that constituted astronomical knowledge in the century before Copernicus and had an impact on his work. The investigation combines perspectives from the history of science, intellectual history, and cultural history of the Islamic, Byzantine-Greek, Jewish, and Western-European traditions, and stretches geographically from Samarkand and Istanbul in the East, to Eastern,



Figures used by Regiomontanus and ‘Ali Qushji illustrating how to convert the epicyclic models of Venus and Mercury into eccentric ones. The underlying proposition, a key element in the mathematical transformation from a geocentric to heliocentric cosmology, most likely was first developed in Samarqand around 1430 and then made its way to Constantinople and central Europe. (Left: J. Regiomontanus and G. Peurbach, *Epytoma Joannis de monte regio In almagestum ptolemaei* (Venice, 1496), n4r, Courtesy of the History of Science Collections, University of Oklahoma, Norman, U.S.A.; Right: ‘Ali Qushji, *Fi anna aṣl al-khārij* ..., Carullah MS 2060, f. 137a. Courtesy of the Süleymaniye Library, Istanbul, Turkey

→ see also: Knowledge and Belief in Early Modern Science , p.136

Central and Western European countries. The first two meetings of the group took place at the MPIWG in December 2006 and August 2007, and the third and final meeting at McGill University, Montreal, Canada, in August 2009. The Working Group will produce a collective volume (submission by December 2010) that re-evaluates the rich conversation between different traditions and disciplines that constitutes the relevant context for interpreting Copernicus' contribution. The interdisciplinary work of the group will be integrated through thematic chapters, often written by more than one person.

Members

- *Nancy Bisaha* (Vassar College, U.S.A.)
- *Christopher S. Celenza* (Johns Hopkins University, U.S.A.)
- *Raz Chen-Morris* (Bar Ilan University, Israel)
- *Ihsan Fazlioglu* (Istanbul University, Turkey)
- *Rivka Feldhay* (Tel Aviv University, Israel)
- *Maria Mavroudi* (Princeton University, U.S.A.)
- *Robert Morrison* (Whitman College, U.S.A.)
- *Jamil Ragep* (McGill University, Canada)
- *Sally Ragep* (McGill University, Canada)
- *Michael Shank* (University of Wisconsin, Madison, U.S.A.)
- *Edith Sylla* (North Carolina University, U.S.A.)

Science in Circulation

The Islamic Scientific Manuscripts Initiative (ISMI)

MPIWG ORGANIZER *Lorraine Daston*

COOPERATING ORGANIZERS *Jamil Ragep* (McGill University, Canada), *Sally Ragep* (McGill University, Canada)

COOPERATION PARTNERS McGill University, Canada; American Council of Learned Societies

Member Institutions of the ISMI Board: Institute for the Study of Muslim Civilizations, Aga Khan University, London, U.K.; Archimedes Project, Harvard University, U.S.A.; Filología Semítica, Universitat de Barcelona, Spain; Encyclopaedia Islamica Foundation, Tehran, Iran; Institute for the History of Arabic Science, Aleppo University, Syria; Institute for the History of Science and Technology, Moscow, Russia; Institute of Ismaili Studies, London, U.K.; Warburg Institute, London, U.K.; The Written Heritage Research Center, Tehran, Iran

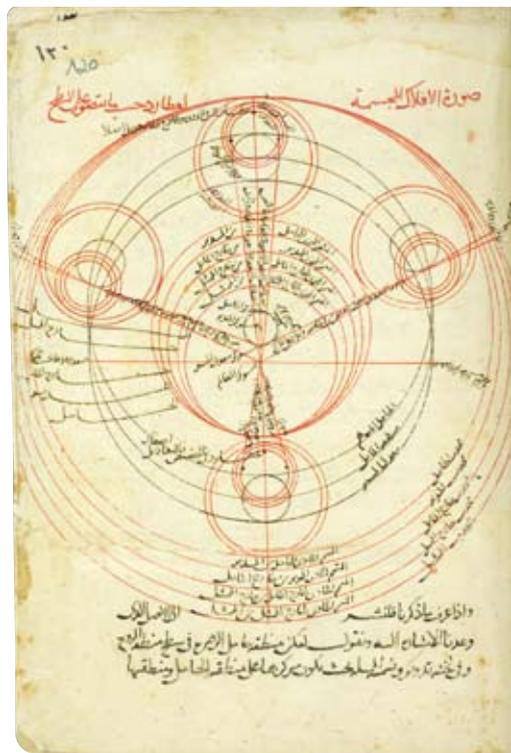
The ISMI project aims to make available a vast array of information about the exact sciences in the premodern Islamic world. This material will be accessible via the Internet without charge both to researchers and experts in the field and to the educated public worldwide. It will be an online database that contains the works of some 2,000 authors who span the entire Islamic world from Islamic Spain to India and the

borders of China, beginning in the eighth century and continuing until the nineteenth. These works in astronomy, mathematics, physics, geography, mechanics, and related disciplines number in the thousands and are represented, conservatively speaking, by tens of thousands of manuscript copies spread throughout the world.

In 2008, J. Ragep was awarded a Canada Foundation for Innovation (CFI) grant worth approximately 950,000 CAD, for work on the ISMI and related projects. (This is in addition to 1.4 million CAD awarded in 2007 for a Canada Research Chair, which has a sizeable research component that is being used for the ISMI project.) This CFI grant has been combined with another CFI grant awarded to Ragep's McGill colleague, Robert Wisnovsky, for work on an Islamic philosophy database. The two projects and databases are now seamlessly integrated, which has allowed for economies of scale and also for considerable synergy between the related fields of Islamic philosophy and Islamic science.

In 2009, ISMI, as a component of the Rational Sciences in Islam project (RaSI), entered into an agreement with the Staatsbibliothek zu Berlin to digitize a substantial number of Islamic codices (500 to 1000) related to scientific, philosophical, and theological subjects. The images will be put online, as part of the MPIWG's ECHO website. Thanks to equipment provided by McGill and funding for personnel by the MPIWG, work has moved forward and the first batch of sixty-eight codices is currently being digitized, of which eight are already online. Metadata to accompany the online manuscript images is being provided by Adam Gacek of McGill.

→ see also: Workshop to establish a new Partner Group with India, p. 178



The system of orbs for the planet Mercury, model produced by Islamic astronomers to reform the Ptolemaic system. Anonymus [Qutb al-Din al-Shirazi (d.710/1311)], *Nihayat al-idrak fi dirayat al-afalak* (The utmost achievement in comprehending the orbs), Staatsbibliothek Berlin [SBB: *Ahlw.* 5682 = *Petermann I 674*], ca. 1600, available through MPIWG ECHO Website

New Project

The Sciences of the Archive

DURATION 2010–2015

MPIWG ORGANIZERS *Grégoire Chamayou, Lorraine Daston, Fernando Vidal, Christine von Oertzen*

“Data” (literally, “the givens”) is perhaps the most taken-for-granted word in all 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 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 archives raises questions about the evolution of categories like “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; the techniques for registering and manipulation of information, from the table to the data base.

The Sciences of the Archive

Working Groups

Documenting the World: Photographic Media and the Scientific Record

ORGANIZERS *Kelley Wilder* (DeMontfort University, Leicester, U.K.),

Gregg Mitman (University of Wisconsin-Madison, U.S.A.)

Archives composed of photographs or film span the scope of human history: these are archives as intimate as the family shoebox and as vast as the world's microfilm holdings. They form the backbone for visually based disciplines like art history, and alter the way we collect information and learn from it. Photographic and filmic documents in archives do not speak for themselves. They only have life in relationship to something else: to the context of their production, to other documents in the archive, to a person's life history, to a historical narrative. These documents are always on the verge of becoming documentaries—otherwise they would be dead to the world. This Working Group will investigate the impulses behind much of the archiving activity that utilized the two mediums. We will investigate how these photographic and filmic documents, through their creation and circulation, are continually shaping and reformulating the status of the archive. We want to know how photographic documents are made, how they circulate, and how they become documentaries.

Documenting the World attends to both the material and cultural histories of the photographic, filmic, or digital scientific record. It aims to reflect on, and work toward, a set of common methodologies that can reach across the divides of film and photographic history. The first meeting of the Working Group will take place in January 2010.



Greenland's Icy Mountains—A small Arctic specimen. Library Photographic Archive Vantor, Isle of Wright, The Museum, Courtesy University of St. Andrews, ca. 1890

Members

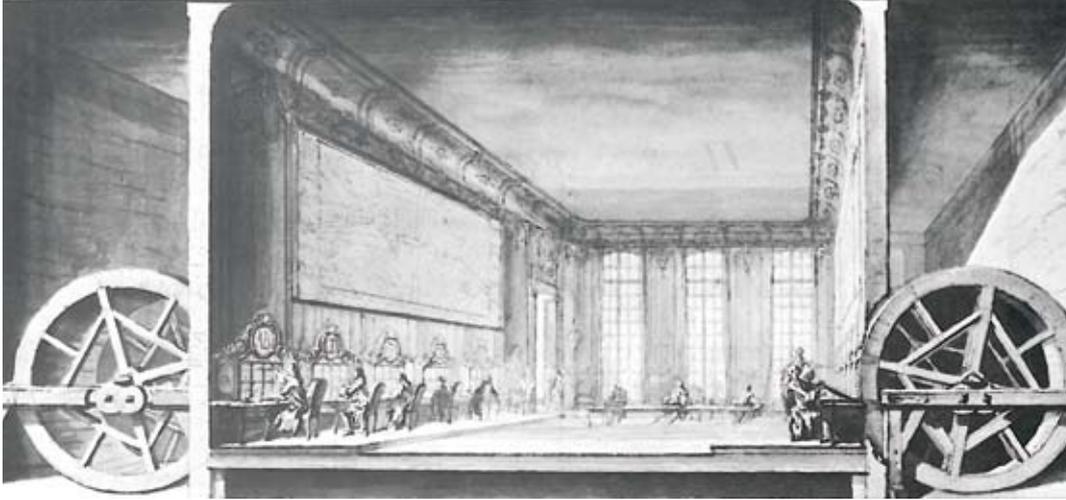
- *Paula Amad* (University of Iowa, Iowa City, U.S.A.)
- *Estelle Blaschke** (MPIWG)
- *Elizabeth Edwards** (University of the Arts London, U.K.)
- *Peter Geimer* (ETH Zürich, Switzerland)
- *Faye Ginsburg* (New York University, New York City, U.S.A.)
- *Jean-Baptiste Gouyon** (MPIWG)
- *Stefanie Klamm** (MPIWG/Paul Getty Research Institute, Los Angeles, U.S.A.)
- *Gregg Mitman** (University of Wisconsin, Madison, U.S.A.)
- *Jennifer Tucker* (Wesleyan University, Middletown, U.S.A.)
- *Janet Vertesi* (University of California, Irvine, U.S.A.)
- *Kelley Wilder** (De Montfort University, Leicester, U.K.)

*Members of working group also involved as scholars in residence at Department II.

→ see also conference "The Educated Eye", p. 71

Machines of Memory. The Archival Technologies and the Genealogy of Datapower (Seventeenth–Twentieth Centuries)

MPIWG ORGANIZER *Grégoire Chamayou*



Le serre-papier, a bureaucratic machine invented by Guillaudé (1749), from: M. Guillaudé, *Mémoire sur la réformation de la police de France*, reprint Paris 1974, p. 65

Archives are apparatuses of socialized memory, organizational tools of memorizing and remembering. The aim of this project is to study the history of their machinery, including the history of the card-filing systems or traceability devices in heterogeneous fields of practices, from the archives of cattle management to the use of archiving devices within the arts of governance. Machineries embrace not only concrete systems of material apparatuses, but also whole sets of social relationships, rationalities, and desires that embrace the technical devices. Archiving technologies have encountered an unprecedented global extension today. The hypothesis is that we are experiencing the deployment of an archival kind of power—“datapower”—that operates through the recording, storing, and retrieving of data on a gigantic and ubiquitous scale. The goal of this Working Group is to link the history of techniques of archiving and the formation of new ways of managing men, animals, and things: to sketch a genealogy of datapower by means of its technological history. The first meeting of this Working Group will take place in October 2010.

Endangerment and Its Consequences (to begin in 2011)

MPIWG ORGANIZER *Fernando Vidal*

See description on the MPIWG website:

http://www.mpiwg-berlin.mpg.de/en/research/projects/DEPT1_Loza-Quipu/projects/DeptII_VidalFernando-EndangermentAndItsConsequences/index_htm

The Archives of Deep-Time Sciences (to begin 2012)

MPIWG ORGANIZER *Lorraine Daston*

See description on the MPIWG website:

http://www.mpiwg-berlin.mpg.de/en/research/projects/DEPT1_Loza-Quipu/projects/DeptII_DastonLorraine-SciencesOfDeepTime/index_html

The Sciences of the Archive

Individual Projects

Grégoire Chamayou (Research Scholar, MPIWG)

History and Philosophy of Traceability, Seventeenth to Twentieth Centuries

Traceability is “the ability to find the history, the use, or the location of an entity by means of registered identifications.” It implies an ensemble of notation and archiving techniques, in other words, an ensemble of “mnemotechnics,” elaborated on the one hand in the management of livestock, herds, and libraries (inventory, classification, indexing, bookkeeping, and monitoring), and, on the other hand, in the administrative sphere of the government of populations (census reporting, postal addressing, card-filing systems, identification). The project is to write a genealogy of the contemporary techniques of traceability that draw on a heterogeneous corpus, in studying for example the installation of the first centralized judiciary records in the context of the birth of criminal anthropology as well as the introduction of the techniques of identification and of monitoring cattle in the process of husbandry. The study aims at revealing the link between the emergence of highly effective techniques of archiving and identification and the formation of a way of managing men, animals, and things as founded on a principle of individualization.



Grégoire Chamayou

Photo: Hakan Dahlström

Jean-Baptiste Gouyon (Postdoctoral Fellow, University of York, U.K./MPIWG)

Archiving the Doomed. Fashioning a Public Science of Conservation

This project studies ARKive, an Internet database of images and recordings of animals, and its claims to knowledge (www.arkive.org). This collection of audio-visual material is presented as an “electronic Noah’s Ark,” a central repository whose civic usefulness is justified by the threat of extinction looming over several, if not all animal species in the catalog. ARKive also seems to foster the notion that natural history

films, as well as the animals they document, are precious objects of knowledge in need of preservation. The research will therefore examine the role that such an “ecology of doom” plays in bringing cognitive legitimacy to natural history film-making, most notably through the role ascribed to the archival potential of this set of material practices.



Jean-Baptiste Gouyon

Screenshot of the ARKive Website, 2010

Project

Emmy-Noether Research Group

The Intellectual and Cultural History of Listening from the Enlightenment to the Present Day

DURATION 2008–2011

MPIWG ORGANIZER *Nikolaus Bacht* (Emmy Noether Research Group Director, Funded by the Deutsche Forschungsgemeinschaft)

This project focuses on a phenomenon that has persistently eluded historical description: the history of music listening, a subject only recently (re-)introduced into the canon of the humanities. The aim is to overcome both the traditional psychometric approach and recently developed social- and cultural-historical approaches to listening. Ultimately, the project strives to find a “third way:” a way that goes beyond the irreconcilable extremes of total universalisation on the one hand and total historicisation on the other. This interdisciplinary method should considerably enhance our understanding of the divergent rational and ontological forms that listening assumed from the Enlightenment to the present.

→ See also Julia Kursell, *Historical Epistemology of Hearing*, p. XXX

Individual Projects



Nikolaus Bacht

Nikolaus Bacht

(Emmy-Noether Research Group Director, funded by the Deutsche Forschungs-gemeinschaft)

An Intellectual and Cultural History of Listening

Actual listening experience, as far as it can be reconstructed, is considered alongside music theorists’ and philosophers’ ideas about listening, and tested against one another. Starting in the late-eighteenth century, the project works all the way up to the present, analysing the vast array of different sources dialectically in order to make comparisons possible.



Binaural localization and masking.
Winston E. Kock, *Journal of Acoustical Research* Vol. 22 No. 6, Nov. 1950

William Lockhart (Predoctoral Fellow, Humboldt Universität zu Berlin, Germany)

Compositional Listening: Musical Arrangement in the Nineteenth and Twentieth Centuries

The piano arrangement—an adaptation of a larger musical work for easy performance at the piano—was central to both the performing and listening habits of the nineteenth century amateur musician. Vital to the lived reality of musical individuals, and serving a pivotal role as the means by which music was circulated, the piano arrangement was one of the most important socio-musical phenomena of the nineteenth century. As such, it deserves far more academic interest than it has thus far received. By writing a comprehensive history of this maligned and forgotten genre, the project not only resurrects a near-forgotten body of music, but also exhumes its centuries-long history and associated aesthetic of reception, and thus illuminates an integral element of the social reality of music in the nineteenth century.



William Lockhart



Paul Cézanne, *Girl at the Piano* (*The Overture to Tannhause*). Oil on canvas. 57.8 x 92.5 cm, State Hermitage Museum, St. Petersburg, Russia, circa 1868

Short-Term

Visiting Pre- and Postdoctoral Fellows

- *Estelle Blaschke* (E.H.E.S.S./Université Paris I, Sorbonne): From the Picture Archive to the Image Bank. Commercializing the Visual Through Photography. The Bettmann Archive and CORBIS, 1933–present
- *Bernhard Bolech* (University of Vienna, Austria, funded by the University of Austria): Brain Research and the Human Sciences in Vienna around 1800
- *Mirjam Brusius* (University of Cambridge, United Kingdom, funded by the Gerda-Henkel-Stiftung, the Arts and Humanities Research Council, and the Cambridge Trust): Preserving the Forgotten: William Henry Fox Talbot, Photography and the Antique
- *Frederico D’Onofrio* (Universiteit van Amsterdam, The Netherlands, funded by the Universiteit van Amsterdam): Political Economy in Eighteenth-Century Naples
- *Emmanuel Didier* (Centre national de la recherche scientifique, Gouyancourt, France): US-Survey Statistics During the Interwar Period
- *Andrew Fearnley* (Cambridge University, U.K., as of February 2010 predoctoral fellow in Veronika Lipphardt’s Junior Research Group): Methods to Madness: Race, Knowledge and American Psychiatry
- *Angela Grünberg* (University of Sheffield, U.K.): Virtues as Sensibilities: The Tone of the German Language
- *Katja Guenther* (Princeton University, U.S.A.): A Body Made of Nerves: Reflexes, Body Maps, and the Limits of the Self in Modern German Medicine)
- *Daniela Helbig* (Harvard University): Turbulence in Flight and Fluid Dynamics Between the World Wars
- *José Ramon Marcaida* (CISC Madrid, funded by the Spanish National Research Council): Nature, Art, and Knowledge in Seventeenth-Century Spain
- *Maurizio Meloni* (University of Rome, Italy): Molecular Dasein: Living and Thinking in a Neurobiological Era
- *Kathrin Müller* (Kunsthistorisches Institut Florence, Italy, funded by the Kunsthistorisches Institut Florence): Diagram and Ornament in Boethius’ “De institutione arithmetica”
- *Winifred Newman* (Harvard University, U.S.A.): History and Philosophy of Aesthetics, Psychology and Perception
- *Trevor Pearce* (University of Chicago, U.S.A.): Nature as Technology: A Philosophical Investigation of Biomechanics
- *Christopher Plumb* (University of Manchester, U.K.): Exotic Animals in Eighteenth-Century Britain
- *Valentina Pugliano* (University of Oxford, U.K.): Practical Botanisers and Experienced Observers: Apothecaries and the Study of Nature in Venice and London, 1550–1630
- *Claudia Linhares Sanz* (Universidade Federal Fluminense, Rio de Janeiro, funded by Deutscher Akademischer Austauschdienst, DAAD): The History of Scientific Photography and Current Historical and Sociological Research on Neuroimages

- *Max Stadler* (Imperial College, London, U.K., as of January 2010 Postdoctoral Fellow in Department III): *Assembling Life. Models, the Cell, and the Reformations of Biological Science, 1920–1960*
- *Andrej Svorencik* (Universiteit van Amsterdam, The Netherlands, funded by the VIDI Grant from the Universiteit van Amsterdam): *History of Observational Practices in Economics, particularly experimental economics*
- *Cecelia Watson* (University of Chicago, U.S.A.): *A Historical Treatment of the Artist and Art Critic John La Farge's Impact on William James's Intellectual Development, Considered in the Context of Late-Nineteenth and Early-Twentieth Century Exchanges Between Arts and Sciences*
- *Anne Ziemke* (Max Planck Institute for Demographic Research, Rostock, Germany, funded by the Max Planck International Research Network on Aging): *Aging Research in Nineteenth-Century Biology*
- *Rafaella Zorzanelli* (Universidade do Estado do Rio de Janeiro, funded by The Brazilian Agency for the Advanced Training of University Personnel, CAPES): *The Impact of Neursciences in the Psychosomatic Field*

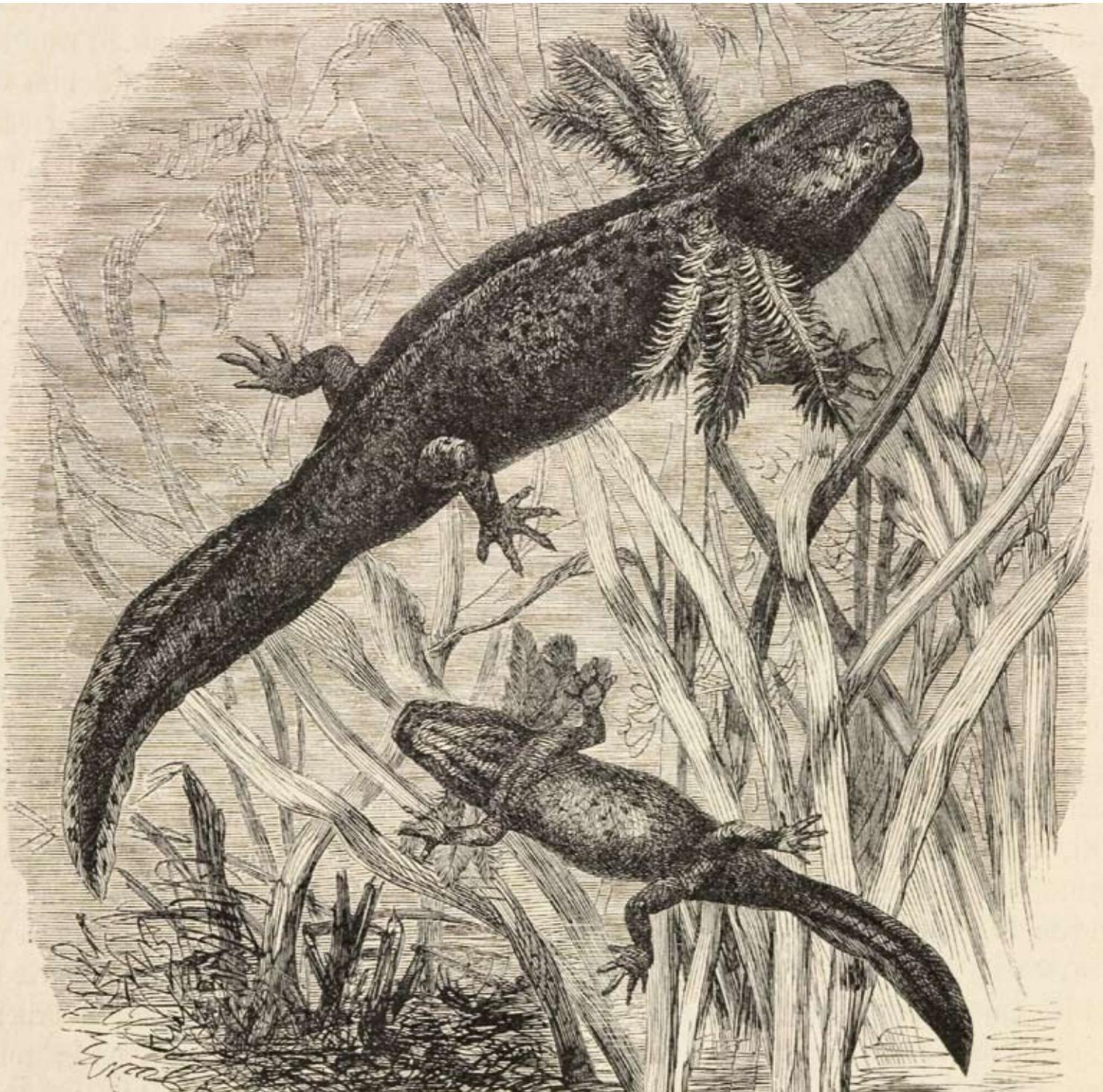
Short-Term Visiting Scholars

- *Gadi Algazi* (Tel Aviv University, Israel): *Households of Knowledge: Reshaping the Scholarly Habitus, 1300–1600*
- *Kirsti Andersen* (Aarhus University, Denmark, funded by Aarhus University, Denmark): *The Early History of Logarithms*
- *Mitchell Ash* (University of Vienna, Austria, funded by the University of Vienna): *Scientific and Political Changes in Twentieth-Century Germany and Austria, 1918–1933/38, 1945, 1989/90*
- *Francesca Bordogna* (Northwestern University, U.S.A.): *Magic Pragmatism. Inner Observation and the Quest for Inner Perfection*
- *Henk Bos* (Aarhus University, Denmark, and University of Utrecht, The Netherlands): *The Early Modern Tradition of Geometrical Problem Solving*
- *Robert Brain* (University of British Columbia, Canada): *The Pulse of Modernism: Experimental Phonetics and the Invention of Free Verse and All-Sound Performance*
- *Jimena Canales* (Harvard University, U.S.A.): *Individual Differences in Observation and Reaction*
- *Alix Cooper* (Visiting Scholar, State University of New York at Stony Brook, U.S.A., funded by the State University of New York at Stony Brook): *Domestic Matters: Family, Household, and the Labors of Observation in Early Modern Europe*
- *Elisabeth Decultot* (Centre national de la recherche scientifique, Paris, France, funded by the Alexander-von-Humboldt-Stiftung): *Aesthetics and History of Art in the Eighteenth Century (particularly Winckelmann and Sulzer)*
- *Otniel Dror* (The Hebrew University Jerusalem, Israel): *The Adrenaline Century*

- *Stéphanie Dupouy* (Université Paris I, Institut d'histoire et de philosophie des sciences et des techniques, Paris, France): History of Experimentation in Psychology, Nineteenth and Twentieth Centuries
- *Martha Fleming* (Natural History Museum, London/King's College, London, U.K.): Intermittance and Inspiration: Flicker, Pulse, Scintillate
- *Hannah Ginsborg* (University of California at Berkeley, U.S.A.): Primitive Normativity and Rule-Following
- *Gary Hatfield* (University of Pennsylvania, U.S.A.): Crisis in Psychology; Internal Senses in Descartes; Diagram from Descartes' Dioptrique
- *Harry Liebersohn* (University of Illinois, U.S.A.) Observing the Gift: The Making of a Social Scientific Category
- *Silvia Manzo* (Universidad Nacional de La Plata, Argentina, funded by the National Research Foundation of Argentina, CONICET): Probability and Certainty in Francis Bacon
- *Gordon McOuat* (University of King's College/Dalhousie University, Canada): Rewriting the History of Essentialism: Logic, Kinds, and Place
- *Amos Morris-Reich* (University of Jerusalem, Israel, funded by the Van Leer Foundation, Israel): Race and Humanism: The Epistemology of Arthur Ruppin
- *Kathryn Olesko* (Georgetown University, Washington D.C., U.S.A., funded by Georgetown University): Prussian Precision, 1648–1947
- *Claudia Passos Ferreira* (Universidade do Estado do Rio de Janeiro, Brazil, funded by Deutscher Akademischer Austauschdienst, DAAD): Moral Psychology. The Impact of the Discovery of Mirror Neurons in Developmental Psychology
- *Dario Perinetti* (Université du Québec, Canada): Moral Certainty and Empirical Knowledge in Early Modern Philosophy
- *Sophie Roux* (Université Grenoble II, France): Edition of Galileo's *Mechaniche*
- *Wolfgang Schivelbusch* (Funded by Deutsche Forschungsgemeinschaft, DFG): Historicizing Concepts of Air
- *Zur Shalev* (University of Haifa, Israel, funded by the University of Haifa): Learned Travel in the Early Modern Period
- *Otto Sibum* (Uppsala University, Sweden): Developmental History, Theoretical Cinematographs, and Physicists' Practices of Theorizing Around 1900
- *John Tresch* (University of Pennsylvania, U.S.A.): The Romantic Machine: Technology and Metamorphosis in France, 1820–1851
- *Harriet Ritvo* (Massachusetts Institute of Technology, Boston, U.S.A.): Making Animals Wild
- *Roy Wagner* (Tel Aviv University, Israel): Semiotics of Mathematical Language
- *Karin Zachmann* (Technische Universität München, Germany): Atomic Food for Peace? Materializing a Radiant Idea in a Transnational Network of Research and Development

Department III

The Axolotl (*Ambystoma Axolotl*).
Alfred Edmund Brehm, *Illustriertes
Thierleben. Eine allgemeine Kunde des
Thierreichs. Fünfter Band. Dritte Abtheilung:
Kriechtiere*, Hildburghausen: Bibliogra-
phisches Institut, 1869, p. 426.



Department III

Experimental Systems and Spaces of Knowledge

Director: *Hans-Jörg Rheinberger*

Introductory Remarks

Department III is headed by Hans-Jörg Rheinberger. Having begun in January 1997, Hans-Jörg Rheinberger's leadership of the department will come to an end in January 2011. During this period a wide range of departmental projects has been accomplished. The disciplinary background of the department's researchers has ranged from the life sciences to psychology, sociology, philosophy, literary history, art history, history of science past and contemporary, technology studies, cultural studies, historical musicology, and history. Projects have covered widely different topics in the history of science, with a focus on the life sciences, stretching from the Early Modern period to the present, and addressing one of four main research topics: first, the history and epistemology of experimentation, more broadly speaking, the material constitution of the research process, including its objects, its instruments, and the spaces in which it is carried out; second, the ways and forms of scientific concept formation, both at the micro level and in the *longue durée*; third, writing and drawing as basic cultural techniques underlying all scientific activity and assuming different forms throughout history; and fourth, an ongoing reflection of historicity itself. The three current joint projects described below—"Experimentalization of Life," "Cultural History of Heredity," and "Drawing and Writing as Research Techniques"—can be seen as exemplary for the first three sets of research issues respectively; the fourth plays into all of them.



Hans-Jörg Rheinberger

This is the last research report of Department III in its present form. For this reason, Hans-Jörg Rheinberger would like to report briefly below about his own activities with respect to these four research horizons in recent years.

Experimentation

My fascination with the phenomenon of *experimentation* stretches back to my apprenticeship in a molecular biology laboratory. After having explored the historiographical and epistemological potential of the concept of the "experimental system" in a previous account, I have continued to explore the forms of experimentation in the life sciences from the end of the nineteenth to the late-twentieth century. Different

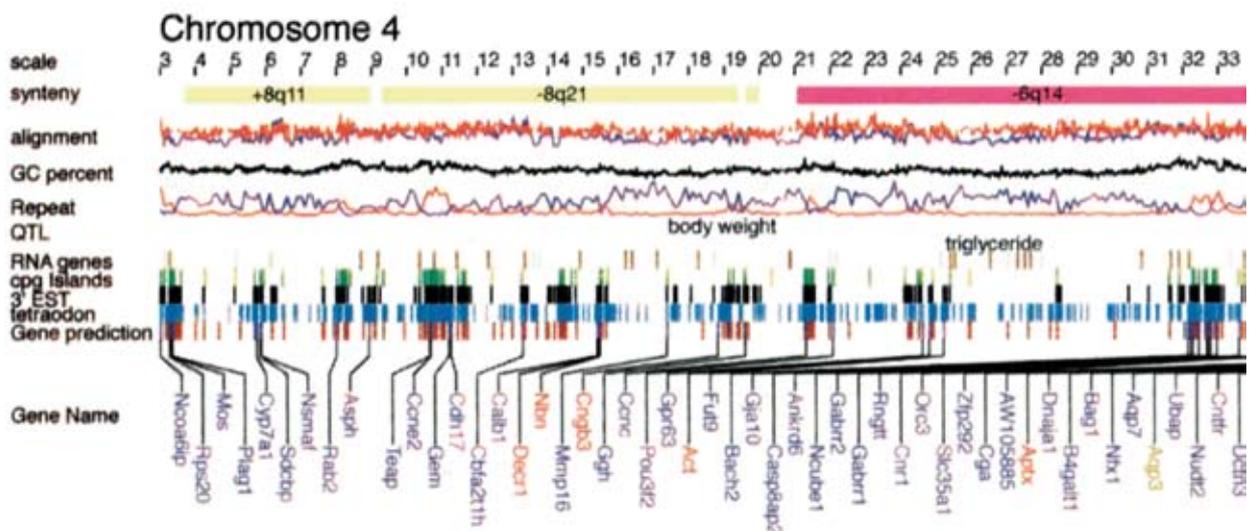
Writing

Writing, in the broad sense Jacques Derrida conveyed to this notion, has been a permanent motif in my studies on the history of laboratory life. Starting from the notion of “trace,” my aim has been to understand better the generative—not only the representative—power of the primary inscriptions and marks resulting from experimentation, and to follow their subsequent transformations. I think it is here, in the medium of the trace, that histories of science, art, and literature may enter into fruitful interaction. In 2005, I published a number of essays on this topic entitled *Iterationen* (Berlin: Merve). More recently, other essays on the topic have appeared in various exhibition contexts.

Historicity

As regards the history of science, *historicity* comes in two main forms. First, studies such as on heredity and on the gene make clear that even basic concepts—or, more to the point, precisely basic concepts—of any science undergo constant historical change. In other words, they are central because they are “open,” i. e., generative, research-enabling concepts. Second, in its engagement with objects, the history of science itself is constantly reshaping its own conceptual and narrative arsenal. Both insights are not completely new, but they call for ongoing reflection. In *Historische Epistemologie zur Einführung* (Hamburg: Junius, 2007), I have sketched the stages of this reflection from the late-nineteenth to the late-twentieth century. Here, I have tried to show that the ways of knowing the sciences are never independent of the changing ways the sciences know their objects. In early 2010, an English-language version of this book appeared with Stanford University Press entitled *On Historicizing Epistemology—An Essay*. With this short digression, let us return to the description of the projects within Department III as a whole.

Detail of the annotated chromosome map of the mouse of 2002.



Research Projects

Experimentalization of Life

RESEARCH SCHOLARS *Julia Kursell, Henning Schmidgen*

PREDOCTORAL FELLOWS *Christian Reiß, Sandra Pravica, Viola van Beek*

SHORT-TERM GUEST RESEARCHERS *Rand B. Evans, Florian Hoelscher* (Pianist in Residence at the MPIWG), *Maria Rentetzi, Dimitris Papayannakos, Costas Mannouris*

COLLABORATIONS Bauhaus Universität Weimar (Fakultät Medien); Hermann von Helmholtz-Zentrum für Kulturtechnik (Humboldt-Universität zu Berlin); Zentrum für Literatur- und Kulturforschung, Berlin; Freie Universität Berlin (Institut für Deutsche und Niederländische Philologie)

FUNDING VolkswagenStiftung, “Focus on the Humanities” of the Fritz Thyssen Stiftung and the VolkswagenStiftung, German Academic Exchange Service (DAAD), IKY State Scholarship Foundation (Greece), and MPIWG

General Description of the Project

“Experimentalization of life” refers to a process that began in Europe around 1800 involving a series of efforts to reconfigure science, art, and technology. After experimental physiology had established itself as one of the leading disciplines of the nineteenth century, psychology, linguistics, and many other disciplines became laboratory-based enterprises. Experimental cultures emerged in a variety of places, as for example in literary movements relying on automatism, procedures of chance, and montage. At the same time, philosophers began to reflect upon the broader implications of this renewed turn to experimentation. In addition, experimental media, such as photography and film, transformed the fine arts *and* the sciences. Entire cities became fields of experience in which people undertook all sorts of experiments in living.

Through a set of interrelated projects we investigate this experimentalization process by focusing on the material culture of instruments, buildings, and supply technologies. By the same token we show that experimentalization is not a one-dimensional process that can be easily equated to “mechanization,” “rationalization,” or “modernization.” Rather, it is a complex and highly distributed development that integrates and differentiates, i. e., configures various aspects of scientific, artistic, and technological activities in ways that allow phenomena of mechanization or modernization to occur.

Experimentalization of Life

Individual Projects

Julia Kursell (Research Scholar)

Historical Epistemology of Hearing (1850–2000)

This project investigates key concepts and practices that have contributed to our present understanding of sound, hearing, and music. After 1850, knowledge of acoustics, which had been guided by the symbolic code of music well into the nineteenth century, began to be transformed into an experimental science of hearing. Through research on the history of media and the material culture of experimentation, the aim of this project is to show the understanding of hearing as historically changing, and thereby to contribute to the current reorientation of research in the human sciences that deal with sound, hearing, and music.

The project is divided into three parts, each focusing on a different historic constellation. The first part is a book project titled “Ear and Instrument—Hermann von Helmholtz’s *On the Sensations of Tone as a Physiological Basis for the Theory of Music*,” which analyzes the relation among physiology, psychology, and the aesthetics of the acoustic around 1850. In 1856, Helmholtz began research on the physiology of hearing. He developed a theory of hearing, according to which the ear analyzes complex waveforms by resolving them into their sinusoidal components. The devices used to study this theory produced sounds that were not present in nineteenth-century music, and the aesthetics of music that Helmholtz had called upon to corroborate the physiological theory of hearing eventually collapsed. If Helmholtz left it to aesthetics to draw the line between sound and music, the music of the twentieth century, in the wake of Helmholtz, abandoned this distinction. In other words, his treatise *On the Sensations of Tone* suggested aesthetic experiments whose outcome was open.

The second part of the project, “Experimentalization of Hearing: Moscow 1920–1930,” deals with attempts to reconcile the diverging disciplines of aesthetics and scientific investigation into hearing in the early Soviet Union. Part three, “Music and Media After 1945,” explores the history of composition from the perspective of media studies. In musical composition of this time, knowledge of the mechanisms of hearing came to be a prerequisite for the creation of music.



Julia Kursell



Vowel Experiments II: Highest recording speed, May 1916. Cover of a box for a wax cylinder with phonographic recordings made by Carl Stumpf. Ethnologisches Museum Berlin SPK, Phonogramm Archiv.

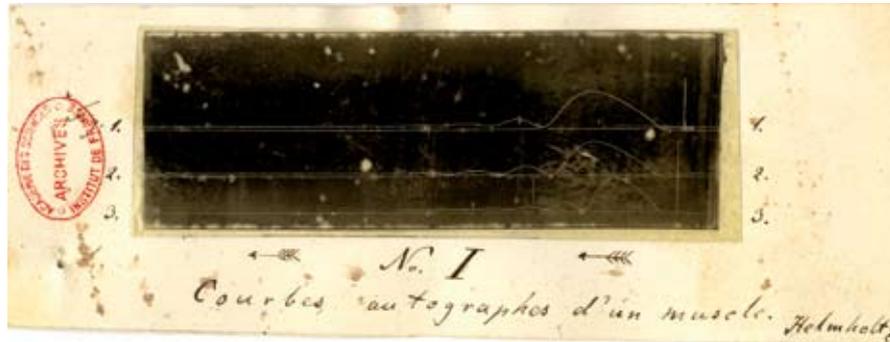


Henning Schmidgen

Henning Schmidgen (Research Scholar)

Chronos and Psyche: The History of Physiological and Psychological Time Experiments

In 1850, Hermann von Helmholtz, then based in Königsberg, conducted path-breaking precision measurements on the propagation speed of the nervous impulse in animals and human beings. Following Helmholtz, a considerable number of nineteenth-century scholars began to study the time individual organisms required to respond to stimuli of all kinds (optical, acoustical, tactile, etc.). Around 1865, two main strands of research were established. While the investigations of scholars such as Albert von Bezdold, Gabriel Valentin, Julius Bernstein, and Etienne Jules Marey contributed to defining and demarcating, within physiology, the field of “nerve and muscle physics,” time experiments conducted by Franciscus Donders, Wilhelm Wundt, Edward Scripture, Hugo Münsterberg, and Alfred Binet prompted the establishment of “experimental psychology.”



Autographic curve of a muscle. Recording of muscle contractions in the frog, made by Hermann Helmholtz in the context of his time experiments.
© Académie des Sciences—Institut de France, Paris. Session of September 1, 1851.

Instead of merely accepting these disciplinary and/or institutional labels, this project argues that these developments can be studied as the history of one experiment, or “research machine,” that emerged and evolved over time, while being retooled in sometimes surprising ways. As a consequence, the concrete materiality of experimental set-ups is emphasized, as are the interactions among scientists, model organisms, and instruments that the set-ups entailed, and the technological as well as architectural surroundings that framed these practices. This approach provides the basis for demonstrating that physiological and psychological time experiments formed a network of “research machines” that constituted the backbone of theoretical debates and institutional developments.



Sandra Pravica

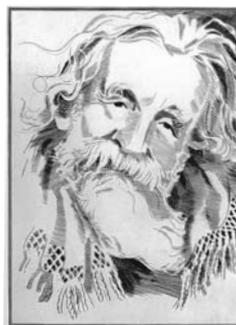
Sandra Pravica (Predoctoral Fellow)

Tentative Transgressions. Gaston Bachelard’s Experimental Epistemology

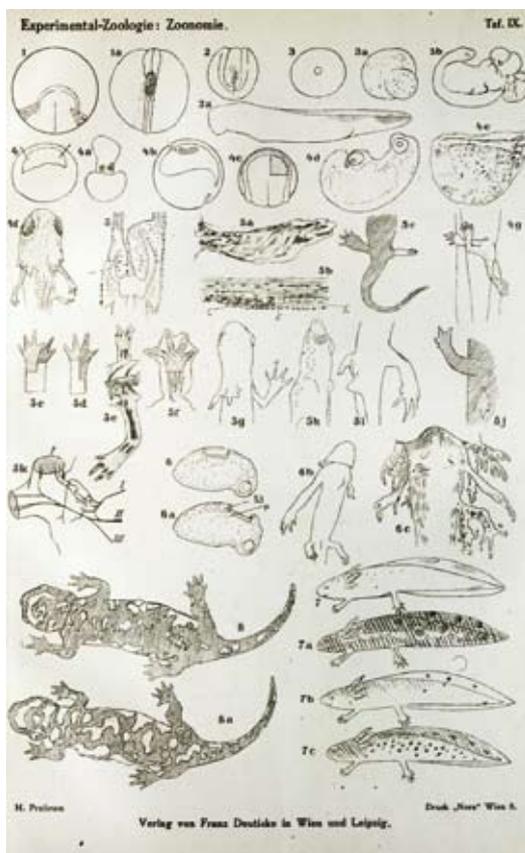
This project is concerned with “tentativity” as a philosophical concept. Exploring the works of Gaston Bachelard, it aims at determining an epistemology that is “tentative” or “experimental.” During the 1930s, Gaston Bachelard chose experimentation as the key topic for epistemological reflection. It will be demonstrated that he focused on experimentation in a way that renders epistemology “experimental” in itself. Inspired by the upheavals of quantum physics and the theories of relativity in the early-twentieth century, Bachelard relocates traditional problems in the philosophy of science to the

realm of means and instruments of scientific research. In so doing, he accentuates a concept of transgression to which the project will especially attend. His definition will be compared with similar concepts in art, literature, and science of that time. As Bachelard also adopted a broad range of notions from biology, evolutionary theory, experimental psychology, musicology, further conceptual implications in discourse besides philosophy of science will be examined. It will be argued that

Bachelard's approach enables a philosophy that is flexible and "tentative" in the sense that its principles, concepts, and vocabulary are deeply engaged in, and inspired by, the particularities of its objects of reflection. The result is an epistemology that—in comparison to other philosophical approaches of that time—does not offer a fixed and normative corpus of concepts and formalities, but rather admits uncertainties and regional characteristics of the respective domain of scientific knowledge. For this reason, a consideration of the connections between Gaston Bachelard's work and the movement of Logical Empiricism will be of particular interest to this study. Moreover, an historical examination of the epistemological discourse of the 1930s will show that the common view of the formation of a "continental" strand of philosophy on the one hand—and an "analytical" strand on the other—must be reconsidered.



Gaston Bachelard. Portrait by Albert Flocon. From André Parinaud, *Gaston Bachelard*, Paris 1996, p. 280 [B. N.-Edimédia.]



Christian Reiß

(Predoctoral Fellow)

The Way into the Laboratory: The Origins and Role of Model Organisms in the Experimental Life Sciences

Beginning in the mid-nineteenth century, experimentation increasingly became the method of choice in physiology and zoology. However, for successful experiments to be conducted, organisms had to be chosen, brought into the laboratory, stabilized, and finally integrated into the experimental setup.

This project argues that this process can neither be considered linear nor entirely driven by scientific rationality. One of the project's key examples is the Mexican axolotl (*Amblystoma mexicanum*), an amphibian nearly extinct in



Christian Reiß

Uses of the Axolotl in Zoology and Experimental Biology. From Hans Przibram, *Experimental-Zoologie, Bd. 6: Zoonomie. Eine Zusammenfassung der durch Versuche ermittelten Gesetzmäßigkeiten tierischer Formbildung (experimentelle, theoretische und literarische Übersicht bis einschliesslich 1928)*. Leipzig, Wien: Franz Deuticke, 1929, Table IX.

its natural habitat, although it populates aquariums in laboratories, households, and zoos all over the world. Initially brought to Paris in the course of France’s colonial activities during the 1860s, curiosity soon turned this organism into a scientific object for studies concerning evolution, ontogeny, and physiology. At about the same time, aquarium fanciers started to adopt the axolotl as one of their most popular “pets.” As this project shows, both developments went hand in hand, influencing each other by transfer of knowledge and technology. As a result, the axolotl was turned into a paradigmatic laboratory animal in the late nineteenth and early twentieth centuries. Among others, August Weismann and his assistant Marie von Chauvin played an important role in turning the axolotl into a laboratory animal. Taking axolotl’s case as a model, the project emphasizes the history of animals in their specificity, tracing their trajectories across disciplines, across the border between science and the public as well as across the great divide between “civilized” and “colonized” countries.

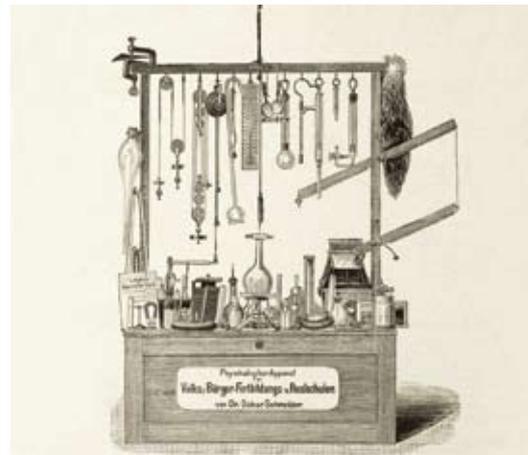


Viola van Beek

Viola van Beek (Predoctoral Fellow)

Codes of Experimenting and Experimental Spaces Around 1900

This project investigated natural science experimentation kits and instruction manuals between 1870 and 1930. During this period, the “experimentalization” of everyday life manifested itself in the revitalization of genres such as the experiment book, the popularization of hands-on experiments in educational institutions (as in the *Urania* in Berlin), and, above all, the widespread use of experimentation kits. These kits, such as physical



cabinets, chemistry sets, and electricity boxes designed for amateurs (and especially for children), began to gain huge popularity in Germany starting in the last third of the nineteenth century. Teaching aid producers and precision mechanics workshops offered mass-produced devices as well as customized kits through teaching materials catalogs and early forms of “mail-order” catalogs. Portable experimentation kits were designed to serve as extensions of classrooms and lecture halls. They illustrate the increased attention granted to experimental practices in general education between 1870 and 1930.

An examination of these objects shows how the miniature laboratories contributed to the creation of experimental spaces beyond the laboratory, in particular by providing specific “codes of experimenting.” Through archival material from the Deutsches Museum in Munich and the Kosmos Verlag in Stuttgart, together with evidence in the form of biographies, advertisements, teaching materials, catalogs, reviews, and introductions, this project depicted the ways in which experiments—and especially successful experiments—were supposed to take place around 1900.

Collection of instruments for the playful study of science. From *Haupt-Katalog der Leipziger Lehrmittel-Anstalt von Dr. Oskar Schneider*, ca. 1902, p. 227.

Experimentalization of Life

Projects of the Short-term Guest Researchers

- *Rand B. Evans* (East Carolina University, Greenville): “Wilhelm Wundt and the Astronomers: Stellar Transits and the Measurement of Prior Entry in the Beginning of Experimental Psychology”
- *Florian Hoelscher* (Hochschule Luzern): “Electro-acoustic Expansions of Piano Sound”
- *Maria Rentetzi* (National Technical University of Athens): “Gender Science and Politics: Queen Frederika and Nuclear Research in Post-war Greece.”
- *Dimitris Papayannakos* (University of Athens and National Technical University of Athens): “An Antiskeptical Reconsideration and Defence of Experimental Realism.”
- *Costas Mannouris* (National Technical University of Athens): “Darwin’s Eight-Year Study of Barnacles: Rethinking the ‘Long Wait.’”

Experimentalization of Life

The Virtual Laboratory

(<http://vlp.mpiwg-berlin.mpg.de>)

Department III’s Experimentalization project created and continues to use and develop a Virtual Laboratory (VL). Online since 2002, the VL has come to function as a unique archive and research tool for the history of the experimental life sciences during the nineteenth and early-twentieth centuries. Currently, it offers more than 32,000 complete bibliographical references and displays some 10,000 scanned items consisting of about 9,000 journal articles, 520 book chapters, 320 monographs and textbooks, as well as 180 trade catalogues of scientific instruments. In addition, it offers access to some 380 items that were digitized in cooperation with archives and museums, including laboratory notebooks, article manuscripts, letters, graphical recordings, and photographs.

Recently, the VL extended its scope by integrating scientific films and phonographic recordings. In cooperation with institutions such as the Bundesarchiv-Filmarchiv, Berlin, and the Berliner Phonogramm-Archiv, a collection of physiological and medical films covering the span from the 1920s to the 1950s has been included in the collections of the VL, as were numerous wax-cylinder recordings of acoustic experiments from the period 1900 to 1920. Similar projects are underway with the Staatsinstitut für Musikforschung PK, Berlin (library collection on acoustics and instrument making), and the Museum für Naturkunde, Berlin (photograph collection).

The project group continues to enhance the VL’s search options. In addition to simple and advanced searches on bibliographical records, the VL offers similar exploration tools for the image database containing some 20,000 fully referenced and captioned drawings, curves, and photographs. The VL also boasts embedded search tools for specific purposes, e. g., the “trend-scout” for statistical analyses of bibliographical references over time. Most recently, the VL has implemented a full-text search tool based on automatic optical character recognition (OCR). This tool allows researchers to search



Main page of the Virtual Laboratory.
http://vlp.mpiwg-berlin.mpg.de/index_html

all scanned text documents by using Boolean operators and term modifiers, i. e., with respect to single words, combined expressions, entire sentences, etc.

Since 2006, the VL has provided users with a new work environment called myLab. The myLab environment allows users to build, manage, and share personal sub-sets of annotated objects found in the VL (bibliographical references, scans of published and/or unpublished texts, short biographies, sites) and beyond. myLab has proven to be an excellent teaching tool, which project members regularly employ in their teaching.

The VL also offers a highly attractive platform for scholarly publication. The VL's essay section enables scholars to publish short articles about the ongoing research work of the Experimentalization project. Articles are linked to other holdings, including short biographies, laboratory descriptions, and instruments in the digital

library and other sections of the VL. External scholars working on related topics and sources have begun to use the publication site, which we intend to develop into a refereed online journal in the near future.

Experimentalization of Life

Activities Related to the Project

Workshops and Events

- “ZwischenRäume: Disorders.” Workshop organized together with the Media Faculty at Bauhaus University, Weimar, the Helmholtz-Zentrum für Kulturtechnik (HU), the Zentrum für Literatur- und Kulturforschung, and the Institut für Deutsche und Niederländische Philologie (FU). Weimar, July 17, 2009.
- “Physiologie des Klaviers.” Concerts and talks, organized by Julia Kursell together with the Musikinstrumenten-Museum SIMPK (2007/2008). Berlin, January 23, March 6, April 9, June 11, 2008, and May 13 and June 10, 2009.
- “Performing Voices: Between Embodiment and Mediation,” a conference organized by Julia Kursell (Dept. III) and Andreas Mayer (Dept. II) in collaboration with Martin Brody (American Academy in Rome), Rome, December 3–6, 2009.

Books

- Bernhard J. Dotzler, Henning Schmidgen (eds.), *Parasiten und Sirenen. Zwischenräume als Orte der materiellen Wissensproduktion*, Bielefeld: Transcript Verlag, 2008.
- Henning Schmidgen, *Die Helmholtz-Kurven. Auf der Spur der verlorenen Zeit*, Berlin: Merve, 2009.

Upcoming events

- “The Place of Experiment in Science and Technology Studies—Part II”, Berlin, July 2–4, 2010.

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Project

A Cultural History of Heredity

RESEARCH SCHOLARS *Christina Brandt, Bernd Gausemeier, Hans-Jörg Rheinberger*

POSTDOCTORAL FELLOWS *Stefan Borchers, Maria Kronfeldner, Vincent Ramillon*

VISITING SCHOLARS *Luis Campos, Edna Suárez*

SHORT TERM GUEST RESEARCHERS *Adam Bostanci, Jonathan Harwood, Brad Hume, Manfred Laubichler, Pablo Lorenzano, Brendan Matz, Staffan Müller-Wille, Alexander von Schwerin, Sophia Vackimes*

COLLABORATIONS ESRC Centre for Genomics in Society, University of Exeter (Staffan Müller-Wille, Christine Hauskeller); Universidad Nacional Autónoma de México—UNAM (Ana Barahona, Carlos López Beltrán); School of Life Sciences at Arizona State University, Tempe (Manfred Laubichler); Center for Literary and Cultural Research, Berlin

FUNDING Government of Liechtenstein, DFG, German Academic Exchange Service (DAAD), British Council, British Academy, CONACYT (Mexico), and the MPIWG

General Description of the Project

This project centers on the history of the scientific and technological practices in which knowledge of biological heredity became materially entrenched. The project also seeks to define cultural contexts in which this knowledge unfolded, as well as to trace its effects. Knowledge of heredity is taken here as encompassing much more than the scientific discipline of genetics. Rather, it circumscribes a much broader knowledge regime in which a naturalistic conception of inheritance gradually formed, one that in fact came to influence all areas of modern society, including medical, legal, political, and ethical discourses. The aim of the project is to explore the changing practices, standards, and architectures of this regime, as well as their particular historical conjunctions.

Collaborative and interdisciplinary in nature, the project aims to draw together expertise, besides from the history of science, from other historical disciplines such as the history of medicine, law, economics, art and literature, as well as political history and anthropology. The research group is exploring a variety of case studies, ranging from the history of generation and reproduction from the eighteenth to the twentieth century to developments in molecular biology and biomedicine at the turn of the twenty-first century.

During the last years, a series of four workshops was held, each concentrating on a specific epoch in the cultural history of heredity. Covering the period from the seventeenth through the early-twentieth century, these workshops facilitated a lively and growing cooperation of international scholars who constantly contributed to the joint

project of writing a cultural history of heredity from a long-term perspective. Results of the first two of these workshops were presented in the essay collection entitled *Heredity Produced. At the Crossroads of Biology, Politics, and Culture, 1500–1870* (Cambridge, MIT Press, 2007). A second volume, based on the last two workshops, is currently in preparation (*Heredity Explored: Between Public Domain and Experimental Science, 1850–1930*). The project will be concluded in the fall of 2010 with a workshop on the history of human heredity in the twentieth century.

A Cultural History of Heredity

Individual Projects



Staffan Müller-Wille

Hans-Jörg Rheinberger (MPIWG, Director) and *Staffan Müller-Wille* (Senior Lecturer, Exeter)

Heredity. History and Culture of a Biological Concept and The Gene in the Age of Postgenomics. An Essay

Both book projects have been concluded in 2009. A brief description has been provided in the introductory remarks of the Department's report.



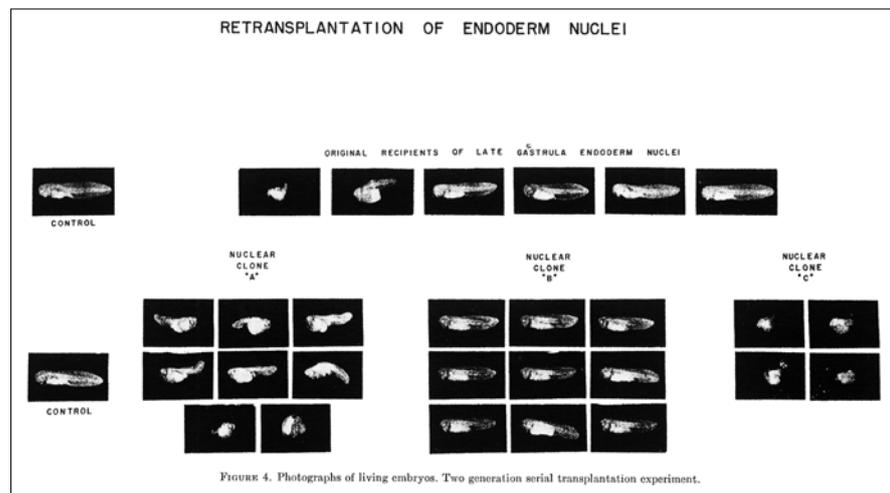
Christina Brandt

Christina Brandt (Research Scholar)

Reproduction in Biology. Configurations between Science and Culture, 1900–2000

Biomedical research on reproduction and research on related topics such as stem cell research are rapidly developing scientific fields with controversial impacts on society and culture. In this project, Christina Brandt explores the fundamental role reproduction played, both as a subject of study as well as an experimental technique, in the life sciences of the twentieth century. The study addresses the emergence and changing techniques of reproduction as well as their uses in different fields of the life sciences. "Reproduction" relates to different ways of propagation and multiplication, and it also refers to ways of making things similar or identical. In the latter sense, reproduction means "replication" and has a bearing on molecular copying and cloning techniques. This historical investigation is concerned with research fields in which reproduction

Photographic representation of one of the first cloning experiments (via transplantation of cell nuclei) with frogs in the 1950s (T. King, R. Briggs: Serial transplantation of embryonic nuclei, *Cold Spring Harbor Symposia on Quantitative Biology* 21 (1956), p. 271–290).



techniques (from artificial propagation to copying) were developed on the level of molecules, cells, and organisms. By exploring a number of case studies, the focus is on (1) the origin of cloning as a technical tool at the beginning of the twentieth century; (2) the history of cell biology (the emergence and reproduction of cell lines); (3) molecular biology and genetic engineering (the notion of replication and molecular copying techniques); and (4) cloning research in developmental biology and embryo research. A particular line of research concentrates on the public debates on human cloning and artificial reproduction beginning in the 1960s.

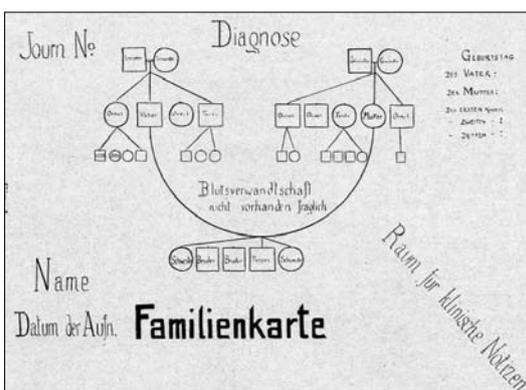
Bernd Gausemeier (Research Scholar)

Genealogy and Human Heredity from the Eighteenth to the Early-Twentieth Century

Knowledge about heredity is dependent on genealogical practices. The methodical investigation of heredity in a biological sense began with reports on families transmitting remarkable diseases or peculiarities, hospitals collecting patients' histories, and herd books kept by animal breeders. The project aims to investigate how these practices evolved, how they influenced each other, and, in particular, how they shaped concepts of heredity. Genealogy, however, does not merely consist of the application of techniques to record familial relations. In a wider sense, it forms a discursive field in which ideas about kinship, descent, reproduction, and social order are formulated



Bernd Gausemeier



and disputed. By taking into account both the material and the discursive aspect of genealogy, it is possible to view the history of human heredity in the broader context of social, intellectual, and institutional changes.

The project follows the interrelated histories of genealogy and human heredity. It begins in the eighteenth century, when genealogy was developing from a

way of representing social status to a method for illustrating vital phenomena. During the nineteenth century, systematic attempts emerged to investigate the regularities of human heredity and reproduction. In the early-twentieth century, a science of heredity took shape. This science was based on new forms of genealogical practice. In the end, it also profoundly changed our understanding of genealogical relations.

“Familienkarte” für den ärztlichen Gebrauch, nach: Arthur Crzelltizer, *Wie vererben sich Augenleiden?* Mit besonderer Berücksichtigung der Frage einer Verschiedenheit zwischen Erstgeburt und folgenden Kindern, *Medizinische Reform* 18 (1910), 120–124, 134–139, p. 121.

Stefan Borchers (Karl Schädler Postdoctoral Research Fellow)

Propagation of the Soul—Inheritance of the Sin

Stefan Borchers explores the influence of religious confession in shaping theories of generation and inheritance in eighteenth-century Lutheran Germany. Although the importance of theological thought is widely neglected in the historiography of biology, religious confession has to be considered as a central reference point for early

modern thought on generation and heredity. In regard to the question of how the embryo is formed, the emerging life sciences were accompanied by a parallel discourse on the soul's origin. Due to the fact that this discourse related the origination of body and soul with one another, physiological and metaphysical investigations were intertwined, sometimes limiting one another.



Res cogitans or res extensa? In Johann Amos Comenius's famous "Orbis sensualium pictus" (1658), the human soul is depicted as being spread throughout the whole body. "Anima hominis/Die Seele des Menschen." Woodcut by Paul Creutzberger in *Johann Amos Comenius: Orbis sensualium pictus/ Die sichtbare Welt*. Nürnberg: Ender, 1658 (Reprint ed. by Johannes Kühnel, Leipzig: Klinkhardt, 1910).

In the course of the seventeenth century, the problem of the soul's origin had become a subject of controversy between Lutheran and Catholic and Reformed theologians. The Lutheran doctrine amalgamated both physiology and the metaphysics of generation, teaching that parents engender both the body and the soul of their offspring. This doctrine made it problematic, if

not impossible, for Lutheran physicians and philosophers at the turn of the century to adopt preformation as enthusiastically as their Catholic and Reformed contemporaries. They, by way of contrast, embraced the dogma that parents only engender the body of their offspring, whereas ensoulment was to be regarded as God's own business (creationism). Yet orthodox Lutheran theologians opposed creationism, holding that the assumption of a continuous propagation of human souls since the times of Adam and Eve (traducianism) was the only possible way in which the inheritance of original sin could be properly understood. As God could not be accused of creating sinful souls, they argued that the offspring's soul was an offshoot (tradux) of the sinful parental soul (or souls). The Lutheran model of traducianism formed part of a non-dualistic anthropology that remained influential until at least the end of the eighteenth century. In this sense, religious confession reveals itself as a factor of *longue durée* for any cultural history of biology.



Maria Kronfeldner

Maria Kronfeldner (Karl Schädler Postdoctoral Research Fellow)

The Anthropological Concept of Culture in the Context of Evolutionary Debates

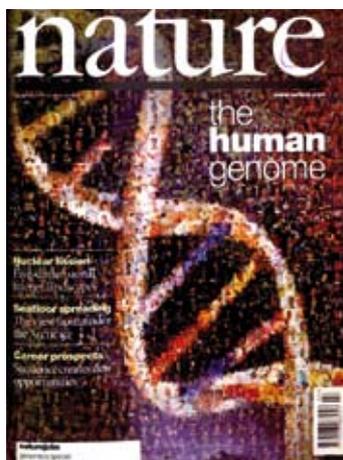
After an analysis of the conceptual landscape surrounding culture and evolution in the nineteenth century, the project concentrated on the emergence of the modern anthropological concept of culture between 1883 and 1917. This concept relies heavily on a sharp distinction between cultural and biological heredity. The establishment of this distinction depended on the denial of the Lamarckian idea of inheritance of acquired characteristics. August Weismann and Alfred Kroeber were two central figures in this conceptual "segregation" of culture from nature. The historical material was also used for the analysis of contemporary debates on evolutionary psychology, theories of cultural evolution, and the nature/nurture distinction.

Vincent Ramillon (Postdoctoral Research Fellow)

Norms and Practices in Genomic Research, ca. 1985–2003

This project seeks a better understanding of genomics from a historical perspective. Focusing on the material practices of this field of research, it attempts to articulate their evolution with reference to the transformations of the social and epistemic norms regulating biomedical activities during the late-twentieth century.

The history of genomics is characterized by the progressive differentiation of a managerial rationality and associated governmental practices in the institutions involved in genome mapping and sequencing or related technological and resource developments. The introduction of these managerial practices into the laboratories has led to various negotiations affecting the social, technical, and epistemic dimensions of sequencing. The use of Expressed Sequencing Tags to create gene indexes, one of



the most important applications of sequencing techniques in the 1990s, originated in the use of automata and the subsequent re-organization of sequencing procedures. The same concerns led to the emergence of factory-like production centers and to networks of laboratories as the two archetypal organizational models in genomic projects. Moreover, this managerial rationality constituted a shared language between scientific and non-scientific institutions that proved instrumental in fostering the development of companies whose business model was based primarily on the mass production of sequences. Finally, the transfer of mass production practices from sequencing to

other experimental procedures has played a critical role in the experimental and theoretical reconfigurations of molecular genetics during the second half of the 1990s, known first as the “post-genomic” and “functional genomic” turn, later theorized under the unifying label of “systems biology.”

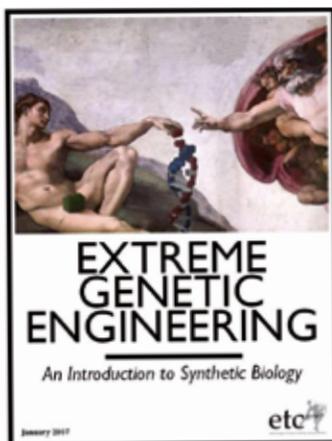


Vincent Ramillon

Cover *Nature*, 15 February 2001

Luis Campos (Visiting Scholar, Drew University)
Synthetic Biology

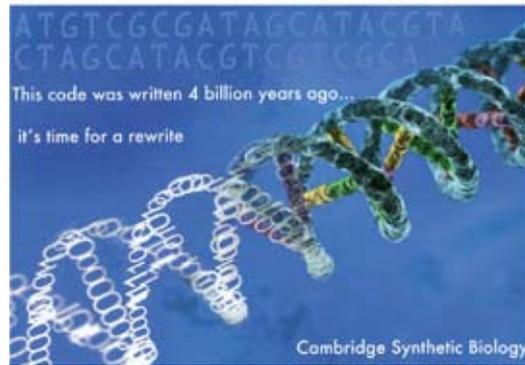
Luis Campos worked on the history of the newly-emerging field of synthetic biology, an epistemologically provocative disciplinary mixture of engineering, computer science, molecular biology, and artificial life that seeks to redesign living systems to accomplish human-desired functions. This attempt at a “plug-and-play” biology, characterized by an “open source” ethos as regards matters of intellectual property, has been claimed by some to be based on standardized biological parts with the goal of “making biology easier to engineer” and in ways that far supersede the



Luis Campos

“Extreme Genetic Engineering”: Front cover of a January 2007 report on synthetic biology issued by the ETC Group, a civil society organization based in Canada. The full report is available online at <http://www.etcgroup.org/en/node/602>

A leaflet distributed by a synthetic biology group at Cambridge University, with a phrase attributed to MIT's Tom Knight, a founding figure in synthetic biology (2007)



so-called genetic engineering of earlier generations.

In the first part of his project, Campos explored the “prehistory” of synthetic biology, relating the claims and aims of this newest of fields to institutional and disciplinary forebears and to deeper, longer-lasting themes in the history of biology in the early-twentieth century. These

include: using synthesis as an experimental tool; the idea of control as proof of understanding; and the application of principles of design and modularity to biological phenomena. In the second part of his project, he traced the evolution of synthetic biology as it has appeared in scientific publications, popular science news articles, public talks, and conferences and workshops from 2002 to the present, including both bibliographic and ethnographic data. Finally, Campos sought to characterize the development of newly emerging competing “schools of thought” within the field of synthetic biology, particularly following its internationalization. During his time at the institute, he observed the novel formation of a distinctively “European” interpretation of synthetic biology. Campos’ project not only uncovered important historical connections, but also revealed the contemporary ways in which natural, engineered, and social orders are being co-produced.



Edna Suárez

Edna Suárez (Visiting Scholar, Universidad Nacional Autónoma de México)

Representation and the Construction of Knowledge in Molecular Evolution

The aim of this project was to cover the production and representation of knowledge in the field of molecular evolution, from its beginnings in the early 1960s to the rise of bioinformatics and comparative genomics in the 1990s. The analysis took place at three different levels.

At the micro-level, molecular evolution offers a place to investigate the role of experiments and techniques in different scientific traditions and the ways in which they are connected with specific practices of representation. The goal was to extend a previous study on the uses of nucleic acid hybridization, to cover the role of electrophoresis in theoretical population genetics, and the effects of protein and DNA sequencing on the construction of phylogenies and comparative genomics.

At the disciplinary level, the project aimed to offer an account of how the idea of informational molecules came to provide a powerful rhetoric for a new style of evolutionary studies. By developing a new vocabulary, scientists such as Emile Zuckerkandl, Walter Fitch, Roy Britten, and others helped to create a technical, social, and political frontier between the new molecular evolutionists and the “old” organismal evolutionists.

At a transdisciplinary level, as molecular evolution has been constitutive in the development of the bioinformatics revolution, the historiography of genomics must be broadened to include the role of evolutionary approaches and tools. The elaboration

of the first computer programs as early as 1966 for the construction of trees based on molecular data and the first databases on proteins as early as the mid-1960s illustrate this point. The project included a study of the symbiosis between computer technology, bioinformatics, and genomics as a result of the Human Genome Project.

At all three levels, Suárez has detected important historical continuities. Such continuities arise around the study of human evolution and variation across the twentieth century. This insight has opened a wide range of collaborations with other scholars at the MPIWG and abroad.



Catalytic control of an enzyme by the last product of its activity. MON.Bio. 18, Dossier 9.2, Lectures on physiology and bacteria genetics, 1957, Humorous illustration of these lectures by a series of drawings by F. Lavallé, Legends by Georges Cohen (Institut Pasteur, Paris, France)

A Cultural History of Heredity

Projects of the Short-term Guest Researchers

- *Adam Bostanci* (Hughes Hall, University of Cambridge): “The Human Genome: A Study of Something We All Partake in.”
- *Jonathan Harwood* (Centre for the History of Science, Technology & Medicine, University of Manchester): “History of Plant-Breeding.”
- *Brad Hume* (Independent Scholar): “Heredity and the Temporality of the Body.”
- *Brendan Matz* (Yale University, New Haven): “Animal Breeding and the Study of Heredity in Germany and the United States, 1850–1929.”
- *Staffan Müller-Wille* (ESRC Centre for Genomics in Society at the University of Exeter): “The Dark Side of Evolution: Caprice, Deceit, Redundancy.”
- *Manfred Laubichler* (School of Life Sciences, Arizona State University, Tempe): “Regulation and the Origin of Theoretical Biology.”
- *Pablo Lorenzano* (National University of Quilmes/Consejo Nacional de Investigaciones Científicas y Técnicas): “Theoretical Incommensurability and Empirical Comparability in the History of Genetics.”
- *Alexander von Schwerin* (Technical University of Braunschweig): “Making Mutations: Objects, Practices, Contexts.”
- *Sophia Vackimes* (Universidad Nacional Autónoma de México): “Genetic Engineering in Cinema.”

A Cultural History of Heredity

Activities Related to the Project

Research Collaborations

The project has engaged in research collaborations with the ESRC Center for Genomics in Society (Egenis), Exeter, and the National University of Mexico City (UNAM). Three organizations funded these research collaborations: the German Academic Exchange Service (DAAD), the British Council, and the Mexican CONACYT.

1 Reproducing Organisms: A Comparative Analysis of Historical, Social, and Philosophical Aspects in Twentieth Century Biomedicine

(DAAD/British Council, July 2008–June 2010)

This ongoing joint project aims at a historical and philosophical investigation of central concepts in biomedicine and their cultural embeddedness. Taking the concept of “reproduction” as its focal point, the project explores different dimensions of the scientific, medical, and cultural practices connected to reproduction across the twentieth century. The goal is a better understanding of both the complex history as well as present developments in artificial reproductive technologies (ART) in the fields of agriculture and medicine. It also explores the ethical dilemmas surrounding this subject.

The collaboration allowed visiting scholars and PhD students from the MPIWG to stay in Exeter (Christina Brandt, Bernd Gausemeier, Mathias Grote, Maria Kronfeldner, and Florence Vienne from the Technical University of Braunschweig). It also made possible short stays of scholars from Exeter at the MPIWG (Christine Hauskeller, Jean Harrington, Sabina Leonelli, Marco Liverani, and Staffan Müller-Wille), as well as a one-day workshop in Exeter in April 2009. A second workshop was held in Berlin in May 2010.

2 Evolution and Heredity: Genetics and Epigenetics

(DAAD/CONACYT, January 2007–December 2009).

This project’s objective was to forge a close cooperation between the two research groups at the MPIWG and UNAM concerned with the history, philosophy, and sociology of heredity and evolutionary thinking from the second half of the nineteenth century up to the present time. The project aimed at a collective analysis of modern naturalistic thinking about nature, man, and society and at a study of cultural, national, and local differences.

The project enabled a group of highly motivated doctoral and postdoctoral students to participate in the exchange program. From 2007 to 2009, a number of German scholars (Maria Kronfeldner, Christina Brandt, Christian Reiß, and Mathias Grote from the MPIWG, Stefan Willer and Ulrike Vedder from the Berlin Zentrum für Literatur- und Kulturforschung) traveled to Mexico City for research stays of three to four weeks at the UNAM campus. Mexican scholars (Ana Barahona, Sergio Martínez, Edna Suárez) and three Mexican PhD students (Erika Torrens, Vivette García, and Fabrizio Guerrero) traveled to Berlin for research on their dissertation topics.

As a result of this collaborative research, an international workshop on “The Hereditary Hourglass” took place at the UNAM in October 2008. An international conference on the bicentenary of Charles Darwin was organized jointly with the Colegio Nacional de Mexico in November 2009 in Mexico City.

Workshops

- “History of Plant-Breeding Since 1880,” March 28–29, 2008, organized by Jonathan Harwood and Staffan Müller-Wille.
- “Graphing Genes, Cells, and Embryos: Cultures of Seeing 3D and Beyond,” June 12–15, 2008, organized by Sabine Brauckmann, Tartu University; Christina Brandt, MPIWG; Denis Thieffry, University of Marseille; and Gerd B. Müller, Konrad Lorenz Institute, Altenberg.
- “The Hereditary Hourglass. Narrowing and Expanding the Domain of Heredity,” National University of Mexico City (UNAM), October, 1–2, 2008, organized by Ana Barahona, Edna Suárez, Hans-Jörg Rheinberger.
- “Writing the History of Genomics,” October 29 – November 1, 2008, organized by Edna Suárez and Vincent Ramillon.
- “Making Mutations: Objects, Practices, Contexts,” January 13–15, 2009, organized by Luis Campos and Alexander von Schwerin.
- “The Tenacity of the Nature/Nurture Divide,” March 20–21, 2009, organized by Maria Kronfeldner and Carlos López Beltrán.
- “Darwin in Latin America” and “Darwin: The Art of Doing Science,” National University of Mexico City (UNAM) and El Colegio Nacional de México, November, 12–19, 2009, organized by José Sarukhán, Rodolfo Dirzo, Ana Barahona, Edna Suárez, Carlos López Beltrán, Sergio Martínez, and Hans-Jörg Rheinberger.

Books

- Staffan Müller-Wille and Hans-Jörg Rheinberger (eds.), *Heredity Produced: At the Crossroads of Biology, Politics, and Culture, 1500–1870*, Cambridge: MIT Press, 2007.
- Hans-Jörg Rheinberger, Staffan Müller-Wille: *Vererbung. Geschichte und Kultur eines biologischen Konzepts*, Frankfurt: Fischer Verlag, 2009.
- Staffan Müller-Wille, Hans-Jörg Rheinberger, *Das Gen im Zeitalter der Postgenomik. Eine wissenschaftshistorische Bestandsaufnahme*, Frankfurt: Suhrkamp, 2009.
- Florence Vienne, Christina Brandt (eds.), *Wissensobjekt Mensch. Humanwissenschaftliche Praktiken im 20. Jahrhundert*, Berlin: Kadmos Verlag, 2008.

Upcoming events

- “Human Heredity in the Twentieth Century,” Workshop, Exeter, September 2–4, 2010, organized by Staffan Müller-Wille, Bernd Gausemeier, Ed Ramsden.

Project

Knowledge in the Making.

Drawing and Writing as Research Techniques

RESEARCH SCHOLARS *Christoph Hoffmann, Barbara Wittmann*

POSTDOCTORAL RESEARCH FELLOWS *Karin Krauthausen, Christof Windgätter, Stephan Kammer* (associated; funded by the DFG)

SHORT-TERM GUEST RESEARCHERS *Claudia Mareis, Nina Samuel, Barbara Wurm*

COLLABORATION Research Group at the Kunsthistorisches Institut in Florenz:

Omar W. Nasim, Jutta Voorhoeve

RESEARCH NETWORK Yale University (Rüdiger Campe); Freie Universität Berlin (Werner Kogge); Technische Universität Berlin (Cornelia Ortlieb); Universität Wien (Wolfram Pichler and Wolfgang Pircher).

FUNDING Fritz Thyssen Stiftung, Max Planck Society (Strategic Innovation Fund), and the MPIWG

General Description of the Project

“Knowledge in the Making” is an inter-institutional research initiative of the Max Planck Institute for the History of Science in Berlin and the Kunsthistorisches Institut in Florence (Max Planck Institute). The research project started in the fall of 2006 and will conclude in 2010. The two working groups in Berlin and Florence comprise seven individual research projects. The main focus of the Florentine group is on the aesthetic and epistemic aspects of drawing in the modern arts and sciences (1850–2000). Exemplary studies deal with “Constructing the Heavens. Drawings of Nebulae in Victorian Science” (Omar W. Nasim; he was a member of the Berlin group until March 2008) and “Drawing in Contemporary Art: Notation, Expression, and Experiment” (Jutta Voorhoeve). For further details, see the report of the Kunsthistorisches Institut in Florence.

Like the Florentine part of the project, the Berlin working group takes as a starting point the manifold forms of “paper work” in the arts and sciences. Apparently unsophisticated, though ubiquitous, drawing and writing techniques play a constitutive role in the creation and reworking of knowledge. The interaction of hand, paper, and pen involves much more than simply recording what was previously thought, observed, or imagined. Writing and drawing both have the power to *translate* ideas and observations into two-dimensional, manageable, and reproducible objects. That is, they *concretize* cognitive processes, and in this way open up an interaction between the securing of phenomena and the formation of theses—between conception and realization. In fact, the activities of writing and drawing constitute one of the most critical steps in epistemic and aesthetic processes: the step from (potentially)

ambiguous data to stable facts, and from preliminary, provisional ideas to materialized products.

Following the recent discussion on representational practices, the research initiative analyzes the potential of drawing and writing techniques in three main respects. First, they rely on a certain *setting* in which materials, human bodies, and sign systems become interrelated. In such settings, every element is dependent on the other, and all become effective as specific constraints, limiting and shaping the final result. Critical for evaluating the productive effects of drawing and writing processes is, second, the order of operations, which organize drawing and writing activities. Such *procedures* lead to some characteristic formation of the processed object. Finally the members of the research group are interested in the *languages* of inscription, i. e., sign systems which come into play in aesthetic and epistemic processes. In particular, the different projects focus on the creative power of representational modes which subvert and transcend the divide between drawing and writing, either by syntactically combining them or by blurring the differences as for instance in doodles and scribbles.

In addition to an internal perspective on the settings, procedures, and languages of drawing and writing, the research initiative follows the specific function of these tools of knowledge within the technologically advanced, abstract cultures of modern science and art. The target period (1800 to 2000) witnessed an intense competition between “old” and “new” media. The project therefore examines the tension between handwriting and drawing on the one hand and mechanical, photographic, and digital recording technologies on the other. An analysis of the various forms of their interaction opens up new perspectives on the relative potential of writing and drawing under the shifting technological conditions of modernity. Moreover, with the reconstruction of epistemic and aesthetic processes, the focus of the project highlights the underlying “techniques of creativity” which the cultures of scientific research and artistic practice share.

Knowledge in the Making

Individual Projects

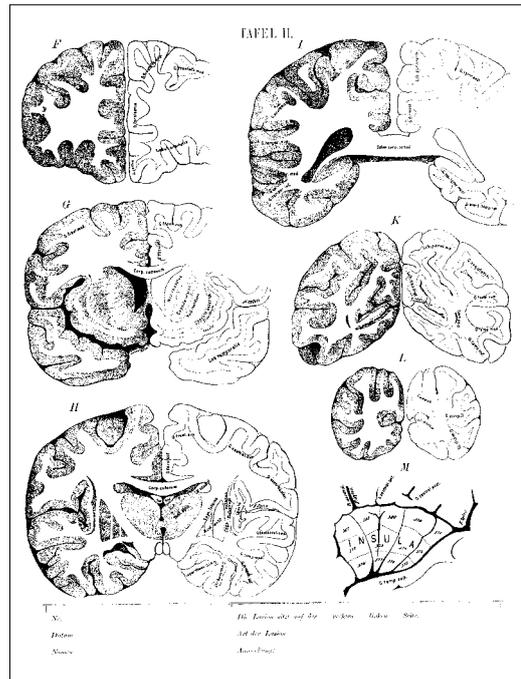
Christoph Hoffmann (Research Scholar)

Epistemic Writings

Writing practices in science implement procedures, i. e., an order of operations, which in a temporal sequence translates into a spatial arrangement of traces. The specific procedures can vary in their degree of complexity. They may be highly idiosyncratic or entirely standardized. They may follow implicit rules or can become the subject of explicit exercise. In any event, procedures are dependent on the context and flexible in their use. Paying attention to the procedures can allow one to identify and characterize ways in which writing processes unfold instrumentality. For example, autopsy reports in pathology result from a highly regulated practice. The writing of the record structures both the course of dissection and the observations of the dissector. The right way of describing was (and still is) part of the regular academic training.



Christoph Hoffmann



Scheme proposed for recording the findings of the dissection of the brain (1888).
Sigmund Exner: Schablone des menschlichen Gehirns zur Eintragung von Sectionsbefunden, Wien: W. Braumüller, 1888.

The settings for recording—note taking by hand, dictation, voice recording, usage of forms—is a matter of constant attention and innovation.

The recording regime in pathology is clearly due to the fact that the “paper body” of the autopsy report serves as a working document and genuine basis of knowledge production. A very similar function can be attributed to the observational notes of the biologist Karl von Frisch. In his research on the communication of honey bees, the records of field experiments represent only one step in a chain of operations. Underlinings and additional numberings point to the fact that von Frisch systematically archived his notes. Yearly compilations served both as an index for the records and as an overview of completed research. Frisch organized his reading notes in a similar manner. Series of booklets, each dedicated to a single theme, were filled with excerpts and sometimes comments. A separate index permitted a search for particular authors.

The physicist and philosopher of science, Ernst Mach, adhered to the opposite habit. Mach kept only one notebook, which covered almost every facet of his scientific life (and sometimes as well of his private affairs)—with one notable exception: primary recordings of experimental data and reading notes are almost absent. Mach’s notebooks represent less of a recording aid than a tool for management and, in the context of research, a space of reworking. Mach’s favorite means for ordering and relating phenomena and ideas were lists and combinations of writing and drawing. In addition, the notebooks provide an example for the instrumentality of the temporal sequence of writing in itself: sometimes, in early stages of concept formation, Mach jotted down series of notes exploring a certain problem. It appears in this respect that his train of thought developed from note to note, so that each time the preceding note became the starting point for his subsequent thoughts.

Barbara Wittmann (Research Scholar)

Meaningful Scribbles. Children's Drawings as Psychological Instruments, 1880–1950

The institutionalization of child psychology around 1900 was accompanied by techniques of observation and experiment that separated scientific attention from the education and everyday care of children. The experimental application and interpretation of children's drawings became one of those techniques. Prior to 1880, children's drawings were seen as mere scribbles, and not considered to be of any aesthetic or heuristic value. Psychologists and psychoanalysts such as James Mark Baldwin, James Sully, William Stern, Karl Bühler, Melanie Klein, and Jean Piaget changed this, considering drawings to be a major diagnostic device in the investigation of children. Like children's play and their stories, the "artistic production" was (and still is) believed to reveal sensomotoric functions and spatial perceptions, to give proof of children's intelligence and social development, and to document or even change their psychic disposition and etiology.

The emergence of children's drawings as psychological tools was supported by different kinds of methods, techniques, and tests that were developed to interpret what previously had been considered "meaningless." These interpretative practices had to control the dynamics of drawing and the transference between the child and the scientist. The experimental set-ups and tests framed and stabilized the scribbles: certain qualities of children's drawings were isolated; single gestures and motifs were repeated again and again. In this way, psychology began to conceive children's drawings as a more or less orderly process through which the visualization of irregular psychic symptoms and dysfunctions was enabled. Children's drawings were embedded and transformed into a calculated procedure that allowed the scientist to be surprised by unexpected phenomena.

The operationalization of children's drawings in psychology is certainly a special case in the history of drawing as a scientific instrument. Whereas all other kinds of scientific inscriptions are produced by scientists or commissioned artists, children's drawings can only be made by the scientific object itself. Still, the drawings produced in experimental and diagnostic contexts should not be considered as immediate "self-portraits" as they do not contribute to the constitution of subjectivity directly, but rather to its mediation and objectification. Thus,



Barbara Wittmann



"Die Olle ist wütend". Drawing from the analysis of a six year old child ("Erna") with explanations of Melanie Klein, 1925. Wellcome Trust, London, Melanie Klein papers, file PP/KLE/B.25.

the historical reconstruction of the experimentalization of children’s drawings around 1900 promises to illuminate the practices and methods through which an everyday activity was transformed into a research technique and how it shifted between these functions.



Karin Krauthausen

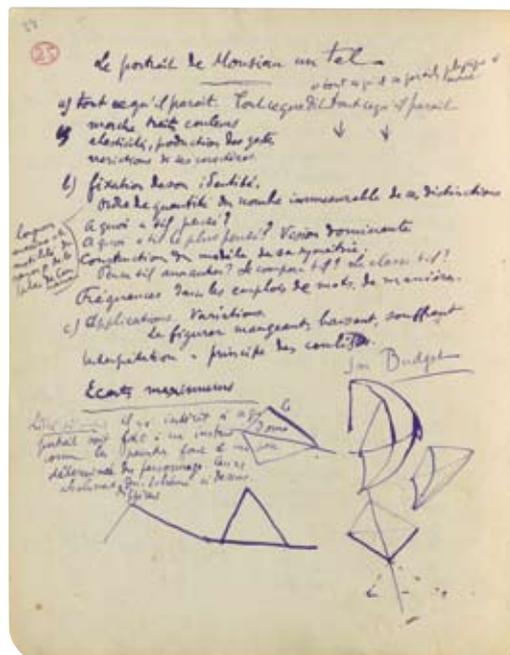
Karin Krauthausen (Postdoctoral Research Fellow)

Valéry’s Cahiers (1894–1945)—Drawing and Writing as a Practice of Thought.

The influence of the French author and poet Paul Valéry extends far beyond literature. His writings concern issues and discoveries in the arts and natural sciences and reflect on political developments and historical events. Valéry’s intellectual agility is most apparent, however, in the 261 notebooks that he left behind, the *Cahiers*, in which he ceaselessly fashioned new connections between different spheres of knowledge. As one leafs through these notebooks, one is astounded by the dense and varied interweaving of text fragments, drawings, and formulas. The writing is not ordered on the page in a purely sequential way, but is rather inserted all at once and with overlaps; it is distinguished by different “formats,” such as lists, philosophical or scientific aperçus, analytical passages, literary fragments, and comments on the drawings. Explanatory sketches alternate with associative, draftsmanlike designs and geometric diagrams. And amidst all this are doodles—stickmen, spirals, and fields of lines.

The interweaving does not result in disorder, and thus Valéry’s notebooks reveal themselves again and again as a place for the appropriation of knowledge from the sciences (mainly mathematics and physics). The formulas and scientific drawings evince an imitation of, and a self-immersion in, conventions of thought and illustration from the sciences, and this especially in the first years of the *Cahiers*. But, bit by bit, what was appropriated is transformed, becoming a writing and drawing practice of its own. My research focuses on this practice, which oscillates between conventional application and personal appropriation, thereby unfolding a productive potential.

Valéry’s writing and drawing practice generates a technique of innovation and creation that undermines the disciplinary or epistemological sorting in science and art.



Page of Paul Valéry’s Cahier ‘Journal de bord’.
Madame Boivin-Champeaux, Bibliothèque nationale de France.

Stephan Kammer (Postdoctoral Research Fellow; associate, funded by the Deutsche Forschungsgemeinschaft)

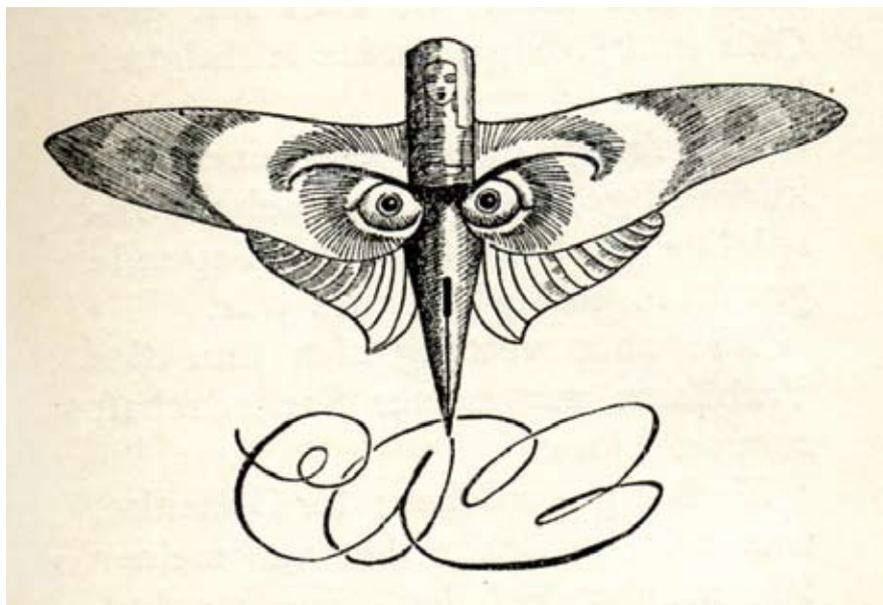
Strokes and Expressions. The History of Graphological Knowledge (1750–1950)

The basic idea of graphological knowledge is a rather simple one: by the strokes of his pen, man records significant evidence revealing the secrets of his character and true nature. Thus, reliable anthropological knowledge results not from written utterances and their propositions—subjects of manifold skills of manipulation—, but instead from the unmistakable traces of one’s hand.

Writing was first designed to be a self-recording system of human individuality in the context of Johann Caspar Lavater’s sensational *Essays on Physiognomy* (*Physiognomische Fragmente, zur Beförderung der Menschenkenntnis und Menschenliebe*, 4 vol., 1775–1778). The evaluation of these traces obtains its methodical routine as well as its name (i. e. graphology) in the second half of nineteenth century. Despite its connections to *fin-de-siècle* psychology, psychiatry, and criminology (which focuses on writing beyond these physiognomic pretensions), graphology remains a controversial, if not dubious part of anthropology. Even its supporters soon split into at least two parties disputing the scope of graphological knowledge. Whereas “minimalists” were inclined to limit it to the identification of individuals from the strokes of their pen (e. g. in forensic graphology), “maximalists” tended to claim a complete interpretation of individual personality, considering the traces of writing as expressions of character.



Stephan Kammer



Psyche’s writing.
Illustration Louis Moe, from Karl Gjellerup’s
novel *Das Briefcouvert. Studie eines
Graphologen*, Berlin: S. Fischer 1898, p. 85.

Nonetheless, or perhaps precisely because of this discord, the history of graphological knowledge can be regarded as a model of the genealogy of modern anthropology. Oscillating between the concepts of individuality and subjectivity, between the competences of physical/psychological and cultural anthropology, between the effects of the *dispositif* of literacy and those of corporeality, graphology covers the complete area in which scientific and cultural knowledge of man has been produced across the past three centuries.



Christof
Windgätter

Christof Windgätter (Postdoctoral Research Fellow)

Typography of Knowledge. The Layout Policy of the Internationaler Psychoanalytischer Verlag (1919–1938)

In our culture, the production, distribution and evaluation of printed texts remain a central aspect of science. Despite new technologies, a major part of our scientific memory is managed, reworked, and handed down in the form of printed matter. Against this background, the project focused on layout strategies as a missing subject in the history of science. Its aim was to examine the epistemic function of the design tools of print. The basic assumption is that books are neither merely reading objects nor just the expression of an author's intentions. Rather, the graphic reality of printed texts influences and guides what can be understood through the act of reading.

The particular perspective of this project was directed toward the Internationaler Psychoanalytischer Verlag (IPV). Founded in 1919 in Vienna by a group around Sigmund Freud, the IPV was shut down in 1938 by the Nazis. The IPV published all the titles of the contemporary psychoanalytical movement—Freud's books starting in 1920, the first psychoanalytical dictionaries, the *Almanach*, the four leading journals, as well as the first edition of Freud's collected writings.

To investigate the IPV layout strategies, six areas of study were considered, which together aimed at an *epistemology of the IPV* and demonstrate that it introduced the practice of *corporate design* in the field of scientific publishing. The areas of study included the following: (1) The chronology of the IPV's business affairs. (2) The naming politics of the IPV. (3) The logo of the IPV, the Oedipus Vignette. (4) The color of the IPV books and journals, which, starting in 1924/25, were produced in yellow bindings or covers. (5) The typography of the books, for which the "Cochin" font was often conspicuously used. (6) The appearance of the shop windows for which the IPV books and journals were produced, ultimately represented the fundamental changes in product display around 1900.



Ödipus Vignette of the Internationaler Psychoanalytischer Verlag. Collection Philippe Helaers.

Knowledge in the Making

Projects of Short-Term Guest Researchers

- *Claudia Mareis* (Kunsthochschule Bern): “Interferences between Discourses of Design and Knowledge.”
- *Nina Samuel* (NCCR Iconic Criticism, Basel/Humboldt University Berlin): “Shaping Chaos. Otto Rössler’s Drawings.”
- *Barbara Wurm* (Internationales Forschungszentrum Kulturwissenschaften (IFK) Wien): “Beyond the Film Strip. Numerical-graphical Notation Procedures of the Medium Film.”

Knowledge in the Making

Activities Related to the Project

Workshops

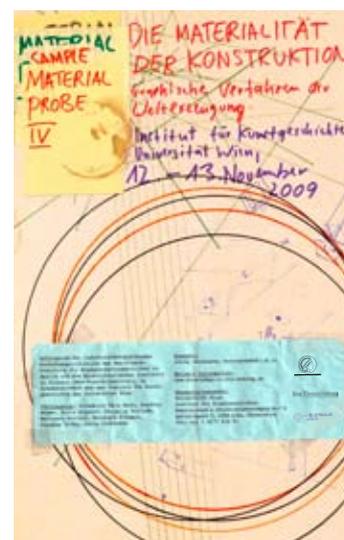
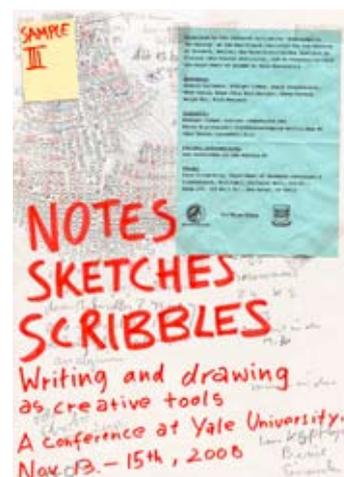
- “*Logik des Verfahrens*,” Wissenschaftskolleg zu Berlin, March 19, 2008.
- *Nachlese/Afterthoughts 2*: “Schreibszenen”/“Writing Scenes” (with Rüdiger Campe, Yale University), MPIWG Berlin, June 10, 2008.
- *Nachlese/Afterthoughts 3*: „Kritzeln und Schnipseln”/“Scraps and Scribbles” (with Hans-Jörg Rheinberger, MPIWG, Berlin), Kunsthistorisches Institut in Florenz — Max Planck Institute, Florence, July 17, 2008.
- *Materialprobe 3*: “Notes — Sketches — Scribbles: Writing and Drawing as Creative Tools,” Yale University, New Haven, November 13–15, 2008.
- “*Wissen im Druck. Zur Epistemologie der Buchgestaltung zwischen 1850 und 1950*,” MPIWG Berlin, December 12, 2008.
- *Nachlese/Afterthoughts 4*: „Erschriebene Denkräume” (with Werner Kogge, Freie Universität, Berlin), MPIWG Berlin, June 19, 2009.
- *Materialprobe 4*: “Die Materialität der Konstruktion. Graphische Verfahren der Welterzeugung,” Universität Wien, November 12–13, 2009.

Books

- Christoph Hoffmann (ed.), *Daten sichern. Schreiben und Zeichnen als Verfahren der Aufzeichnung* (= Wissen im Entwurf 1), Zürich/Berlin: Diaphanes, 2008.
- Barbara Wittmann (ed.), *Spuren erzeugen. Schreiben und Zeichnen als Verfahren der Selbstaufzeichnung* (= Wissen im Entwurf 2), Zürich/Berlin: Diaphanes, 2009.

Upcoming events

- Workshop “Paperwork: Writing (in) Books, 1650–1850,” MPIWG Berlin, June 17, 2010.



Additional Departmental Projects

Senior Researchers



Hans Erich Bödeker

Hans Erich Bödeker (Research Scholar)

The Emergence of the Modern Social and Human Sciences

Hans Erich Bödeker's research on the emergence of the modern social and human sciences focuses on the analysis of the Enlightenment epistemic culture. He inquires into the Enlightenment concept of science (*Gelehrsamkeit, Wissenschaft*). In terms of ideal types, science in the eighteenth century gradually became transformed from compilation to research. For this investigation, Bödeker consciously chose a conceptual history approach, intending to demonstrate its significance in the history of science. At the same time, he explores both relations between the history of metaphors and the history of concepts, as well as the feasibility of a comparative history of concepts. His exploration of the Enlightenment epistemic culture also considers the reciprocity between the concept of science and related scholarly practices such as reading, taking notes, authorization, as well as the varying modes of getting scholarly results published. The interrelations between natural history, anthropology, and history, a crucial issue of eighteenth century human sciences, is at the heart of his research.



Ursula Klein

Ursula Klein (Research Scholar)

Technoscience *avant la lettre* — Science and Technology in Prussia

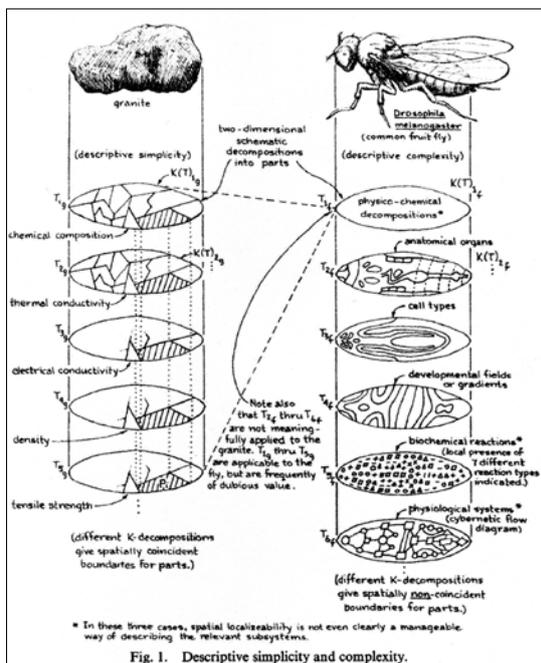
The systematic and stable interconnection of both scientific and technological inquiry into a “technoscience” is usually considered to be the outcome of the twentieth century, with forerunners in the second half of the nineteenth century. This project studies comparatively stable intersections of learned inquiries into nature and technological innovation in a much earlier period, namely from the eighteenth to the mid-nineteenth century. In laboratories, innovative workshops, and specialist market places of that period, artisanal skill and technical competence were combined with learned



The large laboratory of the Berlin Royal “Hofapotheke” (18th century).

knowledge about nature derived from experience. Numerous university chairs, professional schools, economic and philosophical societies, academies, and journals were founded that fostered technological innovation while simultaneously contributing to scientific understandings of nature. Central to this project are forms of such advanced expertise, developed between the early eighteenth and mid nineteenth century at sites where trade, manufacture, and learned natural knowledge intersected.

The specific focus of this project is the interconnection of scientific and technological expertise in Prussia. There is a host of new archival material that provides excellent insight in this issue. During the eighteenth century the Prussian state undertook numerous efforts to improve the balance of trade, innovate manufacture, and reform state administration. One element of this cameralist policy was intervention into commerce, for example, by founding state manufactories. Another was the promotion of so-called useful sciences along with experts willing to combine analysis of natural objects with technological ventures. Among the Prussian men of science, many were mining officials, artillery officers, pharmacists, and other “hybrid experts,” that is, individuals at home in the worlds of science, engineering, and among cameralist state officials. These men possessed advanced useful knowledge and skills and were acknowledged as authorities for solving technical problems. They engaged in commercial production or in technological projects supported by the Prussian state administration, the Prussian military, or the Berlin Academy of Sciences. At the same time, they were highly respected *Naturforscher* familiar with the literature of their field, publishing essays and books, enjoying memberships in academies and other learned societies. In their laboratories these men analyzed material substances regarded both as objects of nature and useful materials. The material culture of the eighteenth-century laboratory enabled them to shift with ease from natural inquiry to technological investigation and back again.



Silvia Caianiello

(Visiting Scholar, Istituto per la Storia del Pensiero Filosofico e Scientifico Moderno (ISPF), Consiglio Nazionale delle Ricerche, Napoli)

History and Philosophy of the Notion of Modularity in the Life Sciences

Silvia Caianiello’s research project on modularity in the life sciences offers a critical analysis of one of the key-notions of evolutionary developmental biology. This concept is particularly relevant as it marks the departure from the notion of organism still supported in the Modern Syn-



Silvia Caianiello

William C. Wimsatt, Complexity and Organization, SA: Proceedings of the Biennial Meeting of the Philosophy of Science Association, Vol. 1972, (1972), pp. 67– 86.

thesis to a new representation of ‘decomposability’ of living systems. The unquestionable appeal of the notion is connected to a new paradigm for naturalization, capable of encompassing several ontological levels, up to minds and societies, and therefore requires historical as well as philosophical investigation. Crossing several disciplinary borders, Caianiello’s analysis seeks to capture the overall relevance of a new metaphoric field connecting the life sciences, bio-computing, and the social sciences.



Tobias Cheung

Tobias Cheung (Visiting Scholar, Deutsche Forschungsgemeinschaft—Heisenberg Programm)

Stimulus-Reaction-Schemes in Psychologies, Anthropologies, Urban Systems, and the Life Sciences, 1830–1950

Organism-milieu-interfaces and stimulus-reaction-schemes are central to Henri de Blainville’s *Cours de physiologie générale et comparée* (1833) and Auguste Comte’s *Cours de philosophie positive* (1830–42). Théophile de Bordeu and the so-called Montpellier school had already explained gland activities and the sensibility of organs according to stimulus-reaction-schemes. Blainville and Comte refer to such schemes, combining instinct economies and Franz Joseph Gall’s organology of the brain. For both, the regulation of processes of the inner body and of the organism-milieu-interface were highly important. After Blainville and Comte, stimulus-reaction-schemes (related to organism-milieu-interfaces) appear throughout the nineteenth century and the first half of the twentieth century in various scientific domains (physiology, medicine, evolutionary theories, ecology, psychology, sociology, economy, and city planning).



Didier Debaise

Didier Debaise (Visiting Scholar, Humboldt Fellow)

Pragmatism and the Life Sciences. The Emergence of an Evolutionary Philosophy

This research project centers on Charles Sanders Peirce and Alfred Whitehead (philosophy of nature), John Dewey and George Herbert Mead (social sciences), and William James (psychology). It proceeds along three axes: first and foremost, it aims at a rereading of the pragmatist enterprise from the point of view of its evolutionary inheritance (Lamarck, Darwin, and Spencer). The major questions that constitute pragmatist philosophy (the theory of knowledge, the “functionalist” method, and the theory of experimentation) can then be relocated in the context of an evolutionary approach. Second, it seeks to analyze the manner in which an ensemble of scientific theories circulates in philosophy and how they are transformed. Finally the ambition of the project is to unfold certain epistemological implications of evolutionary theories. The pragmatists did not stop to insist on the fact that our theories of knowledge had been constructed in taking the physical world as their model and that they were thus inadequate for the interpretation of an evolutionary reality. This question of a transformation of models of knowledge towards biological realities is of vital importance today.

Sybilla Nikolow (Research Scholar, Institute for Science and Technology Studies, University of Bielefeld)

“Words Divide, Pictures Unite.” Otto Neurath’s Pictorial Statistics in Historical Context

Otto Neurath’s (1882–1945) famous slogan that words divide and pictures unite is frequently quoted in visual communication and media studies to support the apparent superiority of pictures over verbal languages. His Vienna method of pictorial statistics serves as evidence in proving that this assumption is correct. Looking at the contexts of its devel-



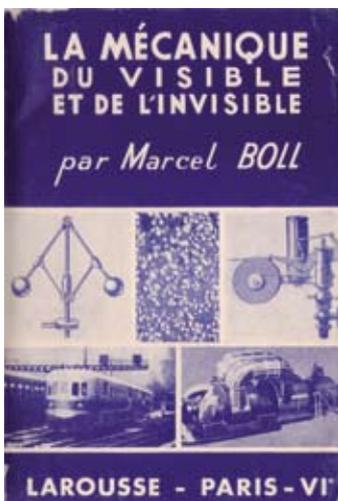
opment, meaning and use, actually reveals that the situation is more complex. Such a perspective also conveys an impression of the changes in society and media that occurred during the first half of the twentieth century, changes which not only produced innovations in visual culture, but which were also driven by them. Neurath’s method can be seen as a typical project of democratization and modernization of a period in which concepts of society and science were interrelated in a peculiar manner. The project illustrates how Neurath developed his communicative understanding of pictures along the methodological premises of the Vienna Circle to a counter-piece of artificial languages, while, at the same time, distancing himself from propagandistic methods and artistic forms of expression. It also shows how the method was systematically transformed from a product of Red Vienna to an International System of Typographic Picture Education (Isotype).



Sybilla Nikolow

Otto Neurath at the opening of the “World of Plenty” exhibition at the Food Conference in New York, circa 1944 (Isotype Collection, University of Reading).

Peter Schöttler (Visiting Scholar, Centre National de la Recherche Scientifique, Paris)
Marc Bloch and Scientism



The French medievalist Marc Bloch, born in 1886 and killed by the Gestapo in 1944, is probably one of the most frequently cited authors among historians. But one of the effects of this transformation into an icon is that the real author and his writings have faded in importance, as his work has been transformed, at best, into a stone quarry. While most of the literature on Bloch tends to present him as an historian of our time, a *toujours actuel*, Peter Schöttler attempts to situate the scholar and his work in his own time, marked, at least in France, by intellectual tendencies that are now depreciated as “positivism” and “scientism.” Schöttler’s work involves a wide-ranging empirical investigation of Bloch’s lifelong relationship with philosophy and



Peter Schöttler

Marcel Boll, *La mécanique du visible et de l'invisible*. Mouvements, mécanismes, moteurs, Paris, Larousse, 1948, 403 pp.

the natural sciences, which Bloch sought to expand to the historical disciplines, and the discursive formation Bloch described as “scientism.”

While the phenomenon emerged during the nineteenth century, the word “scientism” appeared only around 1900. With a few exceptions (like the late Casper Hakfoort), historians have taken for granted that it stood for a widely supported and influential movement. But as Schöttler’s study of French authors who described themselves as “scientists” reveals, this kind of radical scientific optimism concerns mostly outsiders, even if highly qualified and productive. One example is the chemist-physicist Marcel Boll, a student of Georges Urbain und Paul Langevin, who, in the late 1920s, became the decisive transmitter of the “Vienna Circle” to France, a movement that for Boll represented a novel and ideal form of “positivism,” e. g., “scientism.”



Mai Wegener

Mai Wegener (Independent Research Scholar)

Three Undiscovered Epistemologists: Paul Valéry, Kurt Goldstein, Jacques Lacan

The well-known poet Paul Valéry (1871–1945), the neuroscientist Kurt Goldstein (1878–1965), and the psychoanalyst Jacques Lacan (1901–1981) are less known as thinkers who also elaborated on epistemological questions. Each established his (respectively) poetic, neurological or psychoanalytic practice at a certain distance from their traditional disciplines (if poetry can also be called a discipline). Each felt encouraged to explore the conditions of these disciplines and highlight their place in the field between the modern sciences. Their epistemological reflections exceeded self-reflection; they examined the constitution of modern science as a whole. Each tended to focus on the life sciences, which had undergone radical changes in the nineteenth and at the beginning of the twentieth century. Paul Valéry was interested in the rules and structures common to both science and art, specifically the emergence of new objects prior to their definition as epistemic or artistic objects. Kurt Goldstein developed his experimental examinations by renouncing isolation as the basis of the scientific approach. In opposition to the traditional neurosciences, he posited a holistic understanding of the organism. Jacques Lacan’s epistemic interests were closely linked with his reformulation of psychoanalysis. Common to these three disparate approaches is the interest in language and the psyche’s relation to its bodily support. In their epistemic reflections, however, they assumed different positions. This project focuses specifically on the interaction between practice and epistemic considerations in the works of the three authors.

Additional Departmental Projects

Postdoctoral Fellows



Safia Azzouni

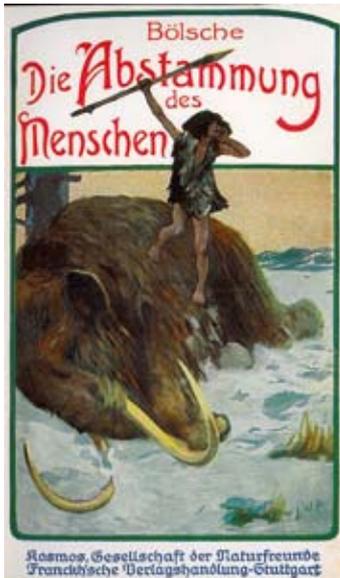
Safia Azzouni (Karl Schädler Postdoctoral Research Fellow)

The Popular Science Book: The Orientation of Knowledge Around 1900 Between Science and Popular Science

This project explores the emergence of popular science books in Europe during the second half of the nineteenth century and the role that these books played in the transfer—and the production—of knowledge. Popular science was written not only

by scientists, but also by professional popularizers. These authors—journalists, poets, or former scientists—often had their background in two fields: science *and* literature.

Over the course of the nineteenth century, the interest poets took in scientific experimentation and innovation continuously increased. Scientific topics and methods influenced positivist literary theory and the naturalistic movement in France and Germany. Accordingly, the research project addresses the question of the extent to which



the genesis of the popular science book was linked to the literary developments of the time.

Azzouni's project focuses on exemplary case studies from the realm of German popular science writings. Among the writers dealt with are the theorist of naturalism Wilhelm Bölsche, one of the most famous German popularizers up to the 1930s, and the mathematician, physicist, and philosopher Kurd Laßwitz, one of the first German science-fiction writers. In addition, Azzouni is investigating the role popularizers took in the philosophical debate over *Geisteswissenschaften* or *Kulturwissenschaften*. Furthermore, she treats the question of whether and if so, how, popular science influenced the production of new specialized knowledge.

The first volume of the German popular science series 'Kosmosbändchen' from 1904. Private.

Tamás Demeter (Postdoctoral Research Fellow)

Hume and the Ideology of the Scientific Revolution

Tamás Demeter's project has a double focus within a single framework. The framework is eighteenth-century science in the context of which Hume's epistemology and his "science of man" are studied. The first focus is on Hume's *Enquiry Concerning Human Understanding*. In this work Hume reflects on methodological and epistemological problems that arose in the context of the knowledge-making practices of contemporary natural and moral philosophy, and arguably, his solutions reflect the newly emerging worldview of Romanticism. From this perspective, the coherence of his work can be shown in a way that significantly differs previous interpretations. This part of the project combines the methods of historical epistemology and ideology-critique. The second focus is on Hume's *Treatise on Human Nature*. Here, Hume's anthropology is developed in the context of contemporary natural philosophy. The assumption is that Hume's account of human nature is fundamentally vitalistic, and belongs to the early phase of "Enlightenment vitalism," a movement that came to dominance during the second half of the eighteenth century and boasted intimate connections to early Romanticism. The project thus aims to recontext-



Tamás Demeter



Hume statue in Edinburgh (private photo).

tualize Hume, detaching him from the traditional historiographic reading in the context of the history of philosophy and of the Enlightenment, offering as an alternative framework an interpretation situated in the context of the history of science and early Romanticism.



Mathias Grote

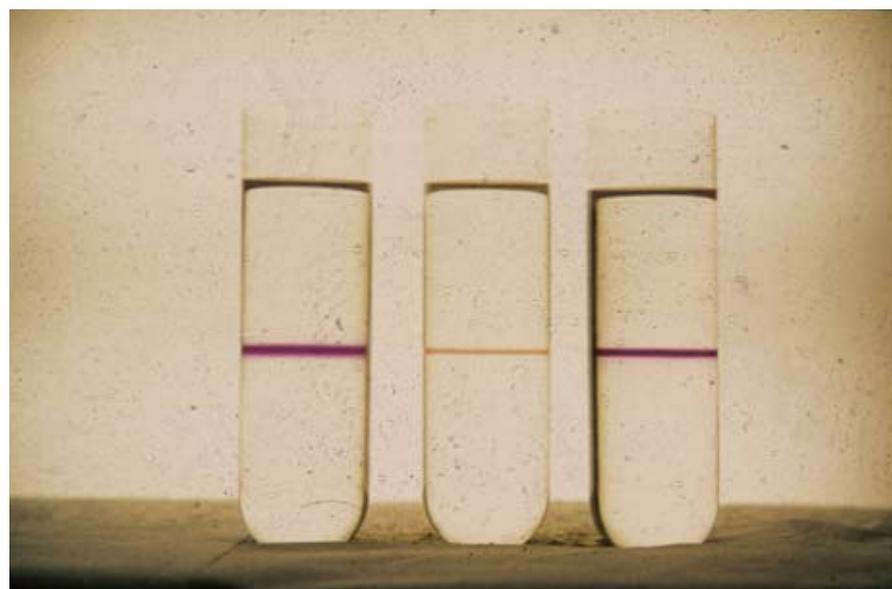
Mathias Grote (Postdoctoral Research Fellow)

Transformations of Scientific Objects: Cells, Membranes, and Molecules (1970–1990)

Around 1970, scientists in San Francisco made a startling discovery. In the cellular membrane of a salt-loving microbe, they discovered a protein similar to rhodopsin, the visual pigment in the retina of vertebrate eyes. Mathias Grote uses the case of research on microbial rhodopsins to pose the general question of how the objects of laboratory science and technology come into being and how they change in time. Within only five years, bacteriorhodopsin was transformed from a “labile object” at the intersection of different experimental effects to a substance prepared from cells and a thing-like macromolecule modeled in three dimensions. And yet, the story was all but settled after the boundaries of bacteriorhodopsin were drawn by the mid-1970s. The substance moved quickly into the focus of technologies, e.g., the production of photographic media or optical data storage. The story of microbiology and rhodopsin research, straddling as it does the worlds of fishery, trade, mundane scientific activities to membrane research, and molecular biophysics, offers a fresh perspective on the twentieth-century life sciences. Grote’s case study also makes explicit how the spatiality of cells, membranes, and molecules was explored and modeled. His work will provide a starting point for an epistemology of surfaces.



Molecular models. Slide displaying calotte models of retinal, the photoactive component within a bacteriorhodopsin molecule. The cellular membrane as a spatial object was tied to experimental interventions and representations on the molecular, compartmental, and cellular level.



Materials. Centrifuge tubes with fractions of cell membranes prepared as material for experimentation. Left, the purple membrane isolated from Halobacterium; centre, membrane depleted of pigment; right, a synthetically reassembled purple membrane.

Both figures ca. 1975. By courtesy of D. Osterhelt, Martinsried.

Hyo Yoon Kang (Postdoctoral Research Fellow)

Patent Classification and Scientific Taxonomies

The project explored relations between modern life science and intellectual property, a relatively unexplored field of research within the history of science, particularly from the viewpoint of patents as objects of the history of science. With the aim to trace the translation and representation of scientific and technological artifacts into the legal knowledge framework, Kang examined the emergence of scientific and technological artifacts as patentable inventions and their representation in patent classification. The guiding research questions were: what is the role of patents in scientific and technological practice? How are novel inventions understood and represented in the legal realm? Is the translation from the scientific realm to the legal one “truthful?” At the center of her study is a specific case study involving the creation of the latest patent class for “combinatorial synthesis,” a technology closely linked to developments in the fields of molecular biology, computer science, robotics, and instrumentation during the early 1980s.



Hyo Yoon Kang

Jeffrey Schwegman (Postdoctoral Research Fellow)

Metaphysics for an Enlightened Age: Condillac and the Construction of the Eighteenth-Century Human Sciences



Jeffrey Schwegman

Session at Madame Geoffrin's salon attended by Condillac (Musée du château de Malmaison).

Historians of the eighteenth century often speak of the birth of the human sciences during this period, even going so far as to portray “psychology,” “anthropology,” or “linguistics” as quintessential Enlightenment preoccupations. Yet there is much that is anachronistic about this view. In France, contemporaries often referred to these kinds of inquiries as “metaphysics,” viewing them as extensions of the problems that had motivated seventeenth-century philosophers like Malebranche and Descartes. Taking this perception seriously forces us to revise our understanding of this Enlightenment science in important ways. Eighteenth-century metaphysicians often had to struggle to assert the legitimacy of their enterprise, and they invested considerable

effort in constructing new kinds of identities for themselves. My project analyzes these struggles and the role they played in remaking this branch of knowledge. Its central protagonist is the influential Parisian *philosophe* Étienne Bonnot de Condillac (1714–1780), who did perhaps more than anyone else in France to redefine metaphysics. Yet throughout, Condillac’s place within larger scholarly networks and traditions and his interactions with readers and critics is emphasized. The project aims to move beyond accounts of the pre-history of social scientific ideas and offers a broader, cultural history of this important Enlightenment science.



Robyn Smith-Braun

Robyn Smith-Braun (Postdoctoral Research Fellow)

Encountering Hermes in the Unknown: Exploring Experimental Vitamin Research during World War I.

Robyn Smith-Braun’s project examines the second of three historical periods in the history of the vitamins. The context for her study is collaborative research carried out by British scientists on behalf of the British government during the First World War. Vitamin research was taken up by the U.K. in 1914 when the British government granted high political priority to questions of food supply and the quality of military and civilian diet.

Robyn Smith-Braun suggests that within the context of government-sponsored war research, British scientists witnessed the problem of vitamins shift suddenly from a problem of their physiological function in individual animals and humans to a problem of population health and food supply as means to meet various international and national nutritional needs. With this shift, vitamins were stabilized and developed as genuine bio-political objects even before they were isolated as biochemical objects.



Christina Wessely

Christina Wessely (Postdoctoral Research Fellow)

Welteis. Science, Pseudoscience, and the Limits of Cosmological Knowledge, 1894 – 1945

The project deals with cosmological *Weltanschauungen* around 1900 from both a cultural-historical and an epistemological perspective. Christina Wessely investigates



left: Cosmology as ‘Cosmotechnic’
right: Gigantensternexplosion: The birth of the glacial-cosmological universe.
Courtesy of Technisches Museum Wien, Hanns-Hörbiger-Archiv.

the social and political conditions that explain the careers of theories like the Theory of the Hollow Earth, the New Theory of Geocentricity, or the Cosmic Ice Theory. Wessely seeks to map the specific circumstances that led to the renaissance of esoteric cosmologies during the first three decades of the twentieth century—a period of time that is generally regarded as *the* age of modern science, a period in which all forms of irrational *Weltanschauungen* appeared to be marginalized. Taking as her first example the Cosmic Ice Theory, developed in 1894 by the Austrian engineer Hanns Hörbiger, Wessely argues that these cosmologies were not anachronistic, marginal ideas brought forward by some obscurantists but that these forms of “scientific esotericism” were in fact an integral part of the discourse of modern science. While on the one hand their authors explicitly disapproved of the development of modern science, sharing a popular fear that a purely materialistic, abstract science would lead to cultural decline, they were at the same time emphatically committed to the scientific discourse they sought to revolutionize in the direction of a New Science: a universal, holistic perception of the world.

Monika Wulz (Postdoctoral Research Fellow)

Collective Theories of Knowledge Around 1930: Edgar Zilsel’s Epistemology of Mass Phenomena

The project focuses on Edgar Zilsel’s (1891 Vienna–1944 Oakland, CA) epistemology, which underlies his philosophical, natural-scientific and sociological works in the course from the 1910s to the 1930s. This epistemology also underpins Wulz’s collective and procedural perspective on the production of knowledge. The project emphasizes the mutual relation of Zilsel’s conception of a variable reality on the one hand and his epistemological account of a procedural knowledge on the other. Based on this fundamental instability and diversification of reality and knowledge, Zilsel aimed to establish a unified methodological foundation for the natural sciences, history, humanistic studies, and everyday experience.

The project examines conceptions of collectivity in Zilsel’s epistemology in three dimensions: first, the understanding of epistemic objects as mass phenomena; second, internal collective conditions for scientific rationality based on procedural rules; third, the collaborative organization of scientific practices such as, e.g., data collection.

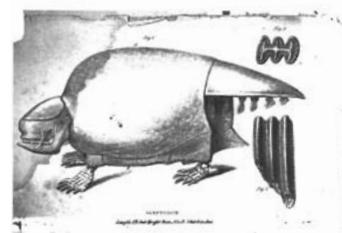


Monika Wulz

Short-Term Visitors and Their Projects

- *Marcel Beyer* (Writer in Residence, Dresden): “Explorations and the Nature of Language: Research as a Process.”
- *David Bloor* (Science Studies Unit, University of Edinburgh): “Rival Theories of Aerofoil, 1904–1926.”
- *Katharina Brandenberger* (University of Zürich): “Psychotropic Drugs in Clinics and Society.”
- *Thomas Brandstetter* (Institute for Philosophy, University of Vienna): “Knowledge and Imitation. Mimetic Experiments in the Natural Sciences around 1900.”
- *Jean-François Braunstein* (University of Paris I, Sorbonne and Institut d’histoire et de philosophie des sciences et des techniques): “History of Historical Epistemology.”
- *Charlotte Brives* (University Victor Segalen Bordeaux II): “Yeast *Saccharomyces Cerevisiae* as a Model Organism: Co-Emergence of a Natural Entity and an Epistemic Community.”
- *Vera Ehrenstein* (Ecole Polytechnique, Paris): “A Comparative Study (France/Germany) of the Participation of Lay People in the Scientific Debate about Genetically Modified Organisms (GMOs).”
- *Johannes Fehr* (Collegium Helveticum, Zürich): “On Ludwik Fleck’s Uses of Language as a Vehicle of Thought.”
- *Ragnar Fjelland* (University of Bergen): “On the Lifeworld Foundation of Science: Einstein and the Special Theory of Relativity; “Newton and Goethe on Reality and Scientific Method.”
- *Rodolphe Gasché* (Program in Comparative Literature, Arts and Letters, State University of New York at Buffalo): “The Concept of Process in Alfred N. Whitehead and Hannah Arendt.”
- *Amanda Goldstein* (University of California at Berkeley): “Tender Empiricism and Improper Bildung: Goethe’s Counter-Disciplinary Morphology.”
- *David Gugerli* (Institute for History, Federal Institute of Technology, Zürich): “Dealing with Human Capital.”
- *Ximo Guillem Llobat* (University of Valencia): “New Concepts of Food Quality and Safety in the Late-Nineteenth and Early-Twentieth Century. Artificial Sweeteners, Municipal Laboratories, and the Search for International Standards.”
- *Michael Hagner* (Chair for Science Research, Federal Institute of Technology, Zürich): “What is Dippoldism? On Sexuality, Criminality and Media Around 1900.”
- *Ina Heumann* (International Research Center for Cultural Studies (IFK), Vienna): “Styles of Science Communication. German-American Transfer Histories, 1945/1964.”
- *Philipp von Hilgers* (Humboldt University Berlin): “Mapping the Field of Vision. From Experimental Research of Reading to Pattern Recognition, 1860–1960.”
- *Giora Hon* (Department of Philosophy, University of Haifa): “On Magnification” and “Dissymmetry and Polarization in Biot and Pasteur. A Tale of Conceptual Analysis.”
- *Thierry Hoquet* (University Paris Ouest/Nanterre La Défense): “Sexual Selection: The Long Century of Absence, 1871–1972.”

- *Doris Kaufmann* (Institute for Historical Science, University of Bremen): “Extending Understanding Beyond Existing Borders’: The Discourse on Primitivism in the Cultural Sciences 1880–1930.”
- *Andreas Killen* (City College of New York/CUNY.): “The History of Early Cinema as a Discourse of Hypnosis and Suggestion.”
- *Marietta Meier* (University of Zürich and Collegium Helveticum, Zürich) “‘The Emotional Sting’—Psychosurgery after the Second World War.”
- *Jan Muggenburg* (Initiativkolleg “The Sciences in Historical Context”/University of Vienna): “Living Prototypes. A Media History of the Biological Computer Laboratory at the University of Illinois.”
- *Laura Otis* (Emory University, Atlanta): “Thinking with Images, Thinking with Words.”
- *Trevor Pinch* (Department of Science and Technology Studies and Department of Sociology, Cornell University): “Sound Studies and the Digitization of Audio.”
- *Irina Podgorny* (National University of La Plata): “America’s Mighty Skeletons.”
- *Jutta Schickore* (Department of History and Philosophy of Science, Indiana University): “Vipers, Venom, and the Vagaries of Experimentation.”
- *Oliver Schlaudt* (Philosophical Seminar, University of Heidelberg): “Measurement as Concrete Activity. Investigations on the Formation of Quantitative Concepts in the Natural Sciences.”
- *Thomas Schlich* (Department of Social Studies of Medicine, McGill University, Montréal): “The Perfect Machine: The Body and Modernist Surgery in Early-Twentieth Century Vienna.”



Glyptodon (from Woodbine Parish, *Buenos Ayres and the Provinces of the Rio de la Plata: their present state, trade, and debt; with some account from original documents of the progress of geographical discovery in those parts of South America during the last sixty years*, London: John Murray, 1839).

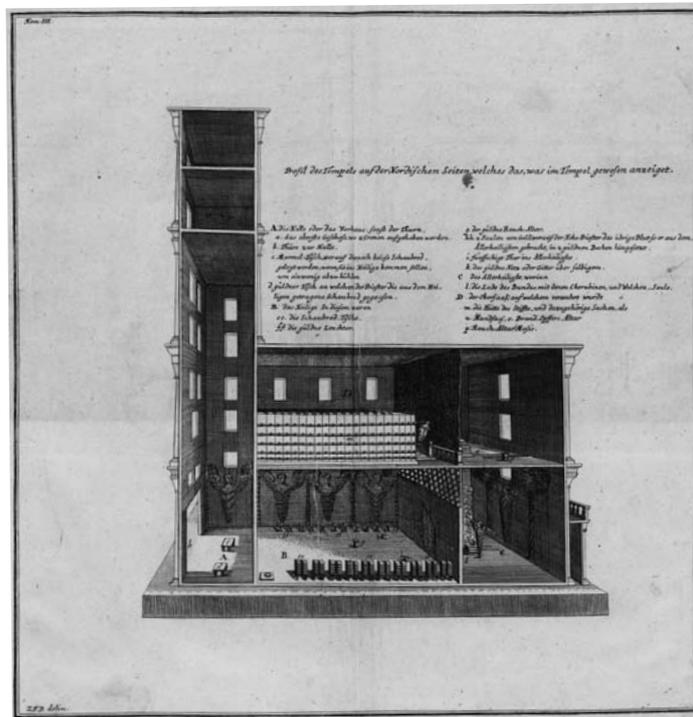


Standardized treatment of thigh fractures in Lorenz Böhler’s field hospital during WWI, ca. 1917. Source: Böhler papers, Department and Collections for History of Medicine, Medical University Vienna.

- *Max Stadler* (Imperial College, London): “Assembling Life. Models, the Cell, and the Reformations of Biological Science, 1920–1960.”
- *Georg Christoph Tholen* (Institute for Media Science, University of Basel): “Imagination and the Imaginary. Epistemological Studies on Concepts of Aesthetics and Mediality.”

- *Magaly Tornay* (University of Zürich): “History of Psychoactive Drugs: Psychoactive Drugs and Personality Concepts in Switzerland (1950–1990).”
- *Bettina Wahrig* (Technical University Braunschweig): “Poisons, Toxicologies, and the Figurations of the Abject, 1700–1900.”
- *Sonja Walch* (University of Vienna): “Sex Hormones in Laboratory Practice: Eugen Steinach’s Development of a Sex Hormone Theory, his Experimental Methodology and his Cooperation with Schering (1910–1938).”
- *Silvia Waisse Priven* (History of Science Graduate Program/CESIMA, Pontifical Catholic University of São Paulo): “From Signs to Remedies: Medical Ways of Knowing in the Eighteenth Century.”
- *Kelly J. Whitmer* (Fellow of the Max Planck International Research Network “History of Scientific Objects”): “Models of Solomon’s Temple as Objects of Scientific Inquiry—Models and the Middle Way: Performing Philanthropy in the Early Enlightenment.”

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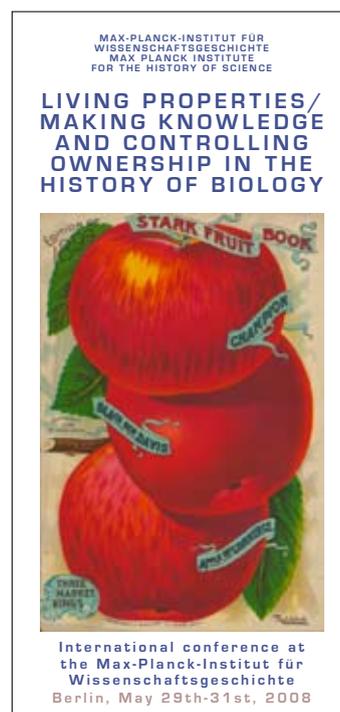


Halle's model of Solomon's Temple as a scene painting (skenographia), 1718, copperplate engraving.

- *Lambert Williams* (Harvard University, Cambridge, MA): “Historical and Philosophical Issues in Complex Systems: Models and Simulations.”
- *Charles T. Wolfe* (Unit for History and Philosophy of Science, University of Sydney): “History and Philosophy of the Concept of Organism, 1650–1950.”
- *Gábor Áron Zemplén* (Budapest University of Technology and Economics): “Scientific Debates Around the Modificationist Theories of Color.”

Other Departmental Activities

- “Living Properties: Making Knowledge and Controlling Ownership in the History of Biology.” Workshop, May 29–31, 2008. Organizers: Jean-Paul Gaudillière (INSERM, Paris), Daniel Kevles (Yale University), Hans-Jörg Rheinberger (MPIWG, Berlin).
- “Müller’s Vision. Das wissenschaftliche Vermächtnis des Naturforschers Johannes Müller.” Symposium, October 9–11, 2008. Organizers: Philipp v. Hilgers (Hermann-von-Helmholtz-Zentrum für Kulturtechnik), Laura Otis (MPIWG, Berlin/Emory University), Thomas Schnalke (Medizinhistorisches Museum, Charité).
- 11th Ischia Summer School on the History of Life Sciences: “From Generation to Reproduction. Knowledge and Techniques from the Renaissance to the Present Day.” June 28–July 5, 2009, Villa Dohrn, Ischia. Organizers: Zoological Station Anton Dohrn, Naples (Christiane Groeben); Department of History and Philosophy of Science, Cambridge University (Nick Hopwood); Max Planck Institute for the History of Science, Berlin (Hans-Jörg Rheinberger); Department of History of Science, Harvard University (Janet Browne).



Independent Research Group I + III

Ben Parry (2002) "TV World Order & The Technological Military Machine."



Independent Research Group I

Concepts and Modalities:

Practical Knowledge Transmission

Director: *Dagmar Schäfer*

The Independent Research Group established by Dagmar Schäfer in October 2006 focuses on how technical knowledge was perceived, transmitted and evaluated to form distinct, yet changing, “cultures of knowledge” in Pre-modern China in the period from the Song to the mid-Qing Dynasty (tenth to eighteenth century). Our holistic approach recognizes the complex institutional, cultural, social, economic and technical factors involved in the perception of technical knowledge and its transmission.

The first phase of the project, 2006–2009, concentrated on how historiography shapes our view to technology. Copious reflections on invention and innovation and their manifestations were examined to see how novelty was historicized in the culture of Pre-modern China. The products and processes of this research lead to reflection on the actual meaning of innovation and invention, and this lead in turn to a re-examination of the concepts and modalities with which they were expressed and the effect this had on their (possibly non-) implementation. The result was twofold: (1) a rigorous examination of the methodological base of the history of technology that aims at finding new cross-disciplinary approaches to technology and innovation cultures, and (2) a new collection of individual projects that pursue different aspects of the concepts and modalities in the transmission of technology. These new projects encompass: the development of an expertise culture; various discursive practices circling around practical and theoretical knowledge; the role of normative frameworks; the analysis of rhetorics of knowing; and issues of authentication, standards and standardization in material production.

In addition the group’s collective experience in researching Pre-modern China has been mined to provide the basis for the development of a variety of universally applicable digital tools, such as a GIS-Platform China Historical GIS and a Text-Database on Chinese ancient technological texts. These tools are intended to be of use to scholars studying any temporal period or geographic locality. The Group has also been involved in the ongoing Globalisation project initiated by Department I and the cooperation with the Comenius-Garden Berlin-Neukölln.

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Dagmar Schäfer’s intent focus on the cultural context of technology came to fruition with her book about a seventeenth-century Chinese intellectual’s approach to natural processes and material inventiveness, *The Crafting of the 10,000 Things: Knowledge and*

technology in 17th-Century China, University of Chicago Press, in press. The purpose of writings on crafts and technologies, its effects on and role in Pre-modern Chinese culture; the forms and fabrics of labor, the relationship of artisanal knowledge and scholarly knowing; and the place of nature, man and heaven, are all interwoven into a complex knot of issues tackled and addressed in this book.

Individual Projects



Dagmar Schäfer

Dagmar Schäfer (Head of Group)

Systems, Tools and Artifacts: technology transmission in historical China

The motivation for Dagmar Schäfer's latest project came from a desire to examine how and when technology became an 'object of knowledge' in Chinese Culture. This led to an enquiry into methodological concerns on how the history of technology is pursued and a search for what the Chinese perspective can contribute by adding a non-European perspective. A lacquer box (i. e. a product), a hammer (i. e. an instrument), a bridge across the Changjiang River (i. e. a technological system), and a forger

(the craftsman) form the heart of this project. They are the avatars used to analyze and selectively depict the historical development and conceptualization of technological evolution, in particular (1) the social, political, institutional, normative etc. mechanisms of controlling practical knowledge flow; (2) the various means of knowledge dissemination, texts, sketches, instruments, the products, man's skills, professionalism and expertise; (3) the locality or universality of technology; (4) the relation between use and production. The analysis of inscriptions on objects as a mode of knowledge appropriation and a mechanism of control is a crucial element of this research.



Inscription on a brick from the walls of Yingtianfu 應天府, modern Nanjing, circa 1373. Officials denoted the official hierarchy by inscribing the rank and name of officials involved in the production on one oblong side (right). On the reverse side (left) they recorded the foreman, craftsmen, and laborers by name and profession.

Grace Shen (Postdoctoral Research Fellow, York University, Canada)

The Relation between the Market and the Making: Song to mid-Qing coal culture, (tenth – eighteenth century)

Although coal use was not unknown in Europe at the time, Marco Polo’s thirteenth-century description of “the Black Stones that are Dug in Cathay, and Are Burnt for Fuel” (*The Travels of Marco Polo*, Book 2, Ch. 30) is famous for the sense of novelty and wonder that it conveys. In contrast, contemporaneous Chinese writings on coal often treat it as prosaic, even incidental. And yet, a closer look at these records of coal production and usage reveals changing relations between geographical areas, shifting patterns of economic circulation, and emerging anxieties about class, gender, environment, and power. The project investigates this complex “coal culture” with a view to understanding its technical specifications and its social and cultural landscapes. Based on preliminary findings, the main issues are organized into three themes:



Grace Shen

Workers at the mouth of a coal mine, Late Qing

Spatiality:

Coal production for household consumption was an extremely local activity, frequently conducted on a small scale by surplus agricultural labor for sale within the immediate market community. The quality and availability of coal products was therefore shaped by geological inconsistencies, and it is critical to understand how the spatiality of traditional coalmines embodied the limits of skill, the physicality of the earth, and a culturally conditioned understanding of market demand. Examination of transport mechanisms and flows of information about mining in literati texts then allow us to link discrete mining sites into networks of material and intellectual exchange that traversed both class distinctions and political boundaries. During the Ming (1368–1644) and Qing (1644–1911), these regional variations in local production and household use were increasingly distorted by urbanization, environmental pressures, and large-scale craft manufacture, but did not undermine existing mining or prospecting technologies.

Management:

State records show few attempts to monitor coal production, but a wide variety of controls on coal usage. These controls focused on making sense of the many grades of coal and coal by-products available, and suggest many of the state’s main energy consumption issues. Regulations also used specific quantity-quality combinations to regulate the cost-efficiency of craft industries and help redistribute available resources as environmental and economic patterns shifted.

Innovation:

The project approaches innovation in terms of the perception and valuation of emerging alternatives and uses literature, gazetteers, and mercantile records to illustrate the background of options and desires that influenced developments in both coal production and coal use. Chinese coal mines expanded production in ways that were

sensitive to the local environment, labor force, and market rather than to any anachronistic ideas of industrial efficiency. The goal of the second half of this project is to try and redefine what the standards of effective prospecting, mining, and consumption were and to trace changes in methods and scale as a function of contextual demands. This will then allow a more nuanced analysis of how traditional coal culture—encompassing technology, markets, and discourse—engaged with outside notions of coal as the driver of imperialism and industry in the nineteenth century.



Bruce Rusk

Bruce Rusk (Visiting Scholar, Cornell University, U.S.A.)

Making Things in Ming (1368–1644) and Qing (1644–1911) China

The uses and connotations of the word *zhen* 真 (authentic, genuine, true) in Late Imperial scholarly discourse were broad. This is clear from frequent appeals to *zhen* as an ideal in philosophical, literary, economic, and aesthetic works. Just as significant is the profusion of its opposites: words for scams, lies, insincerity, falsehood, untruth, adulteration, and even adulthood. Though not interchangeable, these antonyms point to a common if often absent value at the center.

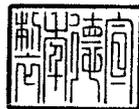
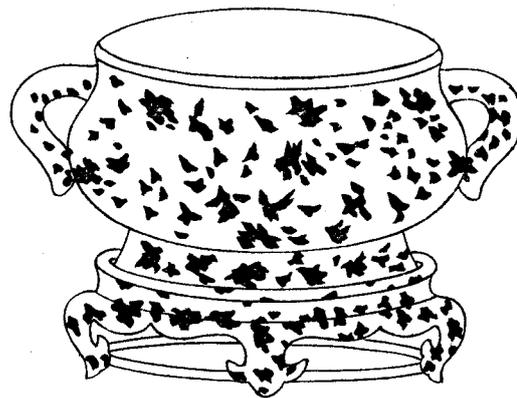


Illustration of a gold-flecked bronze vessel and its reign-mark from the early twentieth century book *Xuande yiqi tupu* 宣德彝器圖譜 [Illustrated register of vessels from the Xuande period].

This project explores authentication and the detection of fakes as an important function of technical knowledge in China during the Ming (1368–1644) and Qing (1644–1911) periods. It examines the construction of categories of genuine and false by seeking connections among documents and objects in a process that constantly pitted new forms of fakery against new methods of authentication. Devices meant to ensure authenticity repeatedly became the medium of its downfall. For example, the stamp-like

marks on porcelain from imperial kilns, meant to identify pieces for official use, became known to collectors as the sign of a quality piece. This gave makers of forgeries an easy-to-imitate target and helped create a market for knockoffs, which led in turn to new authentication practices.

Knowing how things were made was one way to avoid being duped. Many Ming and Qing descriptions of techniques of production seem incomplete as instructions for producers themselves; one reason is that the intended audience for at least some of these texts was users of the things rather than those who made them. Knowledge of how an artifact was or should be made could appear useful even to a consumer who would never apply that knowledge to production, and knowing how fakes were made helped potential buyers to identify them. For example, merchants could purchase pamphlets that described techniques for manufacturing debased silver ingots, with the expectation that through familiarity with the counterfeiter's art one could avoid

becoming his victim. This knowledge about things was, however, as manipulable as things themselves. The information by which a consumer judged a product also had to be scrutinized, since texts could be invented to supply a forged provenance and describe an illusory production process. Thus an important source for this project is a work of “technology fiction,” an account of the casting of hundreds of bronze vessels in the 1420s. Although supposedly consisting of documents contemporary with the project, the book was in fact forged in the late seventeenth or early eighteenth century, when such vessels were widely available for sale. Its detailed, if fantastical, descriptions of the casting process suggest how important technical knowledge could be in a consumer’s encounter with the market.

This focus on the rhetoric of technical knowledge is equally useful for approaching materials that are not suspect or deceptive. Information about production techniques was useful to many parties, not only those directly engaged in manufacturing; indeed most artisans neither needed nor had access to these written sources. Such documents are often a by-product not of the process of making things but of the circulation of those things in the marketplace and through society.

Rui Magone (Postdoctoral Research Fellow)

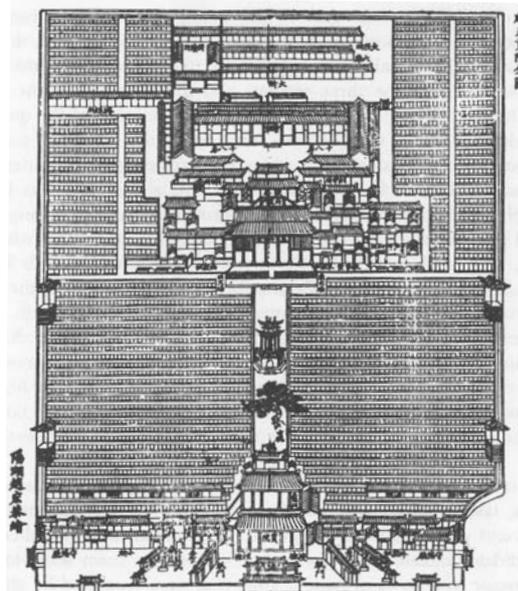
The Emergence of Expertise: professional cultures and the development of occupations

Rui Magone’s project examines the role of the civil service examination system as a feature relevant to the creation and identification of expertise including the fields of practical knowledge in late imperial China, focusing mainly on the Ming period (1368–1644) while including for comparative purposes the two dynastic cataclysms Yuan (1279–1368) and Qing (1644–1911) on its fringes. Open to the entire male population of the empire, both in terms of accessibility and frequency, the civil service examinations had dauntingly low quotas of success at all competition levels. As a main consequence, it became inevitable for repeatedly failed candidates, by far the large majority among the examinee population, to offer, expand, diversify, adapt or even radically alter their professional expertise in order for them to be able to make a living (and possibly finance further examinations).

In addition, the study also investigates the impact of social privileges granted to examination graduates, specifically tax exemption and impunity, which merchant and artisan lineages tried to access by strategically infiltrating the examination system with their own offspring. Protected by examination suc-



Rui Magone



The examination halls of Beijing, erected in the Ming dynasty and expanded through the end of the nineteenth century. Drawing by Zhao Hong 趙宏. In: *Shuntian fuzhi* 順天府志 [Shuntian prefectural gazetteer]. 1885 edition. *Juan shou* 卷首, illustration no. 4.

cess and its obvious benefits, including access to specific networks, lineages were able to expand their professional expertise, both in terms of quantity and quality.

On a theoretical level, the project shows that the two contrasting views of Chinese society (i. e., a mobile meritocracy vs. a rigidly defined social structure) was a direct result of the so-called ‘modernization narrative,’ which was first elaborated by Max Weber, later fleshed out in different versions by May Fourth, Marxist and Harvard School historians and finally radically revised.



Cathleen Paethe

Cathleen Paethe (Predoctoral Fellow)

The Bibliophile Qi Chenghan: book consumption and commercialization in late Ming China (1550–1644)

This project deals with one of the largest private libraries of the Late Ming period (ca. 1550–1644), the Dansheng tang 澹生堂 of Qi Chenghan 祁承爨 (1565–1628) in Shanyin. Private bibliophiles had become a common phenomenon in the Late Ming era’s commercialized world and its significant expansion in the supply of books, both in terms of quantity and quality. Representative collections were built up, with some of them projecting general knowledge ideals and others counting on individuality. Exemplifying by way of one book collector, this project delineates the changes of a library’s contents and organization within a period of great political, cultural and intellectual transformation. The bibliophile is examined in his schizophrenic role as the



Three book seals (*cangshuyin* 藏書印) of the bibliophile Qi Chenghan (1565–1628).

consumer and producer of books as well as in his function for the transmission and circulation of knowledge in China's late sixteenth and early seventeenth century. Particular emphasis is placed on the collector's social, intellectual and material environment. Keywords of interest are networks of knowledge and the purpose of knowledge for identity construction and social status. The representation of the library in the catalogue, its public face, gives view to the social function of knowledge assignments. The fact that Qi Chenghan established and enlarged the library of his father invites an examination of the issue of identity in its generational dimension and as regards the continuation or rupture of traditions. Within all that, intellectual and material networks were necessary to built up and maintain the library. In addition to the explicit, established or legitimated network patterns that are already widely known, this study will uncover implicit intellectual and political networks and analyze their forms and functions.

Falk Juri Knauff (Research Scholar), Dagmar Schäfer

Geographies of Knowing: China historical GIS

In collaboration with the IT Group and Department I

Historical objects, be they artifacts, persons, events or sources, carry beside their specific characteristics spatial and temporal relations. When representing these objects in a database these relations need to be included in the object's data model. Geographical Information Systems (GIS) are software systems specifically designed to process the spatial relations of objects. This information can be stored and displayed graphically in tables and maps, neighboring relations and structural indices can thus be analyzed and quantified.

The project aims at the development of a user-oriented web-based tool for mapping historical information by combining research results with data from other specialized online-databases. Scholars of the humanities, especially historians, will be able to store their own data within relational tables. These tables, as well as specific information from external databases, can be queried, combined and visualized in interactive thematic maps.

In a first step we implemented a prototype to investigate available and useful information technologies, scholarly workflows and the human-machine-interaction.



Falk Juri Knauff

→ Projects for Innovative Research, p. 221

Map of the journeys of Song Yingxing 宋應星 (1587–1666?). Red lines indicate his likely route while the icons indicate manufactures like silk production, pottery, armory and ship building. The web version of the map is dynamic.

According to the policies of the Max Planck Society we favored Open Source Software. The prototype web server and its integrated database are based on Postgres/PostGIS and Zope. In addition to the basic spatial information, political borders, rivers and coordinates of cities and villages, the user-specific datasets are stored. The prototype integrates the GoogleMaps-service for its mapping server.

After initial implementation the system became online available. Selected scholars utilized the system in various applications. The illustration shows travel routes taken by the Chinese scholar of the sixteenth century, Song Yingxing, and the locations of known centers of manufacture, as he was to become a famous narrator of crafts and technologies of his time. The map indicates what kind of technologies Song Yingxing may have experienced first hand during his travels.

The applications generated a vast amount of feedback, which served as starting point for the redesign of the systems configuration. For example, the next will include a mapping server to reduce the web traffic to GoogleMaps, which proved to be a bottleneck in the system. In addition a RESTful service was introduced in the server access, thereby increasing data safety and creating a flexible interface to provide access to other applications like the Scholarly Workbench project. To extend the range of data entryways we are implementing an automated identification of location names within digitized documents. The scholar will be able to link locations within thematic maps bi-directionally to location names within text documents. A newly designed web portal will enable an intuitive use of databases and GIS-technology even without in-depth IT knowledge.



Martina Siebert

Martina Siebert (Research Scholar)

Historicized Innovation: re-using and re-shaping the past

Based on the evaluation of content and intent of the encyclopedias on the “Origin of Things“ (*wuyuan* 物原) accomplished in the first phase on the group, the project explored the means and ways in which the material of these encyclopedias was re-used and re-shaped in other monographic works. Furthermore new sets of “origins” or “inventions” came into view.

When, in the late Ming (1550–1644), the standard set of “origins” presented by one of the fathers of the genre, Gao Cheng’s 高承 *Shiwu jiyuan* 事物紀原 (twelfth century), had become a solid layer of cultural sediment, more marginal or more specific innovations and changes in the technological processes, or in what they produced, attracted the attention of elite authors. They investigated the origins and technological changes of the artificial hatching of livestock such as ducks and chickens, and of entertaining animals such as goldfish and grasshoppers; they discussed where local expertise first emerged in the production of special kinds of tea, sugar or tobacco and they sought unique and irreproducible things. These interests could lead to enthusiasms for “fictional” objects such as walking sticks that glowed in the dark or tea cups that keep their contents hot for days. Here is where the line between origin and originality, respectively between reproducible and exceptional unique things, gets blurred. While some of the exceptional things depend on the expertise and skill of a mortal individual, the origin of others is hidden and mysterious and only one exemplar will ever exist. Another issue which authors of the Ming (1550–1644) and early Qing

(1644–1735) addressed as they wrote on origins, was the mention of lost knowledge or things. One prominent example is the so-called translucent mirrors (*touguang jing* 透光鏡), which seemed to project the engravings on the back onto a wall when hit by light. A technology well known in Han times (206 BC–220 AD), these objects were miracles to scholars of Song (960–1279) and subsequent dynasties.

At the International Conference for the History of East Asian Science, Technology and Medicine (ICHSEA) held in 2008 in Baltimore, a panel organized by Professor Karine Chemla (CNRS) and myself on “Concepts and Uses of Origin and Source in Chinese Knowledge Traditions” brought together scholars approaching the issue of “origin” from their specific expertise. The differences and overlapping of the role of “origins” in the areas of mathematics, historiography, cosmology and religion became apparent and further investigation on this broader perspective was launched.

In the process of my and other group member’s research projects, a number of historical texts relevant to the group projects were sent to China and typed as full text. In collaboration with the Max Planck Digital Library project affiliated to Department I, a detailed guideline for typing traditional Chinese texts, the *Data Entry Specifications for Chinese Text*, were designed. These *DE Specs* present a cutting-edge of in-depth capturing of layout and text features of Chinese traditional text and are without parallel even in Chinese speaking countries.

→ XML-Workflow, p. 63

As of November 2009, Martina Siebert took up a senior position at the Staatsbibliothek in Berlin, in the Cross-Asia Virtual Library South and South East Asia Division she helped to develop.

Feng Jiren (Postdoctoral Research Fellow)

Chinese Architectural Writings and Traditions of Building Technology

This project looks into the distinctive cultural connotations reflected in the technical contents of pre-modern Chinese architectural treatises, reconstructing the intellectual setting for preserving tradition and engaging in innovation in the building profession. Since the tenth century, master craftsmen, scholars, imperial architects and officials summarized practical building technology and methods in the form of technical manuals or scholarly writings. Two social groups, craftsmen and literati, are identified as the interplaying forces for formulating the knowledge field of architecture.

This claim is based on a philological inquiry into the semantic meanings of the professional terminology in the twelfth-century official building manual *Yingzao fashi* 營造法式 (*Building Standards*, 1103). Further investigations of the possible interactions between these social groups and their ways of perceiving the constructed knowledge of architecture have been conducted along with several case studies of these architectural writings, including the tenth-century unofficial manual *Mujing* 木經 (*Classic of Timberwork*) attributed to the master craftsman Yu Hao 喻皓 (fl. 965–989), the seventeenth-century scholar Ji Cheng’s 計成 (b. 1582) treatise on landscape architecture *Yuanye* 原野 (*Craft of Garden*, 1635) and scholar Li Yu’s 李漁 (1611–1680) notes on architecture *Xianqing ouji* 閒情偶寄 (*Occasional Remarks Jotted down while at Leisure*, 1671). It appears that scholars and craftsmen had been working towards shared architectural vocabularies and knowledge since the Song period; moreover, Ming



Feng Jiren

(1368–1644) and Qing (1644–1911) scholars who built on the legacy of the Song, actively engaged in the making of practical building methods and in instructing craftsmen. This interaction between professionals and literati in Song times is evidenced not only by the specific approach employed by Li Jie 李誡 (1035–1110), the writer of the *Yingzao fashi*, in his acquisition of building knowledge from the mouths of craftsmen, but also by other Song scholars who wrote about architecture using the same terminology as that used by those in the building profession. Contemporary accounts suggesting that Yu Hao, the tenth-century master craftsman, consulted scholars in his design of wooden pagodas also support this.

The architectural knowledge presented in writings is often claimed to be a guide to and for contemporary building practice; constructed architectural knowledge in writings was sometimes venerated fanatically as an ideal by both professionals and the learned society. A fine example is the *Mujing*, which Song accounts suggest served as guidance for building practices for almost one hundred years, prior to the official building standard *Yingzao fashi*. Yet artifactual evidence proves that a more comprehensive modular system had long been in use. The *Mujing's* impact on building practice lies in the fact that it ended the long-term silence of technical building manuals in history and thus was perceived as a rare classic by the professional and learned classes. Thus the importance assigned to it in Chinese architecture is largely a literary construct, and not an effect of its actual usage.

Since November 2008, Feng Jiren has been Lecturer in Chinese Studies at the Victoria University of Wellington, New Zealand.



Martin Hofmann

Martin Hofmann (Postdoctoral Research Fellow)

A Philological Archaeology of Master Craftsmen

Concentrating on biographical writings, this project inquires into the perception of craftsmen in Chinese historical writing. The core text of the project is the *Zhejianglu* 哲匠錄 (*Collected Biographies of Master Craftsmen*) by the eminent Chinese scholar, art collector and politician Zhu Qiqian 朱啓鈞 (1872–1964). This compilation of short biographies attempted to provide a comprehensive overview of the major historical representatives of all traditional Chinese crafts from remote antiquity until the Republican era. Introducing a unique set of specializations for the categorization of craftsmen, Zhu set out to reposition extracts from traditional historiography to form a novel perspective on the history of Chinese crafts, and moved the hitherto unstudied ‘minor’ practitioners into the foreground of historical research.

The research at the MPIWG has led to significant results concerning the importance attached to craftsmanship by pre-modern scholars. The analysis of biographical accounts in various Chinese literary genres has shown that even though craftsmen are not singled out as a category, accounts including craftsman skills frequently occur and play significant roles in the characterization of the persons.

In order to further clarify what role craftsman skills played in the portrayal of individuals in comparison to, for example, military achievements or skills as practitioners, the international workshop “Status and Skills—the portrayal of individuals in Chinese historiography, 10th–18th century” was held. Whereas philosophical research has given much emphasis to the conceptualization of skills, talents and capa-

bilities on an abstract level, this workshop approached the issue from the perspective of historio-social and -political contextualization. Probing into various text genres, the various contributions to this workshop looked into the interplay of social recognition and the veneration of skills in traditional China.

In a second step, this project investigates the historiographic approach and scope of Zhu Qiqian's *Zhejianglu*. Based on a hand-written manuscript by Zhu found in the National Library in Beijing, it has been possible to reconstruct the original structure and the coverage well beyond the information in the various fragmented editions of the *Zhejianglu* hitherto published. Moreover, the hand-manuscript revealed how Zhu Qiqian distinguished his approach from other, less comprehensive collections of craftsmen biographies, and in what ways he attempted to synthesize traditional Chinese historiography and Western concepts of science and technology. Zhu Qiqian's interest in the history of Chinese crafts and his idiosyncratic epistemological agenda provide an illustrative example of how traditionally educated Chinese appraised and re-invented their own cultural heritage in relation to a Western conceptual framework and under the pressing need to reconstitute their cultural pride and establish national identity. The investigation into this topic is continued in my current research at the Cluster of Excellence "Asia and Europe in Global Context" at Heidelberg University.

Martin Hofmann is Research Scholar in East Asian Intellectual History at Heidelberg University.



Complete map of the central axis from the Daqing gate to the Kunming Palace of the imperial palace, Beijing (ink on paper, no date)

Partner Groups and Cooperations

Cooperation Project with The Palace Museum (Gugong bowuyuan), Beijing

In collaboration with the MPG, and the First Historical Archive of China, Beijing
*Dagmar Schäfer, Guo Fuxiang, Luo Wenhua, Zhang Qiong, Zhang Shuxian,
Xu Xiaodong, Wang Guangyao*

**History of Exchange of Craft Techniques between the Imperial Court and the
Local: from the early Qing Dynasty until the Qianlong era (1735–1796)**

Book Publication

*Courting the Crafts in Qing China: Technology Diffusion and Communication through
Media in 17th-Century China*

Chinese Language Version, Palace Museum Press, Beijing 2010

English Language Version, to be published 2011

EDITOR *Dagmar Schäfer*

CONTRIBUTORS *Guo Fuxiang, Luo Wenhua, Zhang Qiong, Zhang Shuxian,
Xu Xiaodong, Wang Guangyao*

To a modern mind it is the Internet rather than the ancient Chinese court in which theories of technology diffusion and media effects can be fruitfully tested, because of its unique integration of modes of communication and forms of content. What then, can an inquiry into ancient traditions of knowledge circulation, in particular in the sector of practical know-how, offer to the modern world? It is safe to assume that Qing means and methods of communication cannot compete with modern technologies in velocity and volume. They are, however, compatible in their demand for accuracy, and in that their design that is geared towards global gathering rather than selective distinction.

In the variance of media and methods employed by the Qing the inextricable intertwining between communication techniques and patterns of human behavior come to the fore, revealing the complex dynamics of socio-political and technological endeavor within human history.

The Qing scholars subtly collated oral, textual and visual documentation, institutionalizing some parts while leaving others to the individual. The combination reveals Qing views to efficacy and standards, labor and expertise. Records on the management of men, and materials as well as the remaining artifacts display the tension between the ideals and realities in the production of material culture and their categories of arts, or crafts, practice and theory. In the historical view, negotiation and compromise characterize practical knowledge transmission, not the willful exertion of power or the enforcement of imperial rights. Manchu rulers acknowledged the political potential and social implications of technological knowledge transfer, and acted knowledgeably and thoughtfully about the technological side of practical knowledge transmission. Localities were equal partners, with individual craftsmen and artisans parleying their abilities to the central state and court rather than adjusting to pressure.

This book analyzes the details of practical knowledge transmission and actual production—what information was conveyed by sketches, by three-dimensional models, in texts or through the dispatching of experts, when, where and how—to expose how this era’s ideals clashed with the realities of knowledge circulation. Juxtaposing textual documentation with artifactual evidence, examples from porcelain, silk, jade, enamel and bronze production as well as interior design, illustrate the conditions under which locally produced knowledge moved into the court and was “universalized” (made universal); or vice versa, the role imperial knowing played for the construction and maintenance of standards of validity on the local level within fields of practical knowledge. The articles group around three themes: (I) Knowledge circulation within expanded technological systems, (II) Transplantation of new technologies and (III) Piggybacked knowledge transfer within consumption processes.

I. Knowledge Circulation within Expanded Technological Systems

Zhang Qiong (Visiting Scholar, The Palace Museum, PR China)

Imperial Power and Skills: survey of *Nei zhiran ju* in Qing Dynasty

As shown in the expression “clothes make the man,” the dress code is a crucial part of a country’s rite system; the Emperor’s clothes carried the meaning of supreme power and prestige: The acquisition of materials and products that represent imperial privilege became the imperative and fundamental issue for each emperor upon inauguration. Building manufactories and ensuring a supply of raw materials and skilled labor were immediate and graspable priorities, the transfer and importation of knowledge and the maintenance of existing wisdom were less tangible targets. The teaching and transmitting of traditional material techniques found its own channels, unlike the circulation of knowledge, including the modern broader sense of the circulation of techniques. The circulation of traditional crafts occurs mainly through practice and accumulation of experience passed down from generation to generation through the form of *koujue* 口訣 (rhymes to aid memory). The transmitting process is creative, individual and interactive. It is not transmitted through words and symbols but through the migration of the craftsmen who own the techniques. Through the analysis of success and failure of the *Nei zhiran ju* 內織染局 in the Ming and Qing Dynasties, we can see that the influence and control of power and social elements over techniques is limited.



Zhang Qiong



Portrait of the Qianlong Emperor (reg. 1736–1796) in his enthronement robe at the age of 25. Oil painting by G. Castiglione (1688–1766).



Wang Guangyao

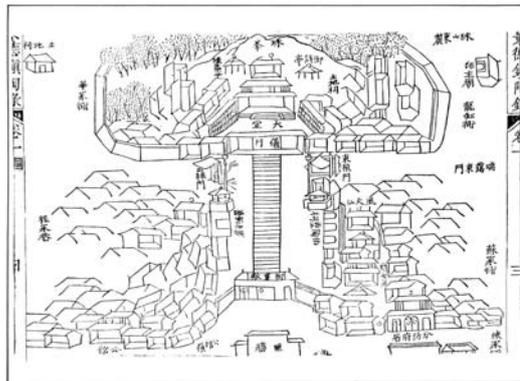
Wang Guangyao (Visiting Scholar, The Palace Museum, PR China)

Imperial Kiln Factory’s Management System and Official Sample System in Emperor Qianlong’s Period

The Imperial Kiln, called “the Imperial Porcelain Factory” in the Ming Dynasty and “the Imperial Kiln Factory” in the Qing Dynasty was established for the firing of imperial court porcelain in Jingdezhen, Fuliang County, Raozhou prefecture in Jiangxi province. Research into the archives on this kiln show that the official craft work industry in ancient China involved two specific elements that decided product quality: management technology and production technology.

The management technology was a standard used to guide and standardize production. The establishment and implementation of each part of the system no doubt promoted the development of production and vice versa. The production technology involved two major parts: the pure handicraft technology of the producers and knowledge gained from outside by the handicraft producers. The system whereby production followed samples limited folk kilns as they could not imitate and produce official sample porcelain which greatly reduced the positive development function that the official government could have played in the whole porcelain producing industry. Of-

icial samples also limited the craftsmen’s self-motivation and creation. After Chenghua’s period, the Imperial Kiln Factory became more formularized and rigid. Its basis on “specialized craftsmanship and workrooms” meant it gradually lost its creativity and flexibility in porcelain production.



Map of the Imperial Kiln location.
In: *Fuliangxian zhi* 浮梁縣志 [Fuliang district gazetteer].

II. Transplantation of New Technologies

Luo Wenhua (Visiting Scholar, The Palace Museum, PR China)

Technical Exchange between Qing Court and Tibet



Shakyamuni, gold, 85 cm high. 13th year of Qianlong reign (1746).

Research on bronze Buddhist sculptures and ritual instruments in the available sources, literature and archives, shows the active role of the Qing court as it assimilated Tibetan technology into the Imperial Workshop System. However, these advantageous foreign techniques had their own fates: some of them replaced traditional imperial methods, or were utilized in parallel; some were ultimately discarded. When exploring the historical reasons behind technical exchanges, we realized that they were not only driven by political, economic, religious and cultural factors as well as ne-

cessities of production, but were also dependent upon the impulse of accident elements, such as the individual taste and character of the current Emperor. Furthermore, there is no single determined fate for every technique in the Imperial Workshop, a multitude of factors could lead to complex and comprehensive possibilities.

Xu Xiaodong (Visiting Scholar, The Palace Museum, PR China)

Technical Interaction between the Court and the Local: painted enamel in the Kangxi and Yongzheng periods

Due to the absence of both literature and material objects, the introduction, production and utilization of cloisonné in the Yuan Dynasty (1271–1368) cannot be reconstructed. In the Ming Dynasty (1368–1644), the production and utilization of cloisonné was mainly restricted to the royal family, but there are no records. In contrast, with painted enamels there are abundant archives in the imperial palace, missionaries' letters, literature of western churches, and material objects. All of these records give relatively clear clues to the introduction and spread of painted enamel. In many ways, the firing of the painted enamel and the spread of the technique either within the imperial palace or in localities is fundamentally different to those of other Chinese traditional crafts such as porcelain, jade and silk, but there are some similar features. Therefore, examining the introduction and practice of the western painted enamel technique in Kangxi and Yongzheng period of the early Qing Dynasty shows how a foreign technique was developed with the direct promotion of the Emperor; and what functions the missionaries, the Emperor, supervisors of different ranks at the Palace Workshops, and the craftsmen performed in this process; how the Emperor's requirements were conveyed to specific craftsmen via officials and how the craftsmen met the Emperor's requirements; and how the technical exploration and practice of painted enamel were communicated between the Palace Workshops, Guangdong and Jingdezhen, and accordingly influenced the local technical development.

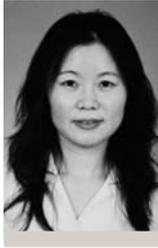


Xu Xiaodong



Water color illustration of the *Taoye tuce* 陶冶圖冊 [Illustrated Book of Enamel], sheet 18, firing kiln (bright kiln), glaze kiln (dark kiln). In his third year of reign 1738, the Qianlong emperor ordered the documentation of enamel production in the imperial kilns. The series is divided into 20 working processes. This section illustrates the glazing (lower right), transportation (middle right), assembling the oven for first glazing (upper right), and final firing (upper left).

III. Piggybacked Knowledge Transfer within Consumption Processes



Zhang Shuxian

Zhang Shuxian (Visiting Scholar, The Palace Museum, PR China)

The Technological Interaction of Architectural Interior Decoration during the Reign of the Qianlong Emperor

The skills and technology of architectural interior decoration reached its highest level in the reign of Qianlong emperor. But the building standards and styles of interior decoration in the Forbidden City were strictly in accordance with the regulations of the “Building Regulations” (*Gongcheng zuofa* 工程做法) and the “Regulations of Craft” (*Jiangzuo zeli* 匠做則例). Thus creativity and innovation were formally restricted. Nevertheless, technologies and products from specialist localities throughout China were accessed to enrich the interiors and enhance the decorations in the imperial palace. One prime source was Yangzhou, famed for its richly detailed inlay and carving technologies. Emperor Qianlong went to the Jiangnan area six times and stayed in Yangzhou every time. On his orders, designers in the palace mapped out the dimensions, designed the form and motifs, drew out sketches, and made models (*tangyang* 烫样) of Ningshou-gong architectural interior decoration. Then officers in the household department in Qing court (*neiwufu* 內務府) sent drawings and models to local

officers in Yangzhou. The local officer in Yangzhou prepared the decoration materials and organized the craftsmen. Local craftsmen in Yangzhou then made the interior decorations according to the drawings and models. This article analyses the centralized power of the Emperor Qianlong, the control of local technologies and how the technological interaction limited the dissemination of court technologies.



Interior room decoration of the Ningshou palace of the Beijing imperial palace. Red sandalwood with inlays made from jade, double sided embroidery, lacquer and bamboo in South-eastern Chinese style.



Guo Fuxiang

Guo Fuxiang (Visiting Scholar, The Palace Museum, PR China)

The court and Suzhou: Suzhou jade craftsmen at the court during the reign of Qianlong

During the reign of Qianlong in the Qing Dynasty, jade carving reached one of its peaks in China. One cause of this was the fact that the Qing government controlled Xinjiang where jade was produced and this ensured a sufficient supply. The construction of palaces and royal gardens increased the demand for luxury furnishings and decorative objects. As skilled practitioners, craftsman from Suzhou played a significant role in the craft communication of jade carving between the court and the local. This article investigates the modes and methods through which the outstanding craft skills of the craftsmen from Suzhou were harmonized with the royal taste represented by Emperor Qianlong in the process of jade carving. Questioning the reasons behind the selection of the craftsmen reveals Suzhou’s important position in jade-carving in

China at that time and the close relationship between Suzhou and the court. Further research into the craftsmen employed by the court demonstrates recruiting procedures, supervision practices and technical demands made on craftsmen. Finally the communication and knowledge transmission between the court and the local can be seen in the utilization of various models and sketches. In this case, communication media affected art and entertainment, as a model could make the transition and become an art object in itself.



Jade carving made from the remains of cutting a bowl for the amusement of the Qianlong emperor (reigned 1736–1796), depicting the scene of a woman in the shade of a Tong-tree (dated to 1773).

MPG/CAS Partner Group with the Independent Research Group at the MPIWG, Berlin at the Institute for the History of Natural Science (IHNS), Beijing

In collaboration with the MPG, the CAS and Department I

→ Approach and Achievements, p. 17

Research Projects

Sun Xiaochun and Han Yi (IHNS, CAS, PR China)

The Northern Song State's Financial Support of Astronomy

This project investigates how the state actually supported astronomical research from the tenth to twelfth centuries. Astronomy was politically relevant to the imperial state as competence in this field supported the legitimacy of rule and symbolized good governance. The purpose of this study is to see to what degree the state supported astronomical research financially. Based on sources such as the Collected Administrative Documents from the Song (*Song huiyao* 宋會要), we estimate the Song government's financial input in astronomy. This input constituted a considerable percentage of the state's total fiscal income. Compared with that of previous and later dynasties, this figure was remarkably high. A paper summing up findings was presented at the 12th International Conference of the History of East Asian Science, ICHSEA, Johns Hopkins University, Baltimore, U.S.A., 14–18 July 2008.

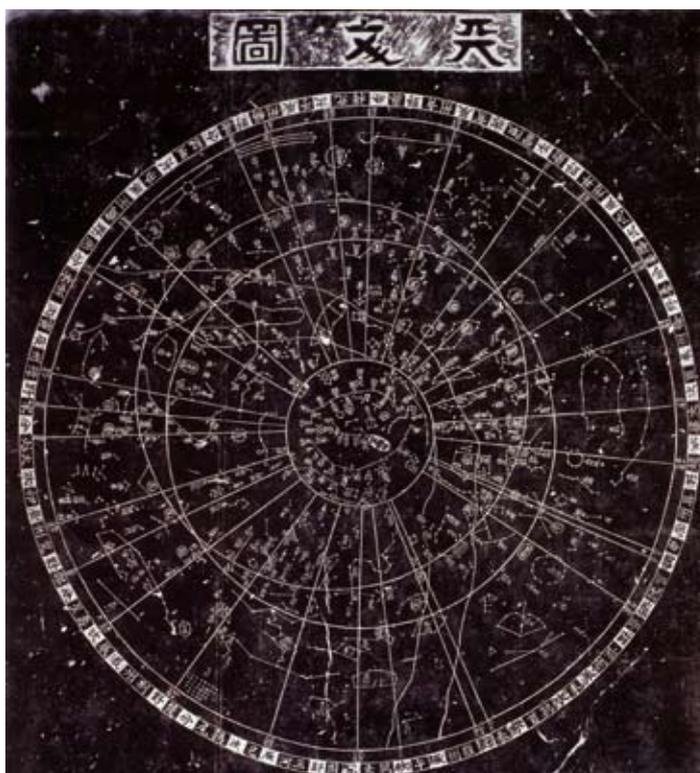


Sun Xiaochun

Li Geng and Sun Xiaochun (IHNS, CAS, PR China)

Gnomon Shadow Measurement and Cosmological Theories

The purpose of this case study is to see how practical gnomon shadow measurement was inextricably related to cosmological theories. The resulting paper, "Cosmos and Measurement: Gnomon Shadow Measurement in Ancient China" concentrated on the knowledge interactions between ancient Chinese astronomy and people's minds and was presented at the ICHSEA 2008 in Baltimore. A further development, the paper "Gnomon Measurement and State Culture," was presented at the workshop of Max-Planck partner group "Artisanal Practice and Popular Culture in Late Imperial China." In 2009, the work focus shifted to ancient star observations and archaeoastronomy. 2009 also marked an important discovery about gnomon observation as a calibrated stick was discovered in Taosi, which was probably the template of a gnomon. It is dated about 2200 BC.



Suzhou Stele Planisphere drawn around (1190 AD) of the Southern Song Dynasty by Huang Shang 黄裳 and engraved in stone in 1247. (*Suzhou shike*) *Tianwentu* (蘇州石刻) 天文圖 [Suzhou Stele Planisphere]. Huang made use of the results obtained from five large-scale surveys carried out between 1010 and 1106, Song period.

Zeng Xiongsheng (IHNS, CAS, PR China)

Divination for Farmers: a study of the *Tianjia wuxing* (Five Phases for Farmers)

This project investigates how astrology and divination were incorporated into books on agriculture to formulate a sort of “useful knowledge” for farmers. The paper, “Divination for Farmers: based on the *Tianjia wuxing*” was presented at our workshop, “Artisanal Practice and Popular Culture in Late Imperial China,” in 2008. Another related issue is its application in real life. As a book about long-term weather prediction, *Tianjia wuxing* put its focus on the forecast of flood and drought disaster. Taking the great floods in Jiangnan area of 1608 as an example, and combining *Tianjia wuxing* with other agricultural books and historical records, research has examined people’s flood awareness and agricultural response in the history of Jiangnan. Another paper, also related with rainfall, “The Invention and Development of the Rain Gauge in Ancient China,” was published in Taiwan.

Philip Cho (IHNS, CAS, PR China)

Sericulture and Popular Culture in Late Imperial China

Philip Cho’s focus is sericulture and popular culture in late Imperial China and the transformation of Chinese religious society from the sixteenth to nineteenth centuries and its impact on specific technical arts in China, including medicine, sericulture, porcelain and agriculture. He presented his paper “Sericulture Songs and the Urbanization of Silkworm Temples in eighteenth century Jiangnan” at the 12th ICH-EASTM, John Hopkins University, July 18, 2008. He is contributing to the edited volume on Artisanal Practice and Popular Culture in Late Imperial China based on

the papers presented at the workshop of the same name, organized by the Partner Group in June 2008. This volume will be published in August 2010.

Philip Cho has moved to Singapore to take up a postdoctorate position.

Visiting Scholars from the MPG/CAS Partner Group with the Independent Research Group at the MPIWG, Berlin at the IHNS, Beijing

Sun Xiaochun (IHNS, CAS, PR China)

Study of Shen Kua's Three Astronomical Treatises

Sun Xiaochun and Dagmar Schäfer's project on Shen Kua's *On Armillary Spheres* (*Huntian yi* 渾天儀) studies the relations between Cosmos, Computation and Measurement in Chinese astronomy. Nathan Sivin from University of Pennsylvania joined in 2009 to produce an annotated translation of the treatise on astronomical instrument, compiled by Shen Kua 沈括 to request financial support from the emperor. After discussions in Beijing in April 2009 it was agreed to expand the project to cover the other two treatises by Shen Kua, namely *On Water Clock and On Gnomon*. A monograph on these treatises will include annotated translations and two or three research papers on the subject. It will be published as a preprint at the Max Planck Institute.

Liao Yuqun, Li Xiaojuan and Sun Xiaochun

Digitization Project

→ p. 229

The Partner Group initiated collaboration between the two Institutes on digitizing primary sources on Chinese sciences. In May 2008, the Director of the IHNS, CAS, Beijing, Liao Yuqun accompanied, Li Xiaojuan and Sun Xiaochun on a fact finding trip to investigate and be trained in digital scanning technology. In April 2009, the Max Planck Institute for the History of Science sent two digital experts to the Institute for the History of Natural Science to help establish its digital group.

Han Yi (IHNS, CAS, PR CHINA)

The Technological Landscape across Space and Time in the Song Dynasty

Han Yi visited the institute to focus on two themes: The first was a focus on the development and change of technology of the Song tapestry, embroidery, printing and dyeing in Song Dynasty. This culminated in the paper, "Silk production, geographical distribution and Technology Transfer of the Song Dynasty," currently being prepared for publication in English with the assistance of Dagmar Schäfer. The second focus was the China GIS Project database. He participated in data collection, ancient and modern place names, and the seat of local government on the *Northern Song 24 Roads* and its changes. The database was displayed in Beijing on October 11–16, 2009. The project has become a successful example of the study on Historical Research and GIS system.



He Juan

He Juan (IHNS, CAS, PR CHINA)

Between External and Internal: alchemy and fire in Song China

He Juan examined descriptions of Chinese elixir masters to trace developments in fire technologies and heat control. An important issue is how such practices were made compatible with Chinese cosmological ideas. The research project “The Manipulation of Fire in Chinese Alchemy” inquired into how Chinese alchemists manipulated fire practically and dealt with it within the epistemological tradition of the Yin Yang theory, the Five Phases, the trigram and hexagram systems of *Book of Changes* (*Yijing* 易经). Several text readings within the Independent Research Group aided analysis. One introductory reading was on the ‘fire times’ part of *Shenxian liandan dianzhu sanyuan baozhaofa* 神仙炼丹点铸三元宝照法 (*Method of the divine immortals for refining the elixir and casting by projection the precious mirrors of the three originals*, preface dated 902). Another was on the ‘fire times’ and the preface of *Zhiguiji* 指归集 (*Collection of Basic Explanations*, circa 1163). The new focus on this latter text opened perspectives which lead to the paper “The Alchemy of Wu Wu in the Southern Song Dynasty”, presented at the 23rd Conference for the History of Science and Technology held in Budapest, Summer 2009.

Proposed Partner Group with India

In collaboration with MPG India, Department I and Department II

Travelling Cultures of Knowledge in a Global Context

Workshop to establish a new Partner Group with India

Planned for November 2010

Addressing the pressing need for the formation of a Partner Group between the MPIWG and India, Dagmar Schäfer initiated negotiations between the MPIWG, the Max Planck Society in India and concerned Indian Scholars. The application for funds for a start-up workshop has been approved. To define the research agenda for the projected Partner Group two workshops will re-evaluate the state of the field from a global perspective in order to identify and demarcate the most promising areas for joint inquiries. The first will focus on the historiography of knowledge in different cultural contexts and reflect on the changing status of science and technology in the societies under scrutiny. Part Two will examine practices of knowledge production, diffusion, and appropriation, as well as the multifaceted processes of their globalisation, with special emphasis on a critical assessment of concepts such as modernisation, domestication, etc. The concluding session of this meeting will be devoted to delineating the focus and scope of the work to be conducted by the projected Partner Group.

Visiting Scholars 2008–9

Michael Puett (Harvard University, U.S.A.)

worked on a research project entitled, “Changing Conceptions of Knowledge and Expertise in Early Medieval China,” part of a larger research group organized by Dagmar Schäfer on Experts and Expertise in Chinese Culture which culminated in a conference on the topic in March 2009. The focus was on the period covering the first few centuries of the common era in China. This was a distinctive period in Chinese history, when empire was declining and new organizational forms were being innovated. During this period, a complex debate developed over conceptions of knowledge and expertise: how is knowledge defined, who possesses such knowledge, who has access to it, is it rooted in the past or can it be achieved through personal discovery, etc. The goal of the research was to study this debate, trace its development, and explore the significance of the positions taken.



Michael Puett

Chu Pingyi (Academia Sinica, Taiwan)

focused on how people dealt with the disease, *sha* 痧, which was thought contagious in Qing China. Thanks to the extremely efficient interlibrary loan provided by the institute, access was gained to the Unschuld collection of over 500 medical manuscripts. The knowledge gained from this material has led to reflection on how classificatory model of thinking in the Chinese medical field is formulated through visual aids. He feels that “medical reasoning in Chinese medicine” will be an interesting line for future study. Another unique and interesting text is a verse about *sha* and its treatments. Like many other Chinese medical knowledge, *sha* also went through a process of popularization. Its symptoms and prescriptions were written in the style of songs to make it easy to memorize. Although we do not know who read such versions, it will be very useful to compare it with other theoretical texts of *sha* to see how medical knowledge was popularized.



Chu Pingyi

Dhruv Raina (Jawaharlal Nehru University, India)

prepared a proposal with colleagues from the MPIWG to organize a workshop in India in 2010, as a prelude to the establishment of a partner group. In addition, he wrote and presented a paper on the reception of the work of Robert K. Merton in India at a workshop on the future of the sociology of science in Budapest. But most important was the opportunity to access and work in the MPIWG library reading up on the histories of astronomy and mathematics produced in Europe in the late eighteenth and early half of the nineteenth century as part of his larger study on representations of non-Western sciences in nineteenth-century histories of science.



Dhruv Raina



Francesca Bray

Francesca Bray (University of Edinburgh, U.K.)

The project, “Significant Technologies: rethinking technology as a heuristic in Chinese history” reflects a recognized need within the broader discipline of the history of technology for innovative approaches aimed towards overcoming Eurocentrism. It also addresses the post-Needham distaste for technology as an object or tool of analysis among historians of imperial China. As a first step towards identifying productive new directions, together with Dagmar Schäfer, Francesca Bray proposed a critique of anthropology as a keyword, inspired by a more comparative, anthropological approach to technology both as concept and as object. A sequence of reading groups which compared the assumptions, methods, and interpretive frameworks of critical essays on technology by feminist historians of technology, legal historians, historians of technology in non-Western societies, phenomenologists, anthropologists, sociologists, and STS scholars across a range of disciplines introduced the concept. Then, key critical historians of technology were invited to the MPIWG for sustained discussions within the IRG. The resulting colloquium series, *Technological Cultures: Themes and Methods in the History of Technology*, is currently under way. Invited speakers include two historians of China, two of Japan, one of the nineteenth-century United States, one of Cold War Europe, and one of industrializing Indonesia. Among the themes structuring our discussions with the speakers are: how and why technology became important to them as historians and its place in their broader historical analysis; how they employ the term technology and why; how they select and read relevant primary sources; how they might recreate the technological culture of the society they study; and how they locate themselves and their perspectives on technology in broader historical debates.



Song Lingping

Song Lingping (The Palace Museum, PR China)

As director of the joint research project “History of Exchange of Craft Techniques between the Imperial Court and the Local” organized with the Palace Museum, China and the Max Planck Institute of History of Science, Song Lingping took the opportunity to discuss the developments and directions of the research with Dagmar Schäfer. She also gave a lecture on her recent study of the *Jinzhuan* of the Qing Dynasty and pursued research on the ritual objects and vessels of the Qing Dynasty.

→ Palace Musuem Cooperation, p. 170

Events

Status and Skills Workshop

The Portrayal of Individuals in Chinese Historiography, 10th–18th Century

September 4 & 5, 2009

PARTICIPANTS *Chu Pingyi, Joseph R. Dennis, Martin Hofmann, Dorothy Ko, Peter Lorge, Angelika C. Messner, Dagmar Schäfer, Zuo Ya*

Colloquium Series: Technological Cultures

A series of colloquia and discussions explored the potential of emerging approaches on “technology” and “technological cultures” to generate productive new methods and themes. Invited participants gave informal presentations of their work as a point of entry into a broader debate.

- **January 19, 2010**
Technological Culture in Meiji Japan *Morris Low* (University of Queensland)
 - **January 26, 2010**
Roundtable About Rules and Standards: Defining the Validity of Work and its Products
Christian Lamouroux (EHESS, France/CNRS, Beijing), *Christine Moll-Murata* (University of Bochum), *Bruce Rusk* (MPIWG/Cornell University)
 - **February 16, 2010**
Technology: Defined by Exclusion? *Nina Lerman* (Whitman College)
 - **March 16, 2010**
A Strong Multiculturalism: De-centering the Themes in the History of Technology
Suzanne Moon (University of Oklahoma)
 - **April 6, 2010**
Perspectives on Technology: Towards a History of Emergency *Gregory K. Clancey* (National University of Singapore)
 - **June 1, 2010**
(Cold War) Technologies: Political Constructs, Material Practices, Cultural Meanings *Karin Zachmann* (TU München, Zentralinstitut für Geschichte der Technik)
- to be continued



Short-term Visitors

Peter Bol (Harvard University, U.S.A.)

Peter Bol's visit was aimed at improving our mutual understanding of digital humanities projects generally and finding possible collaborations between Harvard's Center for Geographic Analysis and the Institute. In addition and more specifically the intention was to explore possibilities for creating semantic interoperability between projects relating to the geography and prosopography of Chinese history. That line of development was temporarily suspended by the untimely passing of Dr. Malcolm Hyman. Nevertheless, meeting with colleagues at the Institute, learning about their research, and spending time in Berlin were greatly rewarding.

Anthony Barbieri-Low (University of California, U.S.A.)

studies the role of artisan inscriptions on manufactured products during the Ming and earlier periods. Extensive discussions within the reading group threw a new light on the inscriptions he had been studying for years. His presentation and seminar on artisan literacy in early imperial China led to ideas for a potential future workshop on literacy, writing, and control of labor in early state-level societies. The potential benefits for further research was made clear by exposure to and training in the digital projects at the MPIWG, the China Historical GIS and the Database.

Timothy Brook (Oxford University, U.K.)

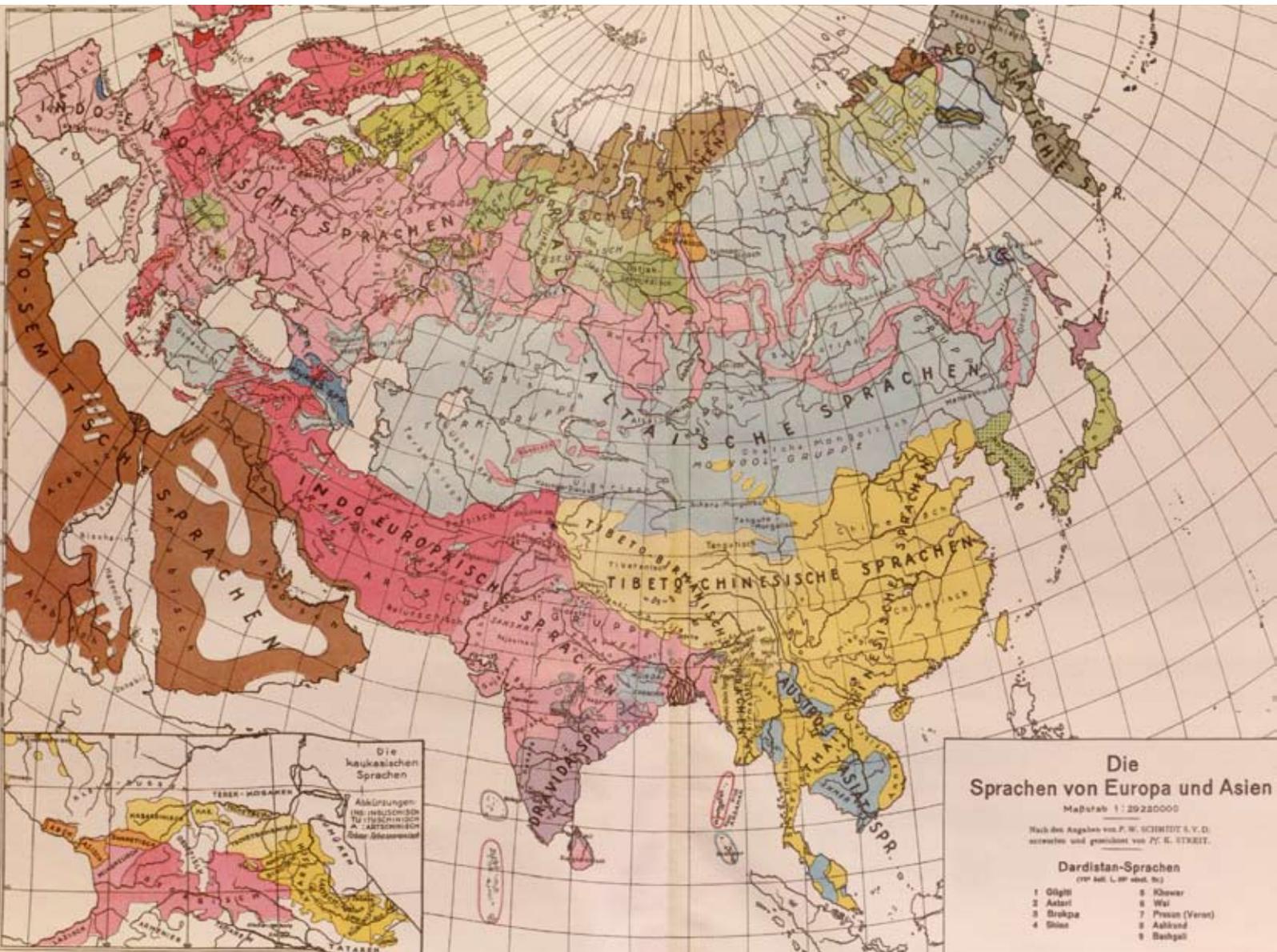
presented a colloquium on "Forgery and the Production of Luxury Commodities in Late-Ming China." The last century of the Ming dynasty, and even more the last half-century, was a period when expensive commodities manufactured not for the imperial household but for the open market were produced and consumed on an unprecedented scale in China. The talk explored what can be learned about manufacturing from the writings of late-Ming diarists who engaged in conspicuous consumption. A focus on forgery was used to understand the methods manufacturers used to respond to commercial demand.

Andreas Janousch (Universidad Autónoma de Madrid, Spain)

studied the changes in salt production methods at Hedong salt lake, Shanxi province, in late imperial China with a special emphasis on the ways in which technological change and innovation interacted with and were reflected in local religious practices. Local temple spaces, cults and myths associated directly with the salt resources and its technological exploitation became a contested arena during late sixteenth century in which the imperial state, through its local representatives, and local society, under the leadership of salt merchants, negotiated their stakes in the production of monopoly salt and in the control of technological innovation. Thus, the study is conceived as a first inquiry into the broader area of the relationships between technology, religion/rituality and the State in China. Frequent and thorough discussions with

members of the Independent Research Group have helped direct the investigations towards a more fundamental inquiry into the organization of space and the aspect of spatiality in workshops and in worship, i. e., to explore spatial arrangements of work processes and of ritual space in temples.

“The Languages of Europe and Asia.”
Representations of linguistic diversity also
found their way into accounts of human
biological diversity; see also image
“Sprachenkarte” on page 192.
Source: W. Schmidt: Die Sprachfamilien
und Sprachenkreise der Erde. Atlas von
14 Karten, Hamburg: Helmut Buske Verlag
1977 (Reprint von 1926), Karte I



Independent Research Group III

Historicizing Knowledge about Human Biological Diversity in the 20th century

Director: *Veronika Lipphardt*

This research project seeks to contribute to a cultural history of biological knowledge by investigating both the professional and societal dimensions of exploring human biological variation. It explores the places, social contexts, and historical moments that defined the production of knowledge about human biological diversity. It adopts a transnational approach and focuses primarily on colonial and post-colonial case studies. The conceptual novelty of the project is that it understands “Knowledge about Human Biological Diversity” to mean knowledge not just about ‘race’, but also, more generally, about human variation that was considered to be ‘biological’ or ‘caused by nature.’ This allows the research team of this project to trace continuities and connections that historians have largely neglected. The project’s methodological innovation lies in its combination of historical and STS methods, reflecting the relevance of both practices and narratives in knowledge production. It also enables the group to approach a highly controversial field of biological inquiry that has not come to its historical endpoint yet.

The research group addresses the following questions: How did life scientists and anthropologists imagine, research, and describe human variation during the twentieth century? How did they narrate the formation of diversity? Which classifications, practices, concepts, and tools did they employ in order to assess human biological diversity? What kind of human variation did they consider to be ‘biological’, and how did they conceive of ‘nature’ as the cause of human variation? How, if at all, did they bring those supposedly ‘biological’ aspects of diversity in relation with those they perceived as ‘cultural?’ Was human biological diversity their primary epistemic object, or rather an indispensable epistemic instrument? And how were contemporary social and political valuations of diversity or unity of mankind reflected in their work?

At another level, the group also addresses historiographical issues, i. e. restraints and blind spots in the common understanding of the so-called ‘history of race science.’ Historians have often reduced notions of human biological diversity simply to the concept of ‘race.’ However, scientists used the term ‘race’ to represent human biological diversity only in the first half of the 20th century. After WWII, geneticists and physical anthropologists researched human biological diversity through the lens of ‘population.’ They supposed that this concept would bring about a more dynamic

understanding of a biologically evolving group of humans. The expression ‘human biological diversity’ was first used in the 1960s and has since come to cover genetic diversity (in a Neo-Darwinian sense) mainly. The project thus also takes into account understandings of human biological variation that do not draw solely on the concept of (Neo-Darwinian) genetic variation.

Furthermore, each of those disciplines involved in the investigation of human biological variation has its own narrative of the discipline’s engagement with this contested issue. Physical anthropologists, population geneticists, and human geneticists tell very different stories in this respect; the narratives of historians, historians of medicine and/or science, social scientists, and cultural anthropologists, likewise, differ from the former and from each other. In addition, Western historiography has concentrated on two notorious examples of ‘scientific racism’: Germany under the National Socialist Regime and the racial divide in the United States. Not enough attention has yet been paid to investigations of human biological diversity in colonial and postcolonial contexts.

Beginning with an intensive two-week-workshop in September followed by numerous subsequent reading and discussion meetings, the group has already formulated a shared theoretical framework and developed mutual interests and aims. A number of joint follow-up projects are emerging from these discussions, as well as a shared understanding of whom we would like to invite.

The five-year research project is part of the cooperation between the Max Planck Institute for the History of Science and the three main universities in the German capital, the Free University of Berlin, the Humboldt University of Berlin, and the Technical University of Berlin.

Project

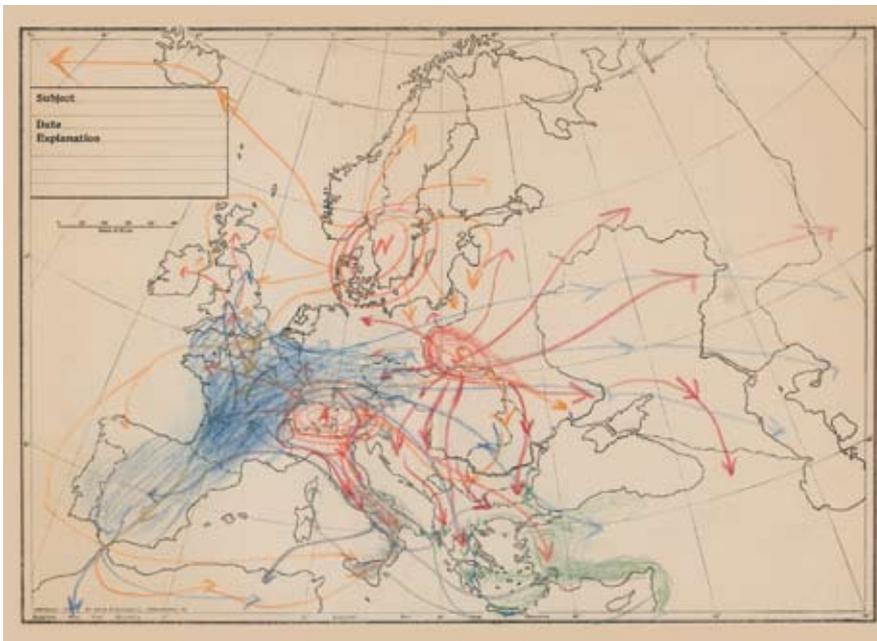
From Field Surveys to Biobanks. A History of Knowledge about Human Biological Diversity

Veronika Lipphardt (Research Group Director)

Susanne Bauer (Research Scholar)

Alexandra Widmer (Postdoctoral Research Fellow)

This subproject approaches the knowledge production about human biological diversity in the 20th century from the broad perspective outlined above. It draws on three case studies from different regional contexts and different time periods (see individual projects below). These case studies make it possible to address epistemological questions and at the same time to reveal the political and social dimensions of research into human biological diversity. The project traces tacit cultural assumptions as well as visual representations on their travels through research, discourses, and practices of diversity. It also considers the role played by different concepts of evolution, migration histories, and origins, and further raises the question how knowledge about diversity intersected with understandings of heredity, reproduction, and health.



Map of Migrations in Europe by Ales Hrdlička. This sketch of Ales Hrdlička is emblematic of a common way of perceiving and representing human biological diversity in its formation and geographical conditions.

Source: Ales Hrdlička Papers, box 138 (Folder Maps), National Anthropological Archives, Smithsonian Institution

The wave of colonial expansion at the end of the 19th century provided new opportunities for life scientists and physical anthropologists to assess ‘races’ of people based on body measurements and other biological markers. Researchers strove to map a chasm between themselves and colonized peoples. At the same time, knowledge about

human biological diversity played a more instrumental, but nevertheless significant role in other scientific endeavours, as for example in demographic, anthropological, and medical investigations of the process of de-population in the New Hebrides in the first decades of the 20th century.

To avoid the legacy of racial biology after the Second World War, scientists drew on the concept of 'population' not only in human genetics, but also in the emerging field of applied biomedical sciences. They assumed that this concept would bring about a more dynamic understanding of a biologically evolving group of humans, in contrast to static and typological notions of 'race.' However, the notion of 'population' produced new epistemological challenges that human geneticists tried to meet by pursuing empirical studies that warrant close scrutiny by historians of science. In order to acquire a sample population that would represent a biologically evolving group of humans, geneticists began to conceive of minorities as 'isolated populations.'

With the advent of molecular genetics in the late 20th century, human geneticists turned to the now available molecular methods to investigate human biological differences as an epistemic object. This is an ongoing process which has already prompted many controversies in the fields of medicine, genetics, the humanities, and in public discourse. However, human biological differences also played an instrumental role in new biomedical fields. For instance, epidemiological risk modeling at the end of the 20th century draws on a host of novel molecular variables—"biomarkers" of disease, susceptibility, or exposure—which are often used in conjunction with social categories such as gender or ethnicity. The project explores the historical continuities, as well as the effects of ever further differentiation into subpopulations, as these "biomarkers" circulate in biomedicine and society.

In all three case studies, the historical sources account for notions of 'unique populations' as a source of information on diversity. Actors draw on assumptions of 'quasi-natural experiments' that operate either on an evolutionary or on an environmental scale. Initial results of this fruitful team-work will be presented in a co-authored paper at the Institute's colloquium on May, 5th 2010.

From Field Surveys to Biobanks

Individual Projects



Veronika Lipphardt

Veronika Lipphardt (Research Group Director)

Tread Warily. Human geneticists in the field of 'human variation' between the paradigms of 'race' and 'population'

In the early 1950s, geneticists and physical anthropologists recognized a professional dilemma. On the one hand, they still found it important to study human biological variation empirically, and even more so in the light of the new evolutionary synthesis. On the other hand, the term 'race', that until then had prevailed in political and scientific debates, now provoked nothing but suspicion and criticism from other scholars and the public. Scientists responded to this challenge by engaging in political lobbying activities, discussing the issues at stake within the scientific community, and redoubling their empirical research.

In the last decade or so, historians have already taken notice of the first two kinds of activities. In several UNESCO initiatives and statements—accompanied by a number of popular publications, scientists from a variety of disciplines took a decidedly anti-racist stance. At the same time, they initiated internal debates on methodological and conceptual issues. This project concentrates on the empirical work of the same geneticists and physical anthropologists in the 1950s and 1960s.

In general, historians have noted a conceptual shift from notions of ‘race’ to notions of ‘population’ after World War II, along with methodological shifts from anthropometric to serological and later to molecular methods. But these shifts did not take place all at once; it was instead a very complex process that led to conceptual inconsistencies on the part of the scientists. Lisa Gannett has argued that ‘race’ was by no means replaced by ‘population’, but that the typological race concept was transformed into a concept of population that was supposed to be grounded in statistics. Other accounts show that it was not until 1962 that scientists began to conceive of human diversity as being structured into clines (instead of a few, easily distinguishable races). In the previous decade, physical anthropologists, human geneticists, and serologists had attempted to argue that their respective disciplines and methods were the best way to explore human diversity. Following the establishment of racial anthropology and human genetics in the 1920s up until the time of the 1960s, scientists considered serology an objective means of studying human races, though it could be employed for very different purposes as well.

Thus, contrary to what some historians have suggested, physical anthropologists and geneticists did not abandon racial concepts in the postwar period. Yet the attention of geneticists like Dobzhansky and Dunn shifted to problems of human evolution (selection, isolation, mixing, migration, drift and so forth). The question of what their empirical work reveals about scientific practices and understandings of human diversity at the time lies at the center of this project. So far their notions of ‘isolated’ and ‘mixing’ populations have proven to be crucial in this respect: By establishing a sample population with the intention to represent a biologically evolving human group, they drew on cultural, political, and historical narratives of social isolation. At the same time, narratives of isolation and mixing accounted for continuities between the ‘old race science’ and ‘the new populational approach’: They were, so to speak, cornerstones of all approaches towards human genetic diversity.

As mentioned above, research on human biological diversity was not limited to the US, Germany, or other Western countries. To a large extent, human diversity research has been pursued in the form of transnational investigations in colonial and post-colonial contexts and in other politically explosive circumstances, where scientists hoped to find ‘isolated’ or ‘mixed’ groups that could be studied under clearly defined conditions. For example, in 1954 geneticist Leslie C. Dunn examined the “Jewish community” of Rome as an example of an inbreeding population. At the same time, colleagues viewed the caste system in India as “the largest biological experiment ever” ready to be studied by human geneticists. Other researchers investigated Bantu speaking people in Africa, or other allegedly ‘isolated’, ‘homogeneous’ groups. It is noteworthy that human population geneticists in the postwar period regularly drew on the assistance of translators, linguists, demographers, economists and anthropologists with specific regional expertise to study populations. Thus knowledge stemming

forthcoming collaborations with other researchers, including among others invited presentations at Cambridge (Department for History and Philosophy of Science, Jan. 2010) and Brazil (Wenner-Gren-Symposium, March 2010). Dialogues with physical anthropologists and human geneticists are emerging from these research trips.

Lively and fruitful discussions with colleagues and international associates from Department III during the first phase of the project have helped to refine the concept of this study, especially during a research trip to Mexico, where the research group director contributed to the Department's conference "Darwin: The Art of Doing Science" (Nov. 2009).

Similarly strong links were established with Department II. The research group leader had the pleasure to co-organize a conference together with Tania Munz on the "Sciences of Communication" (March 2010). The broad thematic scope of this event helped to highlight the connections between notions of human biological diversity and notions of other perceived human differences, such as cultural or linguistic ones. This will result in a new perspective on interconnections across the disciplines in the human sciences that are concerned with human variation.

Susanne Bauer (Research Scholar)

Micropolitics of difference: Soviet/Russian biomedical sciences from the atomic age to genomics

The study of "biomedical problems"—especially the effects of "extreme conditions" such as outer space, arctic climate or radiation exposures on human biology—has been a key research area in Soviet/Russian sciences during and after the cold war era. This project explores the production and negotiation of difference in Soviet/Russian biomedical research, in particular in the investigation of "exposed populations". The research disciplines involved in the study of "medico-biological extremes" in the Soviet Union ranged from experimental medicine to population genetics and medical geography: Soviet biological anthropologists mapped human variation according to molecular markers, and public health scientists designed comprehensive monitoring systems; biophysicists and epidemiologists "took advantage" of exposure situations as "quasi-experimental opportunities" to study biological responses to extreme conditions, in particular radiation.

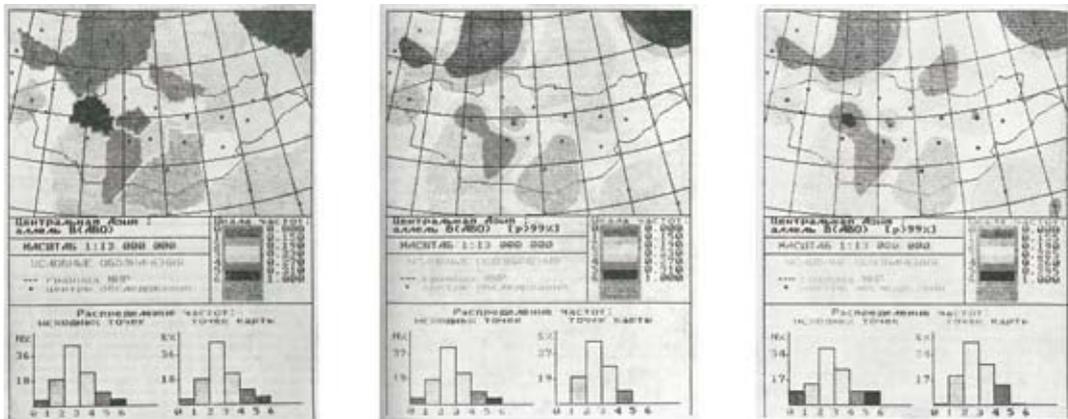
Throughout the atomic age, molecular biologists made use of radionuclides as experimental tools, such as tracers and mutagenic agents. Outside the confines of the life sciences laboratory, epidemiologists investigated radiation effects on the health of environmentally or occupationally exposed populations. Late 20th century radiation epidemiologists investigated the nuclear legacies worldwide in order to quantify health risks. These studies operated in a quasi-experimental space—conceiving of the population (and society) as extended laboratories. The study of "medico-ecological problems" was not necessarily framed only in terms of exposure; on the contrary, this research also involved mapping differences between subgroups, for example in terms of environmental response and genetic susceptibility to exposure. After the cold war, western scientists viewed the databases and biobanks of the former Soviet Union as resources from which insights could be gained into the effects of previously unstudied exposures and into complex "gene-radiation interaction."



Susanne Bauer

Soviet human genetics was marked by tremendous changes in its frameworks and conditions during the 20th century—from early studies in radiation cytogenetics and the age of Lysenkoism, via radiation biology at nuclear facilities during the cold war, to “geno-geography” and international studies in radiation epidemiology that were framed in biomedical terms at the end of the cold war.

Early Soviet population sciences operated in a paradoxical tension between unifying concepts of the “new Soviet man” on the one hand, and a politically promoted ethnic particularism on the other. While most Soviet ethnologists of the 1970s viewed “ethnos” as an entity located in the realm of the social, hybrid concepts of “ethno-ecology” as well as “neo-Eurasianisms” gained prominence around 1990. Along with the gradual dissolution of the Soviet system, a re-negotiation of identities and citizenship—along the lines of languages, cultural traditions, ethnic groups and, at times, environmental exposures—took place in the New Independent States.



“Geno-geography:” Numerical and visual modeling of gene frequencies using three different mathematical approaches.
Source: Rychkov, Iu. G., et al.: *Geno-geografia narodonaseleniia*; *Genetika* 26(2), 1990, pp. 332-340, pp. 335, 337, 338.

By following selected medico-ecological research programs into exposed populations, this project seeks to contribute to an understanding of (post)Soviet biopolitics as it meets globalized biomedicine. Radiation genetics and the emerging broader field of environmental genomics in particular constitute a site at which—through the trope of gene-environment-interaction—human variation is being (re)produced, performed, and negotiated. The methodological points of departure in this project are the “materials and methods” by which physical exposures are reconfigured into quasi-experiments. The project investigates selected cases, techniques, and practices including population data-basing and bio-banking, the spatialization of genetic markers by regions and ethnic groups in Soviet “genogeography” (геногеография), the role of “somatic mutations” used as cytogenetic indicators of radiation dose and, more broadly, scientific programs researching “medico-ecological problems” which gained momentum in the 1990s. Relevant published material and archives in the Russian Federation and Central Asia have been located; archival research and interviews are planned for 2010 and 2011.

While epidemiological databases, bio-banking, and modeling projects were aimed at the study of exposure effects and disease aetiologies, they were at the same time constitutive of (and performative for) a multivalent notion of ‘human diversity’. In this context, the project also aims to develop a theoretical approach to the study of diversity that is focusing on the micropolitics of difference and multiplicity.

of social practices and kinship systems. It stands in contrast to the more common bio-historical narratives of the other researchers who attempted to represent, through the 'racial hybrids' they encountered, the history of Vanuatu as a narrative of racialized encounters between the 'copper skinned Polynesians,' 'woolly haired Melanesians,' and in the case of Speiser, 'pygmies.'

This project is also concerned with how the biological concepts of race were entangled with social concepts of race and forms of colonial governmentality in a culturally diverse and geographically dispersed archipelago with no prior centralization. All of the researchers complained about the lack of census data and most made policy suggestions to the British-French Condominium on how to solve the depopulation issue. For the colonial authorities, the depopulation problem co-existed with another problem: the lack of labor for European settlers. With this in mind, on the subject of imported Vietnamese workers, Buxton suggested that "Men as well as women should be brought, so as to avoid, as far as may be possible, the hybridization which might otherwise occur between the imported race and the natives". From the limited history written about the Vietnamese laborers, it is thought that they associated very little with indigenous people or Europeans. This project investigates how Buxton's suggestion and scientific concerns about miscegenation were implicated in how the Condominium attempted to manage the importation and working conditions of Vietnamese indentured laborers.

The project uses a wide variety of textual and ethnographic sources. In terms of published work, it analyzes scientific journal articles and anthropological monographs about depopulation and human biological variation in the New Hebrides from 1900–1930. With respect to archival materials, it examines narrative reports of medical tours of Native Medical Practitioners and correspondence between Colonial officials of the New Hebrides British Service and their superiors in Fiji and London. Post-colonial scholars of science like Warwick Anderson show the importance of situating the production of scientific knowledge in networks of material practices and knowledge exchange that include indigenous knowledge and politics. Likewise, this project is particularly preoccupied with expanding explanatory frameworks about demographic change to include indigenous women's knowledge and experience. To this end, this project entails oral histories with elderly women in Vanuatu on whether and how colonial measures implemented in the 1950–1960s affected their experience of birth, reproductive expectations, or child nurturing. These grandmothers and great-grandmothers have lived to see contemporary demographers and other experts grow concerned with social and economic issues associated with high population growth. Thus far, published sources have been located and analyzed in terms of the major figures' field methods, representations of history, and policy recommendations. The initial findings of this work have been presented at the conference "Race and Encounters in the Constitution of Human Difference." In developing an analytical framework for the translation of archival material to academic text, work is proceeding in conjunction with a transdisciplinary colloquium for archivists, historians, and anthropologists of science and medicine of the Pacific. The holdings of the Western Pacific Archives in Auckland have been examined, oral histories conducted in Vanuatu, and cooperative links established with a project called, "Transnational Pacific Health through the Lens of TB" at the University of Auckland.

Guests

Mike Laufenberg (Predoctoral Research Fellow)

“Aus der Art geschlagen”—Interdependencies of Gender, Race and Sexuality in the Biology of ‘Sexual Orientation’ during the 19th and 20th Century

This project is part of an ongoing research on the “Government of Sexuality: Subjectivity, Truth, and Power in the Age of Biology.” From a Foucauldian perspective, the government of sexuality contains a twofold genitive: As a *genitivus objectivus* sexuality becomes a matter of governmental technologies, i. e. techniques which aim at the extension of control over sexual practices and identities. At the same time—as a *genitivus subjectivus*—sexuality itself can be seen as a technique through which individuals and populations become governable. The project examines the constitution of particular forms of sexual subjectivities in the 19th and 20th centuries as a vital mode of operation of such governmental technologies. Based on the general assumption of a co-production of societal and scientific knowledge about sexuality, biology is regarded as a specific regime of truth-productions that has played an important role in both, the history of sexual subjectivities and the numerous attempts to make those subjectivities governable. In the age of biopolitics, genetic, neurochemical, or evolutionary-biological knowledge interacts with governmental knowledge. Hence, the shape and content of biological knowledge have become the object and medium of conflicts over the question of which bodies and ways of being are regarded as intelligible and life-sustaining.

As a part of the Independent Research Group, this project is concerned with a historiographical, theoretical, and conceptual framing of ‘race’ and ‘human diversity’ as interdependent and intersectional categories that exist only in their intimate, constitutive interrelations with other markers of difference such as sex or gender.



Mike Laufenberg

Eric J. Engstrom (Visiting Scholar, Humboldt University Berlin, Germany)

Emil Kraepelin’s Research on Native and African American Psychiatric Patients and his Trip to the United States in 1925

The aim of the project is to explore the rise of proto-epidemiological thought and practice in early 20th century German psychiatry. The project is situated against the backdrop of historical research that, to date, has focused chiefly on nosological systems and the influence of racial hygiene. The project examines the trip of the German psychiatrist and putative ‘father’ of DSM, Emil Kraepelin (1856–1926) to the United States in 1925. That trip was part not only of a larger fund-raising drive in support of the Deutsche Forschungsanstalt für Psychiatrie (DFA) in Munich, but also a scientific expedition designed to study the signs of general paralysis in black and native American populations. The project explores the question of how Kraepelin transformed his clinically oriented strategies of data collection into an epidemiological research endeavor. This ‘epidemiological turn’ in Kraepelin’s work can be interpreted as the culmination of a research trajectory that saw him successively expanding the horizon of his research agenda, beginning from a laboratory based experimental psychology in the tradition of Wilhelm Wundt, then evolving into a clinically oriented psychopa-



Eric J. Engstrom

thology that provided him with the empirical foundations for his influential textbook, before finally expanding into a epidemiological project that was designed not so much to advance a racial hygiene agenda, but to sharpen, correct, and verify his own clinically derived nosological categories. Perhaps paradoxically given Kraepelin's strong support for the work of Ernst Rüdin and racial hygiene, Kraepelin's epidemiological turn seems to have had less to do with identifying racially specific disease entities than with honing his own diagnostic techniques.



Manuela Bauche

Manuela Bauche (Predoctoral Research Fellow)

Science, Metropole and Colony: The Medical Discourse on Malaria Between Germany and Africa, ca. 1880–1920

This PhD project investigates the ways in which medical knowledge and medical discourses were generated and shaped within the interactions between colonies and their metropolitan hubs. The project examines the medical work directed at malaria from the 1880s to 1920, both in Germany itself and in its African colonies, i. e. Cameroon, German East-Africa, German-Southwest-Africa, and Togo. Malaria was a concern not only for physicians and officials in the colonies. In Germany, too, until well into the 1920s, physicians struggled to control outbreaks of the disease, especially in the north-western parts of the country. Grounded on archival material documenting this case study, the dissertation shows that the generation and establishment of medical assumptions cannot be understood as the simple outcome of a gradual accumulation of information and knowledge, but that it was substantially shaped by the social, political, and infrastructural contexts and spaces in which medical work was practised from European metropolitan centres to their colonies. At the same time, the dissertation aims to complement research on the history of biomedicine by adding a perspective that integrates both biomedicine's European and extra-European dimensions and that demonstrates that extra-European experiences of biomedical practice were not only relevant in the sense that medical knowledge was diffused from an alleged European centre towards non-European peripheries, but insofar as non-European contexts were of constitutive importance—for the *production* of medical assumptions.

Events

Discussion series “Historicizing Knowledge about Human Biological Diversity”

Beginning in January 2010, the group has held biweekly discussion sessions with talks, pre-circulated papers, or reading group meetings. The group has invited scholars from a wide range of disciplines and at different phases in their academic career to discuss their work. The focus has been on historical and current examples of notions of human biological diversity in various disciplines, such as ethnology, psychiatry, and other medical fields, as well as in biomedical institutions such as fertility clinics.

Organization of a Workshop

(Veronika Lipphardt together with Tania Munz, Dept. II)

Sciences of Communication in the 20th Century

Planned for March 18–20, 2010

Scholars have long looked at language for insights into what it means to be human. From Franz Boas at the beginning to Noam Chomsky near the end, the twentieth century saw fundamental changes in the sciences of communication. This workshop aims to examine the range of disciplinary approaches to language (including anthropology/ethnology, linguistics, psychology, sociology, philosophy, and ethology) and the objects of their study. This is a cooperative project between Dept. II of the Max Planck Institute for the History of Science and the Independent Research Group “Historicizing Knowledge about Human Biological Diversity.”

Workshop Series: Concepts of Population

The biological concept of population has proven to be a productive and functional tool for 20th-century-life-scientists to approach the phenomenon of human diversity. But what is a population supposed to be? How have biologists and anthropologists defined a population and on the basis of what assumptions have they drawn the line between one population and another? And finally, how did scientists in their everyday practice deal with the fact that ‘population’ denotes a statistical parameter rather than a given entity?

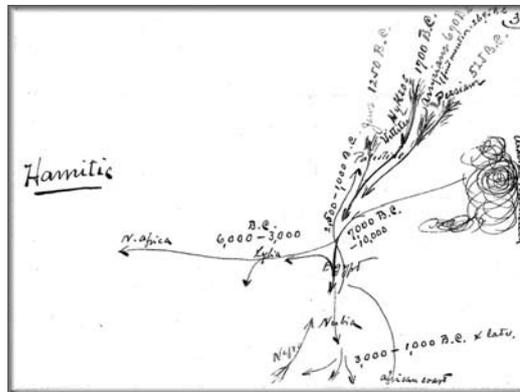
In December of 2009 a workshop brought together scholars from different disciplines to clarify these questions. Evolutionary biologist Ralph Tiedemann (University of Potsdam), human geneticist Katrin Hoffmann (Charité Berlin), and demographer Alyson van Raalte (MPI for Demographic Research, Rostock) were asked to each give a talk on their disciplines’ interpretation of the concept of population and why this concept plays a crucial role for their own research.

The workshop is envisioned as a starting point for an ongoing transdisciplinary dialogue between scientists and historians/anthropologists of science about key concepts such as ‘population’ within human biological diversity research. A sequel workshop is already in planning for 2010.

Database Project: Visualization of Diversity

The Database aims to collect visualizations of human diversity throughout the 20th century. It collects images mainly from published work: textbooks (especially biological and medical), scientific journals such as Nature and Science, scientific monographs and popularized science publications, and in addition also from archival documents, scratch papers, and from the internet, e. g. from ancestry testing home-pages.

Thus far, the images are sorted under four different categories: representations of human genealogies (e. g. trees), maps, visualizations of human bodies, and more abstract graphical representations of diversity (e. g. based on genetic research). The collection thus serves as a visual archive that can be used to trace the changes in different visual practices and types of representation, e. g. from the classic 19th century tree image of human origins to visualizations of human genealogy as a complex network at the close of the 20th century.



“Hamitic:” Draft Map of Human Migrations by Ales Hrdlička
 Source: Ales Hrdlička Papers, box 138 (Folder Whites), National Anthropological Archives, Smithsonian Institution



“Übersichtskarte der Sprachen des Erdkreises.” Linguistic Diversity has been a crucial aspect of representations of human diversity throughout the 20th century.
 Source: W. Schmidt: Die Sprachfamilien und Sprachenkreise der Erde. Atlas von 14 Karten, Hamburg: Helmut Buske Verlag 1977 (Reprint von 1926), Karte I/Karte VII.



“Sprachenkarte. Gegenwärtige Verbreitung der Sprachstämme.”
 As mentioned above, linguistic diversity was also taken up by ‘race scientists’, e. g. Egon v. Eickstedt as a further proof of the biological diversity of humankind.
 Source: v. Eickstedt: Rassenkunde und Rassengeschichte der Menschheit. Stuttgart: Ferdinand Enke 1934.

Joint Activities

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Samples from the Curiosity Cabinet,
Courtesy of the Berlin Medical History
Museum. Photo: Jan Kaminski



Joint Activities

Research Network

History of Scientific Objects

MPIWG ORGANIZERS *Lorraine Daston, Jürgen Renn, Hans-Jörg Rheinberger*

Website: <http://scientificobjects.mpiwg-berlin.mpg.de>

The Max Planck International Research Network “History of Scientific Objects” was established in September 2005 with the participation of twelve leading institutions for the history of science in Europe and the U.S.A. The aim of this five-year collaboration is to explore scientific objects: as things, images, and as concepts. The research network concept goes back to an initiative by the Max Planck Society to fund co-operations between Max Planck Institutes and other research institutions on an ad-hoc basis with the aim of accelerating development in new and exceptionally promising areas of investigation. Exploring the material culture of the history of science, the network is pursuing an integrated interdisciplinary approach to the topic, involving junior and senior academics worldwide.

Network projects not only deal with the character of individual objects, but also with questions concerning the preservation, collection and representation of objects. To this end, the Network aims at inspiring collaboration between scholars based at museums and academic historians of science. The Network welcomes and supports different kinds of publications, such as joint articles, mini-exhibitions or object-galleries in websites.

The MPIWG continues to provide the organizational base of the Network. All three departments as well as the library and the it-group are supporting the various projects. As part of its input into the Network the MPIWG funds two post-doc fellowships every two years. Additionally the Institute hosts Network workshops, meetings of working groups. The Network supports visiting scholars at different ‘stations’ of the Network. For example, Carsten Reinhardt worked in Paris on “Boundary Values,” and Francesco de Ceglia pursued his research on the “Signs of Death” at the MPIWG. The input of the Network Members varies and includes privileged access to collections as well as co-organization of events.

2008 saw the second General Meeting of Network Members in Berlin, which provided an intra-network forum for retrospection as well as the discussion of future projects and on which the agenda for the second half of the Research Network was set.

Given the two main purposes of a research network—to facilitate exchange between scientific personnel and try out new formats of scientific exchange—it was generally agreed the network has been quite successful in experimenting with and creating new formats. The Wandering Seminar in particular created, and profited from, considerable synergy between its members and easily attracted co-operation-partners. As a follow-up, if on a much smaller scale, the Invisible Seminar was set up to bring junior and senior scholars together in experimenting with the concept of object-biography (s. below). Other successful formats such as the Research Colloquium on Epistemic Objects and the Hands-on Workshop on Microscope Slides were continued; collective publications are planned.

One of the members' resolutions was for the projects and the network to be made more visible as a whole. Consequently, the network website witnessed a complete relaunch in 2009 to bridge the diverse Network projects and provide scholars with privileged access to material such as specified bibliographies. 2010 will see a final event in co-operation with the Berlin Science Year.

Cooperation with project partners, especially scholars based at museums, intensified over the last two years. New partners, such as the Institute Pasteur, were won for individual projects.

Network Members

- *Prof. Günter Abel*, Technical University, Berlin
- *Prof. Jochen Brüning*, Humboldt University Berlin
- *Prof. Lorraine Daston*, MPIWG
- *Prof. John Forrester**, University of Cambridge
- *Prof. Peter Galison*, Harvard University, Cambridge
- *Prof. Paolo Galluzzi*, Institute and Museum of the History of Science, Florence
- *Prof. Michael Hagner*, ETH Zurich
- *Dr. Nick Hopwood*, University of Cambridge
- *Prof. Friedrich Kittler*, Humboldt University Berlin
- *Prof. Eberhard Knobloch*, Technical University, Berlin
- *Prof. Wolfgang Krohn***, University of Bielefeld
- *Prof. Thomas Macho*, Humboldt University Berlin
- *Prof. Everett Mendelsohn*, Harvard University, Cambridge
- *Prof. Dominique Pestre*, Ecole des Hautes Etudes en Sciences Sociales, Paris
- *Prof. Claudio Pogliano*, University of Pisa
- *Prof. Carsten Reinhardt***, University of Bielefeld
- *Prof. Jürgen Renn*, MPIWG
- *Prof. Hans-Jörg Rheinberger*, MPIWG
- *Prof. Simon Schaffer*, University of Cambridge
- *Dr. Christian Sichau*, Deutsches Museum, Munich
- *Prof. Jacob Tanner*, University of Zurich
- *Prof. Helmuth Trischler*, Deutsches Museum, Munich
- *Prof. Peter Weingart*, University of Bielefeld

* Professor John Forrester kindly took up the position after the death of Professor Peter Lipton in 2007.

** Professor Wolfgang Krohn having been awarded emeritus status, Professor Carsten Reinhardt was elected new network member in May 2008.

History of Scientific Objects

Working Groups

The Past of Science's Present and Future

MEMBERS *Peter Galison* (Harvard University), *Wolfgang Krohn* (University of Bielefeld), *Carsten Reinhardt* (University of Bielefeld) *Dominique Pestre* (EHESS, Paris), *Simon Schaffer* (University of Cambridge), *Peter Weingart* (University of Bielefeld)

Right after the foundation of the Network Dominique Pestre was invited by the Science, Economy and Society Directorate of the European Commission's Research DG to organize an exploratory workshop "to tackle the questions of the interrelationships of sciences and politics through various historical situations." The aim of the workshop and its report to the Directorate was to give some input into policy making at EU level about science and/in society. Other Network Members involved in this workshop were Simon Schaffer, Peter Galison, Peter Weingart and Helmut Trischler. In the context of the Network the Working Group set up a series of workshops on the interface of science and governmentality, with one subgroup (mainly Dominique Pestre and Peter Weingart) focusing on neo-liberal forms of government today, and the other (Simon Schaffer, Peter Galison) taking a more historical approach. The first activity was an intense, international one-day discussion at the Centre Alexandre Koyré in Paris in June 2007, on the relation of politics to the history of science. In May 2008 an open discussion workshop was set up to document the forms of *Governance of and through Science* that recently developed (s. below). The working group aimed at building political and social genealogies of these concepts and tools, to consider where they come from, who promoted them, how they are/were concretely put into use, how they transform/ed social practices.

The group proposed to re-do this workshop in diverse settings and for different historical moments.

Images as Scientific Objects

MEMBERS *Lorraine Daston* (MPIWG), *Michael Hagner* (ETH Zurich), *Claudio Pogliano* (University of Pisa), *Hans-Jörg Rheinberger* (MPIWG), *Renato Mazzolini* (University of Trento)

Though scientific discourse on images is widely spread over several disciplines, with reference to images as scientific objects the working group found two areas of research still underdeveloped: the conditions of material production of images and the mode of visual thinking.

After an initial meeting with intense theoretical discussions the group decided to go on with two projects, one applying the biographical approach to the history of individual images and the other one putting visual thinking to the test by having the same image interpreted by scholars from different disciplines

The *Invisible Seminar* brought together ten junior scholars from various disciplines, chosen by Network members, who each develop and present the biography of a cho-

sen image. Between two meetings with members of the working group in Berlin and Pisa, the seminarians discussed their approaches virtually.

The Workshop on Visual Thinking as a mode of scientific reasoning is planned to take place in Castasegna in September 2010.

Epistemic Objects

MEMBERS *Günter Abel* (Technical University, Berlin), *Uljana Feest* (Technical University, Berlin), *Thomas Macho* (Humboldt University Berlin), *Jürgen Renn* (MPWIG), *Hans-Jörg Rheinberger* (MPIWG), *Claudio Roller* (Technical University, Berlin)

When something attracts our epistemic curiosity, we may refer to it as an epistemic object. In the sciences, epistemic objects are the fundamental objects of research. But what is the relationship between epistemic objects in the sciences and our pre-scientific notions of them? What is the difference between an epistemic and a scientific object, between an object and a thing? In order to provide a common discussion ground for historians of science as well as historians of art and philosophers, the group started by admitting and discussing several notions of “epistemic objects.” A series of research colloquia has been set up, the first of which dealt a. o. with the dynamics of *Epistemic Objects* as well as their relations to signs and modeling (s. below). A second colloquium on the concept of *Challenging Objects* is being planned for January 2010. The concluding event in autumn 2010 will focus the *On the Concept of the Thing*. A selection of lectures given at these workshops will be published in the series “Berlin Studies in Knowledge Research.”



Wallcharts in the Teaching Collection of the Zoological Institute, Humboldt University of Berlin. Photo: Jan Kaminski

Collections and Collecting

MEMBERS *Paolo Galluzzi, Helmuth Trischler* (Deutsches Museum, München), *Christian Sichau* (Deutsches Museum, München), *Friedrich Kittler* (Humboldt University, Berlin).

As a central project of the Network, an international conference on the topic *The Exhibition as Product and Generator of Scholarship* was set up in Munich November 2008, co-financed and co-organized by the Deutsches Museum. The basic hypothesis of the group was that exhibitions do more than merely visualize the results of research. They have the potential of stimulating scholarship and generating knowledge by posing new research questions. The conference investigated the exhibition not only as publication medium for a wider audience, but as forum to exchange scientific expertise. Organizationally, the group identified integrating scholars working at the museum as a major task of the Network, therefore one of the main aims of the conference was to get different communities, historians of art and science, curators and exhibitions makers, involved.



“Backstage”, Courtesy of the Natural History Museum, Berlin. Photo: Jan Kaminski

Projects 2008–09

Microscope Slides: Reassessing a neglected historical resource II

Website: <http://scientificobjects.mpiwg-berlin.mpg.de/scientificobjects/Slides>

Joint Workshop, 19–21 March 2009, Paris, Institut Pasteur

ORGANIZER *Ilana Loewy* (CERMES, Paris) and *Annick Opinel* (Institut Pasteur, Paris)

NETWORK MEMBERS INVOLVED *Hans-Jörg Rheinberger* (MPIWG)

The first Workshop in Berlin in 2007 had established microscope slides not only as a neglected resource in the history of science, but also as fascinating epistemic problem, due to their intermediary status: Slides are at the same time “things in themselves” (samples of biological material), “preparations” (artifacts), and “representations” (stabilized images of the studied objects). Similarly, collections play a key role in the uses of slides as depositories of existing scientific knowledge and as tools for the production of new knowledge. The second slide workshop was therefore dedicated to the collection, classification, conservation and circulation of slides. It discussed the origins of microscope slide collections, their architecture, material organization and links with other collections of biological materials, including the ethical questions that are raised by these collections. Participants also examined how slide collections connect numerous communities of practitioners and multiple social worlds. Collections of slides may be likened to Foucault’s ‘dispositif’: a network that links a heterogeneous assembly of discourses, practices, institutions, concepts and policies. These ‘dispositifs’ produced and continue to produce new ways to understand and modify living organisms, including humans.

The workshop was based on pre-circulated papers, and included discussion of papers by invited chairs, but also some ‘hands on’ activities such as visits to collections at the Pasteur Institute. A collective publication, intended to present slides and collections of slides as a resource for the study of the history of science, is planned; a preprint is in the making. As a first publication, a website for the project, *Slides in Context*, has been set up to present microscope slides as epistemic and aesthetically challenging objects and to provide a forum for collective material such as essays and links to collections.

MPIWG-Preprint in Preparation

Ilana Loewy (ed.): Microscope Slides—Reassessing a Neglected Historical Ressource

- *Brownyn C. Parry*: The Afterlife of the Slide—Exploring emotional attachment to artefactualised bodily traces
- *Flavio Braulin*: Variations of the Epistemic Status of “what is seen” in the Microscopic Preparation of Syphilis before and after the Invention of the Ultramicroscope of Reichert.
- *Oliver Gaycken*: “The Unseen World”—On the Circulation of Microscopic Slide Knowledge in 1903
- *Ilana Loewy*: Sex on a slide—Antoine Lacassagne and the Search for a Microscopic Definition of Masculinity and Femininity.

- *Maria Theresia Mayrhofer*: Biobanks in Practice—The Contingent Meaning of Collected Bodily Material
- *Naomi Pfeffer*: R slides us?
- *María Jesús Santesmases*: Samples, Cultures and Plates—Early Human Chromosomes
- *Jean-Paul Gaudillière*: Changing Scale—Slides and electron Microscopy at the Pasteur Institute Virus Laboratory
- *Paul Weindling*: From Scientific Object to Commemorated Victim—The Children of the Spiegelgrund

Governance of and through Science and Numbers: Notions, Categories and Tools

A project of the working group *The Past of Science's Present and Future*

Workshop, 26–27 May 2008, Paris, EHESS, Maison des Sciences de l'Homme

ORGANIZERS *Dominique Pestre* (EHESS, Paris), *Peter Weingart* (University of Bielefeld)

The idea for the workshop was two-fold. To be considered were both the forms of government—the new ‘dispositifs’ and discursive regimes in common use in today’s neoliberal ‘governance’ for which scientific knowledge of all kinds plays a decisive role—and the way universities and academics are ‘managed’ within that new order? This included considering theoretical works on ‘liberal governmentality’, starting with Foucault amongst others; considering examples of particular forms of government through types of ‘dispositifs’, of ‘technologies’ that are developed—benchmarking, the Open Method of Coordination, the redefinition of quality for (statistical) data or the ‘dispositifs’ that are elaborated to include ‘stakeholders’ or ‘civil society’ in decision processes; considering the way ‘ethics’ and ‘risk’ are made central for innovation and the government of people and markets around techno-products; considering the ‘technicisation of expertise’ and the making of ‘global experts;’ considering the new meaning given to certain notions and categories; and in particular how this all functions today in the management of higher education and research.

The central questions were defined as follows: how can we think about and describe today’s neo-liberal form of government—that is to say, the intricacy and the hierarchy of devices, tools and categories through which various agents try to govern, regulate and administrate (i) scientific institutions, knowledge or innovation, (ii) products and technologies made available through markets or public authorities, and (iii) the management of effects and consequences of all kinds that result from such innovations (in terms of public health or the environment, for example). The aim of the workshop was to study this regime by placing these questions in theoretical, historical, sociological and anthropological perspectives, and by presenting relevant cases from various fields.

Epistemic Objects

A project of the working group *Epistemic Objects*

Research Colloquium, 16–17 May 2008, Berlin, Technical University

ORGANIZERS *Hans-Jörg Rheinberger (MPIWG), Günter Abel, Uljana Feest and Claudio Roller (TU Berlin)*

What are the dynamics by which epistemic objects come into being? How are epistemic objects articulated linguistically? What role do empirical methods play in the constitution of epistemic objects? What is the relationship between the shifting status of epistemic objects and the supposedly a-temporal character of scientific results? epistemic objects are the fundamental subjects of scientific research. They attract the attention and interest of scientists as well as of historians and philosophers of science and knowledge. The first research colloquium aimed to place a particular emphasis on the following four aspects

1 The internal relations between linguistic as well as non-linguistic signs and epistemic objects:

Both the constitution of scientific objects and the communication of the results of scientific research are conditionally bound to description and articulation by means of signs and interpretation. There are no epistemic objects without signs and interpretation. This relationship has to be elucidated.

2 The relationship between modelling and epistemic objects:

Many—but not all—epistemic objects can be construed as models. In elaborating on this point, one has to distinguish between the objects of the history and philosophy of science and the objects of the sciences themselves as well as the objects in everyday life. One also has to stress the differences between the epistemic objects in the various sciences and in the arts and humanities. The character and detail of these differences have to be assessed.

3 The dynamics of epistemic objects:

In theory as well as in practice, epistemic objects are subject to changes, modifications, revisions, broadenings and restraints, in short: they have their own dynamics and temporal character. Both have to be elucidated and analyzed accompanied by a close analysis of historical cases.

4 The relationships between epistemic objects and scientific experience:

The notion of an epistemic object is internally linked to questions about scientific experience and epistemic justification. Issues surrounding the nature and status of the empirical in the constitution of epistemic objects need to be addressed. Likewise objects' convincing character and our 'adaptation' of judgment according to the properties and features of the epistemic objects calls for close analysis.

MPIWG-Preprint 374

Uljana Feest, Hans-Jörg Rheinberger, Günter Abel (eds.): Epistemic Objects

- *Michael Esfeld & Vincent Lam: Structures as the objects of fundamental physics*
- *Carl F. Craver: Experiments, Instruments, and Activity Realism: Reflections on Early 20th Century Electrophysiology*
- *Günter Abel: “Epistemische Objekte als Zeichen- und Interpretationskonstrukte”*
- *Claudio Roller: Colors as epistemic Objects*
- *Jim Bogen: Worldly Objects and Epistemic Things*
- *Uljana Feest: Phenomena as Explananda and Phenomena as Epistemic Objects*
- *Hans-Jörg Rheinberger: Epistemic Objects/Technical Objects*

The Biography of Ten Scientific Images: An Invisible Seminar

A project of the working group: *Images as Scientific Objects/Visuality*,

Co-financed by the University of Pisa

Invisible Seminar, 7 March 2008, MPIWG and 16–17 October 2008,

University of Pisa

ORGANIZERS *Claudio Pogliano* (University of Pisa), *Michael Hagner* (ETH Zurich),
Renato Mazzolini (University of Trento)

FURTHER NETWORK MEMBERS INVOLVED *Hans-Jörg Rheinberger*,
Lorraine Daston (MPIWG)

In the last few decades academics from very diverse disciplinary backgrounds have taken a growing interest in the complex issue of visual representation within science, exploring a broad range of types, aspects, and uses. The mass of studies produced has become increasingly wide and heterogeneous, now forming an impressive body of knowledge scattered throughout various journals and books. However there is no consensus about which questions and methods historians of science should apply to the investigation of visual records.

In the Invisible Seminar ten junior academics (PhD students or Post-docs) selected by network colleagues, were asked to write a paper on the ‘biography’ of a single meaningful scientific image, conforming to certain general guidelines. By following the ‘career’ of an individual image, the concept of object biography was put to the test. The network organized and financed two meetings as occasions for shared discussion with the senior academics involved, in between which the seminar participants work and discussed their projects ‘invisibly’ via mailing lists and file servers. The results of their work will be published in a special issue of *Nuncius* 2010.

Special Issue of *Nuncius*, 2010

Claudio Pogliano, Michael Hagner, Renato Mazzolini (eds.) The Invisible Seminar

- *Lorenzo Beltrame & Silvia Giovanetti: Extraction of stem cells from the inner cell mass of a human embryo? Biography and social life of an uncertain origin image*
- *Andrea Bernardoni: Biringuccio’s De la Pirotechnia*
- *Jan von Brevern: An erratic boulder in the Swiss Alps photographed by Aimé Civiale*

- *Mirjam Sarah Brusius*: A fundamental photograph by Fox Talbot for Assyriological research
- *Elena Canadelli*: Schiaparelli Canals on Mars and the Martians Controversy
- *Fabian Krämer*: The Two-Legged Centaur by Aldrovandi
- *Stefano Gattei*: Kepler's "School of Athens" for Astronomy: the frontispiece of *Tabulae Rudolphinae* (1627)
- *Omar W. Nasim*: An Image of a Nebula: Victorian Stellar Astronomy
- *Katrin Solhdju*: Lateral view of the hand taken by Henry Head in 1904

Scientific Objects and Seriality

II Seriality and scientific objects 1780–1848

Workshop, 16–17 June 2008, University of Cambridge

ORGANIZERS *Nick Hopwood, Simon Schaffer, Jim Secord* (University of Cambridge, U.K.)

Co-sponsored by the Network

For a workshop on seriality and scientific objects in Europe and beyond between 1780 and 1848, historians of science and others were invited to discuss the relationships between the practical construction of series as objects of scientific study and the technologies through which such objects were made visible and public.

The two-day workshop consisted of very brief presentations by authors and brief commentaries, followed by substantial discussion.

Our provisional hypothesis was that there is a fundamental connection between the communicative modes in which scientists convey their accounts of the world, and the pictures of the world they produce. It is often noted that the transformation of accounts of nature and society in the decades around 1800 coincided with the emergence of new forms of material production. One way of exploring this issue is through the category of the 'series', as seriality can describe both an organization of communication and an account of the contents of nature. The notion of seriality seems especially apt in the age of revolution, when it became a central category in fields ranging from zoology and political economy to periodical publication and newspaper journalism.

Three serial registers would seem, *prima facie*, related in this period: serial objects, serial images and serial publics.

Scientific Objects and Seriality

III Seriality and Scientific Objects 1848–1919

Workshop, 15–16 April 2009, University of Cambridge

ORGANIZERS *Simon Schaffer, Nick Hopwood* (Cambridge University, U.K.)

Co-sponsored by the Network

Papers for this final workshop on Seriality and scientific objects, 1848–1919 were invited on subjects related to the principal historiographic focus of the project: the relationships between the organization of communication and accounts of nature's

contents in serial form. This project juxtaposes the emergence and subsequent history of serial and developmental models of natural systems; the sequencing of images, artifacts and traces of scientific objects in organized and deliberately serial form; and the significance of the periodical and journalized forms of publishing and communication in this period. The conjuncture of the second industrial revolution, high imperialism and the ascent of the evolutionary sciences proved highly apposite for an examination of the relationship between the communication, performance and knowledge of scientific objects.

Papers from the three workshops (January 2007, June 2008 and April 2009) will be selected for joint publication in 2010. This will result in a major edited publication on the history of seriality and scientific objects between the eighteenth and twentieth centuries in fields drawn from across the sciences, to be accompanied by systematic historiographic and methodological reflection on the models of sequence and seriality at work in the formation of scientific objects as units of knowledge and analysis.

The Exhibition as a Product and Generator of Scholarship

A project by the working group *Collections and Collecting*,

Co-financed by the Research Network and the Deutsches Museum

Conference, 27–28 November 2008, München, Deutsches Museum

ORGANIZERS *Helmuth Trischler, Christian Sichau and Susanne Pickert*

(Deutsches Museum München)

FURTHER NETWORK MEMBERS INVOLVED *Lorraine Daston, Jürgen Renn,*

Hans-Jörg Rheinberger (MPIWG), Jochen Brüning (HU Berlin)

This conference aimed at providing a forum to reflect on delicate task to balance research activities with exhibition works. Recently, museums in Europe have witnessed a growing interest of political and scientific stakeholders in museums as places of research. It has been claimed: No exhibition without scholarship; object-based studies and the exploration of the cultural context of the object are prerequisites for an intelligible presentation. But exhibitions do more than merely visualize the results of research. They have the potential of stimulating scholarship by posing new research questions. How can researchers take advantage of this opportunity? In which way can scholarly arguments be translated into spatial arrangement and at the same time kept serviceable for reading and citing by later recipients? Unlike for printed texts, the traditional publication media of scholarship, common standards of terminology and argumentation for exhibitions have yet to emerge. What exactly is the role of the objects on display? How do the objects unfold their epistemic properties in being staged for exhibition purposes?

The conference brought together curators, museum experts, designers, artists, experts in cultural studies and historians of science and technology to engage in a discussion about their experiences and expectations of the exhibition as product and generator of scholarship. A collective publication is planned; a preprint is in the making.

MPIWG-Preprint in Preparation

Susanne Lehmann-Brauns, Christian Sichau, Helmuth Trischler (eds.):

The Exhibition as Product and Generator of Scholarship

- *Susanne Lehmann-Brauns, Christian Sichau, Helmuth Trischler:*
The Exhibition as Product and Generator of Scholarship—An Introduction
- *Hans-Jörg Rheinberger:* Making Visible. Visualization in the Sciences—and in Exhibitions?
- *Jochen Brüning:* Exhibitions vs. Publications. On Scientific Achievements and their Evaluation
- *Robert Bud:* Power, Belief and Trust. A Context for Scholarly Priorities in the History of Science
- *Martha Fleming:* Thinking Through Objects
- *Walter Hauser:* Exhibition Making as Knowledge Production, or: Struggling with Artefacts, Visuals and Topographies
- *Ad Maas:* The Storyteller and the Altar. Museum Boerhave and its Objects.
- *Ulrich Raulff:* Old Answers, new Questions: What do Exhibitions really generate?
- *Uwe Brückner:* Scenography—Opera as Model for Integrative Design
- *Thomas Söderqvist and Adam Bencard:* Do things talk?
- *Thomas Schnalke:* Arguing with Objects. The Exhibitions as a Scientific Format of Publication

Network Fellows 2008–10

With her project on models, Kelly Whitmer is working with Dept. II and III; Arie Krampf's investigation of the central bank is part of the globalization project of Dept. I.

Arie Krampf

Central Banking as Scientific Object—Transfer and localization of economic knowledge in the Twentieth century

The twentieth century was a period during which the logic of the nation state was extended and a large number of new states joined the community of nations. This process was accompanied by diffusion of knowledge and practices and convergences of state structure. In recent years a growing body of knowledge has attempted to capture the way by which transfer of knowledge has also brought about divergences and emergence of differences between states in the international system. This approach emphasizes the fact that when knowledge is transferred it is also translated and localized.

In his work Arie Krampf combines approaches of political economy with those of science studies to study the encounter between “deterritorialized,” “universal” and theoretical economic knowledge, on the one hand, and differences between countries in the context of policy making. It is shown that this encounter brings to existence local economic rationalities and packages of knowledge, which are bounded in local contexts of policy making.

The project focuses on two key areas in which such local economic rationalities are manifested: practices of central banking and categories of econometric (statistical) systems. The study examines how central banks, and the discourse surrounding them, have produced epistemic scientific objects, which mediate between transnational knowledge and domestic political-economic conditions, thereby contributing to processes of state-formation. The aim of the research is to map central banking practices and econometric technologies of representation within time and space throughout the 20th century. The outcome of the research would be an epistemological map that would enhance the understanding of the dynamic of transfer and localization of economic knowledge in a non-homogenous world.

Kelly J. Whitmer

Models of Solomon's Temple as Objects of Scientific Inquiry—

Models and the Middle Way: Performing Philanthropy in the Early Enlightenment

Gottfried Wilhelm Leibniz linked philanthropy to the cultivation of ethical techniques for producing knowledge about the world. Leibniz participated in an ambitious philanthropic program articulated in many Central European cities between 1700 and 1750, one involving the most eminent philosophers, theologians, mathematicians and physicians of the era. In the early years of the eighteenth century, Halle's orphanage commune, founded by a minister and Berlin Academy of Sciences member, became a key site for making philanthropy visible. Largely inside of this space and others modeled after it, practitioners worked to improve the intensive regimens of moral education and mission for which their institutions became famous. They forged links between spiritual exercises, observation, instruments for measuring and improving "inclination," and the characteristics of a divinely sanctioned, princely authority.

The project explores the status of models, and the techniques of model building, for early practitioners of philanthropy. It concentrates on the very large wooden model of Solomon's Temple that was innovatively used in the city of Halle as a visual encyclopedia by 1718. The Temple model became a tool for facilitating an intuitive, assimilatory grasping of relationships between parts and wholes, even competing points of view, through sustained and collective observation.

The first phase of this project involved studying the arrangement of the space of the Halle Temple model—a very large wooden model of Solomon's Temple that was innovatively used in the city of Halle as a visual encyclopedia by 1718—, including how it was built, relative to other Temple models exhibited at the time. The second phase has involved comparative analysis of the pedagogical uses of models, especially of machines, in several eighteenth-century German cities.

Upcoming Projects for 2010

Challenging Objects in the History of Science

A project by the working group *Epistemic Objects, in co-operation with the TU Berlin Workshop*, 21–23 January 2010, MPIWG

ORGANIZERS *Jochen Büttner, Jürgen Renn* (MPIWG)

FURTHER NETWORK MEMBERS INVOLVED Günter Abel

Recent history of science has paid increasing attention to the role of objects in the formation of scientific knowledge. It is acknowledged that prior to any theoretical reflections objects bear knowledge, likewise it is understood that objects, as bearers of knowledge, tend to play an important role in the transmission of knowledge, both diachronically and synchronically. Objects are preserved over time and can travel in space. When in this kind of transmission the context of an object changes, the knowledge associated with it is often transformed. Likewise the objects themselves as epistemic entities are altered when the knowledge connected to them evolves. Drawing on the wealth of insights that has originated from recent object-centered approaches in the history of science, the workshop aims to explore and elaborate a historiographical approach to the role that a particular type of object played in a particular period for the development of a particular body of knowledge—the *challenging objects of early modern mechanics*. This approach to the challenging objects of early modern mechanics has provided the basis for two recent case studies, one concerning the role of the pendulum, the other the role of fly-wheels for the development of early modern mechanical thinking. The aim of the workshop is twofold: On the one hand it aims to refine and extend the approach developed so far; on the other hand it aims to probe this approach by contrasting it with alternative explanatory schemes and by comparing it with the insights that have been gained in other object-centered studies in the history of science.

→ see also p. 34

Scientific Images as Objects of Research

A project of the working group *Images as Objects/Visuality*,

co-financed by the Research Network and the ETH Zurich

Workshop, 17–20 September 2010, Villa Garbald, Castasegna, Bergell

ORGANIZER *Michael Hagner* (ETH Zurich)

The remarkable increase in studying scientific images has led to a fascinating Babylonian charivari, and this is not restricted to those situations when image producers from science and technology meet image interpreters from the humanities. If we consider those disciplines which are active in the business of understanding images after the iconic turn—art history, media studies, cultural studies, history and sociology of science, philosophy, literary theory etcetera—it seems that they look at images in very different ways. The idea for the workshop is to approach this diversity in the way images are understood by putting the rule to the test. What happens if an art historian, a philosopher and a historian of science all interpret the same image? What are their respective interests, their respective strategies when determining the meaning of the

image? What kind of visual thinking is behind such an interpretation? What kind of experience, judgement and intuition are at play? Do we apply the same criteria used to talk about an eighteenth century botanical image to the visualisation of an e-cell? The meeting will bring together between twelve and fifteen participants including members of the network, those who attended the first meeting as well as colleagues coming from fields not yet represented within the group. The aim of the meeting within the MPI Network is to gain some clarity on the issue of what we are doing when we focus on images as objects of research.

On the Concept of “Thing:” Philosophical, Historical, Social, and Cultural Investigations

A project of the working group *Epistemic Objects*

Workshop, MPIWG/TU Berlin, Autumn 2010

ORGANIZERS *Günter Abel* (TU Berlin), *Hans-Jörg Rheinberger* (MPIWG), *Friedrich Steinle* (TU Berlin)

Since Michel Foucault’s *Les mots et les choses* (1966), the concept of “thing” (Ding, chose) has gained new currency in philosophical, historical, social, and cultural studies of science and of knowledge. The turn to the material side of science, the “scientific real” (Bachelard), in its many guises, is the focus of this workshop. Specifically, it asks for and intends to analyze the peculiar role of the concept of “thing” as compared to the more common notion of scientific, or knowledge, “object”. To this end, it tries to bring together philosophers, historians, sociologists, and literary and cultural critics in a common reflection on past and present uses of the concept of “thing” for the study of knowledge phenomena.

Ways of Voyaging Through the Human Body.

A project by the working Group *Images as Scientific Objects/Visuality*

Multimedia Seminar, January and November 2010, MPIWG and University of Pisa

ORGANIZERS *Claudio Pogliano* (University of Pisa), *Francesco de Ceglia* (University of Bari)

FURTHER NETWORK MEMBERS INVOLVED *Hans-Jörg Rheinberger*

The Seminar will focus on the leitmotiv of the *Voyage through the human body*, which has often been played in the last few decades from different viewpoints, with various aims and outcomes. As for the beginning—although a ‘prehistory’ should be traced in medical writings and in generale literature—1966 is apparently the crucial year. A science fiction film (*Fantastic Voyage*) was then directed by Richard Fleischer; the movie holds the distinction of being the first to deal with the concept of “inner space:” in doing so, it created a new sub-genre. It inspired, among other things, parodies, an animated TV series, a painting by Salvador Dalí, and a double novelization made by Isaac Asimov, up to 1987. The frequent and growing exploitation of the leitmotiv by literature, art, cinema, television, museums, advertising, has been going along with the various attempts made by technoscience to scan interior body regions and to give

a visual rendering of them. It is likely that a circular process, involving various kinds of actors, has been producing a series of scientific and cultural artifacts which might be collected, compared, and studied. Within the MPI Network a number of young scholars will be selected, willing to approach the topic of the *Voyage through the Human Body* as a scientific object, entangled in webs of material practices, cultural significance, theoretical and social implications.

The World Knowledge—of Things. Scientific Objects in Dialogue

Final Symposium, 4–5 October 2010, Berlin, Martin Gropius Bau,
in co-operation with the Berlin Science Year 2010 and the Exhibition “Weltwissen”

The planned symposium will make use of the opportunity of the setting of the celebration and discuss the role of objects in the production of “World knowledge,” on the example of Science in Berlin, in the context of the Exhibition. Objects of the exhibition will be singled out for closer attention in form of a scientific dialogue between the disciplines: the perspective of an art historian meeting the perspective of a scientist, an exhibition maker talking to a historian of science ...

The discussants will ask not only for the objects’ widespread uses and the hi/stories inscribed in an object, but also analyse the history of its preservation, its role in collections and exhibitions. They will ask for the objects’ specific historical moments, how and when they became charged with significance, and what they meant to Science in Berlin.

Drawing on the work of the Research Network, which over the last five years has researched not only the concepts and qualities of various kinds of (forgotten) objects, but also the interrelations between object and text, object and collection, and on the expertise of the MPIWG in the history of science and exhibition making, the planned conference will create an extra room for scientific comments on the “Weltwissen”—of Things.



Historical Instruments for Eye Surgery,
Courtesy of the Berlin Medical History
Museum. Photo: Jan Kaminski

Workshop

Scholarly Publishing and the Issues of Cultural Heritage, Fair Use, Reproduction Fees, and Copyrights

Berlin, Januar 11, 2008

ORGANIZERS *Christine von Oertzen* (MPIWG), *Kelley Wilder* (MPIWG, De Montfort University, Leicester, U.K.)

The purpose of this workshop was to bring together leading representatives from key universities, research institutes, libraries, museums, government agencies, commercial image providers and academic publishing houses to provide an opportunity to discuss experiences in working with and publishing visual images and cultural heritage items in academic contexts, especially in the humanities.

As science publishing moves forward into an increasingly fluid, international e-publishing model, the humanities scholars, especially those studying visual images, are being left farther and farther behind. They are constrained not only by restrictions to print and web publishing of images, but also by the confusion arising from conflicts of national, regional, and institutional policies concerning picture reproduction and cultural heritage citation. This is not only a question of copyright, but also a question of access, whether open or free, and to uncopyrighted information, as well as a question of reproduction fees and the politics of cultural heritage.

The Max Planck Institute for the History of Science saw an urgent need to address these problems and to communicate them, in order to find ways to ensure the continued quality of research and scholarship. More and more scholars, especially in the history of science, are using images for their work, but frequently their choice of subject matter is unduly influenced by availability or affordability of key sources. As an internationally renowned institution that devotes its funds and energy to fostering innovative research in the humanities, the Max Planck Institute for the History of Science initiated this dialogue to yield a better understanding of and a broader subscription to fair practices of access that are acceptable to scholars, museums, libraries, publishers and research institutes alike.

Participants at the workshop agreed that access to unique historic objects, images, or texts—cultural heritage—is only rarely a copyright issue. Access to cultural heritage is first and foremost a contractual matter. As such, access to cultural heritage is inherently negotiable. When repositories impose excessive fees on scholars, with reference to copyright they may not be operating within the boundaries of the law. In any event, by restricting access and use they are limiting in unforeseen ways the scholarly

potential of digital cultural media. The curators at the workshop emphasized that financial and legal considerations are not the only reasons museums and collections restrict access to digitized cultural heritage. Fear of abuse and theft also factor in how they make decisions about access and use. Digitalization simplifies the distribution of reproductions, opening the floodgates to forgery and incorrect attribution, a potential threat to the painstaking work of image curators. If an object can no longer be identified, it loses its value – not only to cultural organizations, but to scholars as well. As the trustees of cultural heritage, curators in museums and collections must guard against such abuse.

The participants also discussed that some museums and libraries are demonstrating a renewed willingness to take into account the particular needs of scholars, exploring new ways to reconcile scholarship with stewardship. Several institutions presented at the workshop have recently begun to provide researchers free-of-charge access to some of their digitized collections. The Victoria and Albert Museum in London, for example, offers scholars this service from the museum's home page, while the Metropolitan Museum of Art in New York is cooperating with scholars through ARTstor, a non-commercial digital library. Via the database Images for Academic Publishing (IAP), high-resolution images from the Metropolitan Museum of Art's collections are made available for scholarly use. These initiatives were seen as encouraging signs that other repositories will follow such important examples.



Rembrandt van Rijn (1606–1669),
Aristotle with a bust of Homer, 1653.
Image displayed free of charge with the
kind permission of the Metropolitan
Museum of New York (MET)

Following the January 2008 gathering of experts, our Institute, with input from all participants, drew up a set of recommendations to improve scholars' access to digital media. This document calls upon curators and scholars to enter into a new relationship to promote mutual trust and common interests. The aim of this compact is to address the pressing challenges raised by our digital present and future. We request that curators refrain from arbitrarily restricting the public domain. We further ask our colleagues in libraries, museums, and other repositories to accommodate the needs of scholars for freely accessible, high-resolution digital images. This request concerns not only print publications, but also new forms of electronic publishing. We exhort scholars in the humanities to respect the special custodial responsibility of museums, libraries, and other image repositories. In particular, we insist that careful attention to attribution must become part of each scholar's contribution to a relationship based on trust and mutual benefit.

The Best Practices Recommendations as well as a detailed report of the workshop can be found on our website

<http://www.mpiwg-berlin.mpg.de/PDF/MPIWGBestPracticesRecommendations.pdf>;

<http://www.mpiwg-berlin.mpg.de/PDF/MPIWGWorkshop1-2008Report.pdf>

Participants

- *Mitchell Ash* (University of Vienna)
- *Susan Bielstein* (University of Chicago Press, Chicago, U.S.A.)
- *Lorraine Daston* (MPIWG)
- *Carole Ann Fabian* (ARTstor, New York, U.S.A.)
- *Annette Godefroid* (Bridgeman Art Library, Berlin Office, Germany)
- *Hans Rupprecht Goette* (German Archaeological Institute Berlin, Germany)
- *André Gunthert* (EHESS Paris, France)
- *Kenneth Hamma* (J. Paul Getty Trust, Los Angeles, U.S.A.)
- *Frank James* (The Royal Institution, London)
- *Volker Kitz* (Max Planck Institute for Intellectual Property, Competition and Tax Law, Munich, Germany)
- *Norbert Lossau* (State and University Library Göttingen, Germany)
- *Catriona MacCallum* (Public Library of the Sciences)
- *Christine von Oertzen* (MPIWG)
- *Doralynn Pines* (Metropolitan Museum of Art, New York, U.S.A.)
- *Jürgen Renn* (MPIWG)
- *Hans-Jörg Rheinberger* (MPIWG)
- *Simone Rieger* (MPIWG)
- *Urs Schoepflin* (MPIWG)
- *Alan Seal* (Victoria & Albert Museum, London, U.K.)
- *Wolfgang Schieder* (University of Cologne, Germany)
- *Cristina Steingräber* (Hatje Cantz Publishers, Berlin, Germany)
- *Theudel von Wallmoden* (Wallstein Publishers, Göttingen, Germany)
- *Kelley Wilder* (MPIWG/De Montfort University, Leicester, U.K.)

Information Technology

Overview

The *Information Technology Group* at the MPIWG aims to provide an optimal infrastructure for operating digital resources, tools, and publication channels. The specific task is to develop instruments adapted to exploit the promising potential of the digital world both for research and for academic publishing.

The IT group develops software solutions according to the needs of the institute's projects and maintains an infrastructure for publishing primary and secondary sources on the web. Hence the focus is on new innovative solutions based on open source software but also on stabilizing the existing infrastructure to provide access to Internet sources as part of an increasing demand from inside and outside the institute.

Web presentations have become an integral part of research in all departments and independent research groups. These research web sites are jointly maintained by the researchers and the IT group; the sites give access to material relevant to their research interests and are part of their dissemination strategies of research results. Currently, 11 research sites are available online: European Cultural Heritage Online (ECHO), The Virtual Laboratory (VLP), History and Foundation of Quantum Physics, Virtual Einstein Exhibition, Cuneiform Digital Library Initiative (CDLI), The Archimedes Project, Database of Mechanical Drawings, Islamic Scientific Manuscript Initiative (ISMI), Drawing with Optical Instruments (Vision), Research Network "history of

scientific objects," Knowledge in the Making, The Virtual Einstein Exhibition in Pavia, "Wunderforschung," Planck Exhibition, and History of Science in a Garden (Pratolino). Thus the institute's web representation is one of the largest in the Max Planck Society.

The IT group also provides a comprehensive computing service, i. e. providing the most current IT infrastructure, desktop computers, conference technologies, data backup and printing services. The email service and high-speed internet connection is provided in cooperation with the *Joint Network Center (GNZ) of the Berlin-Brandenburg Max-Planck Institutions at the Fritz-Haber-Institut der MPG.*



IT Projects for innovative research

The basic infrastructure—developed originally in the context of the European Cultural Heritage Online Project (ECHO)—is constantly improved to face the challenges of a perpetually increasing demand. The current infrastructure is based on a highly modular set of extensions of the content management system and applications server ZOPE. All developments are, wherever possible, based on existing open source solutions, so that they can be adopted by other institutions.

In 2008 and 2009 new elements of this infrastructure have been developed; on the basis of an open source optical recognition software (OCR) software package, all scanned books of the library have been OCR-ed (totaling 2,500,000 pages). Experimental full-text search is available on these texts and can be accessed over the ECHO, VLP and Quantum History websites. Internally, the digital collection of the institute's library can now be searched online. Search results are displayed utilizing the marking functionality of the institute's image display server Digilib. Although the OCR texts have only been processed with low recognition rates and still need improvement, these full text searches already make it possible to find quickly occurrences of concepts and terms in documents of well defined corpora, which was not possible before. In the future, it is planned to improve the search results through data-mining and natural language technologies, and using the self-learning abilities of the OCR software to improve the accuracy of the results. → p. 226

This work complements the endeavors of the XML group to develop a workflow for the transcription of books into an semantically structured format. While the OCR project aims to give a rough overview over a corpus, the XML project makes it possible to analyze and annotate documents which are relevant to a specific research question in full detail. In the further development of both projects, the detailed analysis of selected documents, carefully transcribed and annotated in XML, will help to improve the search functionalities in the corpus treated by OCR by identifying important concepts and terms, which then can be specially searched in the OCR-ed text corpus. The IT group also closely cooperates with the GIS project of Dagmar Schäfer's independent research group. The goal is to make tools for spatial annotation useful to the researchers at the institute, e. g. to investigate the transmission of knowledge over time and space. Further applications will be developed for the globalization project and the ISMI project. All these projects are planned as starting points for building working ontologies that will help to structure and organize electronically accessible knowledge. These work tools will be made accessible to researchers in the context of a collaborative working environment. → p. 63

Another focus of the development work of the group was the improvement of publication tools for databases. In particular, a web interface of the database of the Kant project was created, allowing searching and concept browsing. Systematizing the experiences made by designing the web presentation and backend for the different database projects (CDLI, DMD, Kant) a prototype of a new database system, OpenMind, has been developed and finds its first application in the database of the ISMI project. It will be extended for use by the GIS projects. The leading idea for the new system is that a database as research tool has to be as flexible as possible; one reason why software such as *FileMaker* is successful as a research tool at the institute. In par-

ticular, if new properties have to be added to an object or existing objects have to be re-combined into new objects, it should be possible to change easily the underlying data models without re-entering data and re-designing interfaces. Existing relational databases like *MySQL* and *Postgres* allow this only by programming scripts and need the intervention of a programmer, other solutions like *FileMaker* run into difficulties if they have to deal with large datasets.

Another challenge in particular for electronic publications on the history of modern physics and early modern science is the historically adequate representation of mathematical formulas on the web. To tackle this problem the IT group has started to evaluate different publication strategies of formulas based on established tools for the transformation from *FrameMaker* or *LaTeX* in XML. Extensions and adaptations of XML standards as well as existing transformation tools to the needs of historical formulas will be explored in cooperation with *The Newton Project* at the University of Sussex.

Since 2008 the institute has acquired state-of-the-art 3D scanning equipment. This is part of its endeavor to provide digital representations of artifacts. A model workflow showing how to scan and present 3D sources as part of academic publication is currently under development as part of the CDLI project. The Institute cooperates with other institutions working in the humanities within and outside the Max Planck Society, e. g. the **KHI Florence** and the *Istituto di Scienza e Tecnologie dell' Informazione "A. Faedo," Pisa* in order to open up a broad field of applications.

→ p. 61

Preparing for the future

The existing infrastructure has reached the limits which can be maintained by a relatively small IT group. Moreover, there is the need to extend the use of existing resources for multiple purposes, such as viewing text and images not only in a web browser but also with more interactive tools such as *Arboreal* or data-mining software, or software for the spatial connection of objects, as developed in Department I (*VirtualSpaces*). In addition, the amount of openly accessible sources in the internet useful for research in the history of science has increased significantly in the last few years. Therefore a new infrastructure has to make these resources accessible to researchers at the institute. This challenge is two-fold: both social and technological. Socially the content providers and users have to agree on an interchangeable repository structure; technically such an infrastructure has to be developed and maintained. A stricter division between content and presentation is needed than the current infrastructure can provide. Therefore major efforts were put into preparing the migration of the existing infrastructure of the MPIWG into an infrastructure based on the *eSciDoc* project. *eSciDoc* is a basic infrastructure for storing and managing digital objects in shared repositories developed jointly by the Max Planck Digital Library and FIZ Karlsruhe. The IT group organized a workshop in December 2009 bringing together five Max Planck Institutes in the GSHS and the MPDL to consolidate the modules needed for the humanities, and to define priorities for the development of this infrastructure. The aim is to migrate all digital objects provided by the institute into the new system to render them more interoperable and easier to maintain. The involvement of the IT

group in the formation of a Digital HPS consortium is also part of this strategy. The IT cooperates here with institutions in the US, such as the Marine Biological Laboratory in Woods Hole, Arizona State University and Harvard University.

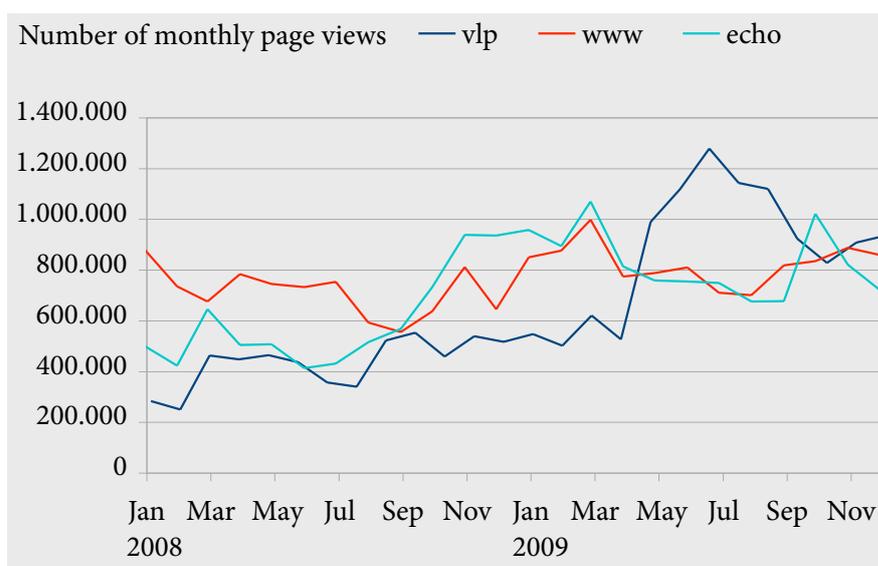
The IT group is actively involved in evaluating and adapting the existing *eSciDoc* solution for the needs of the institute, therefore the institute is running its own *eSciDoc*-server and an adopted *PubMan* server, where *PubMan* is an application based on *eSciDoc* for managing digital publications. Currently the migration of the institute's bibliography is under preparation. As a test case for the use of the new system as research tool, the shared bibliography of the quantum history project is provided by the institute's *PubMan* server.

Services for cooperation and dissemination

As part of its standard services, the IT group offers Webmail, VPN, experimental Jabber and WLAN to all researchers at the institute. The IT supports up to 150 scholarly users, i. e. research scholars, guests, post-docs and pre-docs, in using the IT infrastructure at the institute, which includes the help with standard problems in electronic work but also the maintenance of web sites and the creation of research databases. The preparation of print publications is also growing in importance since publishers increasingly request the submission of camera-ready copy.

On the institute's web-site, multimedia content can be published using a standardized *Mediathek* which also can be included into project specific websites. IT provides support and a standard workflow for creating these content. In addition, the IT supports the documentation of workshops by audio and video recording. The group supports the creation of websites for workshops and projects. In close cooperation with Hansjakob Ziemer (Public Outreach and Cooperation) the IT group maintains and develops the Institute's website with up-to-date information about the research projects of the institute.

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Library

by *Urs Schoepflin*, Library Head

Introduction

The Library's mission is to provide the best possible information services to the research groups of the Institute and to create optimal access to both print and electronic resources. It aims to develop effective services and infrastructures for research in history of science by exploiting the potential of traditional and new media for scholarly work and for disseminating research results.

To meet the evolving needs of the existing research groups at the Institute and to integrate new groups, particular attention was given to the following key areas: 1) further development of the collections, content provision, and services; 2) enhanced acquisition of and access to digital content and sources; 3) support of scholarly publication and dissemination activities by copyright clearing services and additional publication aids including the implementation of the Max Planck Society's open access policy; and 4) extension of the collaborative network of the Library.

Thus, the Library continues to develop into a universal information instrument covering the widespread needs of a multidisciplinary research area and is prepared to flexibly master new bodies of knowledge as new research directions and themes appear.

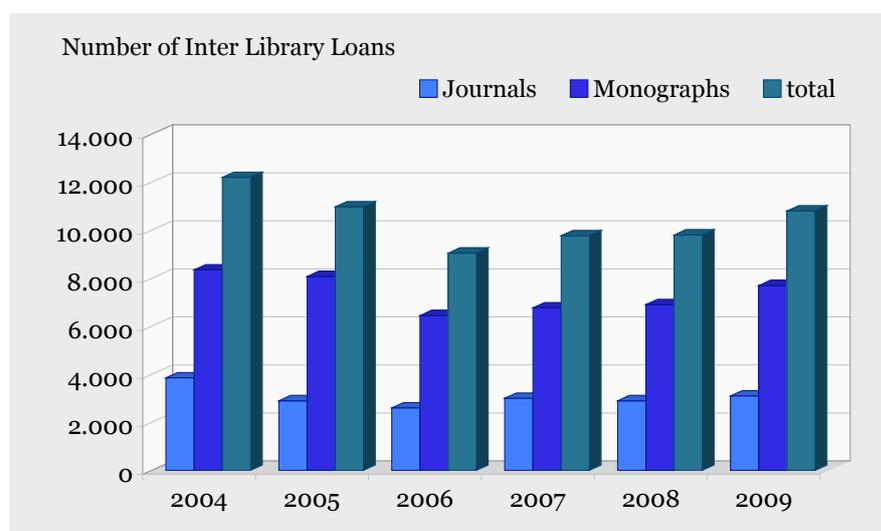
The Library's collections and services

The Library collections currently hold 65,000 volumes in print in addition to over 25,000 historic works and materials in microform. Besides the systematic collection building policy in line with scholarly needs, the print collection has also benefited from special book collections entrusted to the Library, in particular, the Erwin Hiebert collection, the Max Born collection, the Assyrological collection of Blahoslav Hruška, the books donated by the Chinese Academy of Science commemorating the 30th anniversary of cooperation with the MPG, and, most recently, the offprints collected by the late Laszlo Tiszan. These unique collections are all of particular interest since they reflect the special approach of the collector or the collecting body to specific thematic areas relevant to the Institute's research.

In addition, original archival resources contain some 10,000 items mainly including papers of physicists of the first half of the 20th century (Gehrke collection, Rupp correspondence, Einstein letters), the majority of which have been made available in digital form.

Access to electronic resources has again been substantially enhanced to include over 30,000 electronic journals, more than 200 full-text and reference databases, as well as a number of e-book collections, 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).

Complementing these holdings and resources, the interlibrary loan service has been in high demand and has maintained a level between 10,000 and 12,000 loans p. a. This particular 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 451 individual libraries worldwide—, bringing together information from a wide range of relevant sources and making them available to the scholars at the Institute and at its collaborative research centers.



Digital Research Library and enhanced acquisition of digital content and sources

Access to digital sources and other materials has become crucial for research in history of science. To address this issue, the Library has unfolded a multi-layer strategy to enhance acquisition and access to digital content and sources. The strategy includes several elements.

The special program for digitizing and presenting sources in history of science in high quality color facsimiles from the Library's rare books collection and in grey-scale images from the microform archive has been further developed. All digitized materials are accessible via 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 p. a. The workflow comprises procedures to upload the resulting images to the online presentation environment of the Digital Research Library and to securely archive the master files. The service is designed to react flexibly to new demands in the short term. The program is working closely with the research groups at the Institute who present their research on the Internet and who can immediately integrate the digitized sources into their presentations (ECHO Project, Archimedes Project, Virtual Laboratory, Epistemic History of Architecture, History of Mechanical Knowledge in China, Jesuit Sciences, Early Modern Engineering Drawings, Vision Project, History of Quantum Mechanics Project, Pratolino Project). The ECHO open access infrastructure (European Cultural Heritage Online) is a key instrument for uploading and openly presenting sources on the Internet and at the same time for providing scholars with appropriate tools to work with the digital sources.

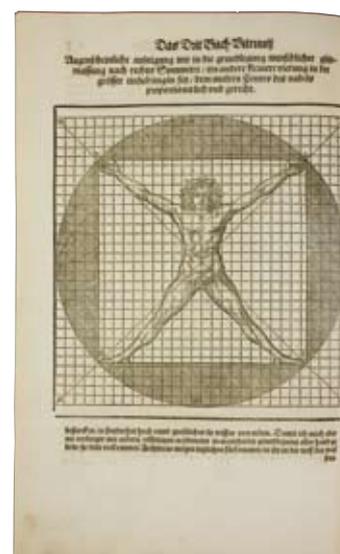
The Library has invested in professional mobile digitization equipment and expertise for systematically digitizing also on remote sites. As a further element, dedicated digitization campaigns have been conducted to acquire source materials in institutions or in private collections, for example: the Giusti collection of rare mathematical books in Florence (in cooperation with the Art History Institute); the Vitruvius collection at the Werner Oechslin Library Foundation in Einsiedeln, Switzerland; the Hilprecht Archive and Cuneiform collection at Jena University (using also 3D scanning, in cooperation with Jena University and Dept. I); the collection of Arabic manuscripts at the Berlin State Library (in cooperation with the ISMI project at McGill University, Montreal).

To expand the scope of the available digital sources even further, the Library has negotiated several cooperation contracts with institutions holding relevant material and commissioned its digitization. A key issue in the negotiations is to obtain permission to use the digitized materials freely and openly on the Internet for scholarly purposes. Digitization contracts for the following source corpora have been concluded and digitization is ongoing: Adanson Botanical Illustrations, Hunt Institute for Botanical Documentation, Pittsburgh; Humboldt-Herbaria, Botanical Museum, Berlin; Francis G. Benedict Papers, Harvard University Library; and Harriot Manuscripts, British Library.

- ECHO Project, p. 62
- Virtual Laboratory, p. 125
- Epistemic History of Architecture, p. 20
- History of Mechanical Knowledge in China, p. 159
- Jesuit Sciences, p. 36
- Early Modern Engineering Drawings p. 33
- History of Quantum Mechanics Project p. 38
- Pratolino Project p. 32
- Werner Oechslin Library Foundation, p. 60
- Hilprecht Archive, p. 27
- ISMI Project, p. 104

The Library has continued to acquire and make available archival materials as major research resources and thus represents an innovative model on how to make archival materials immediately accessible to the research groups at the Institute and to their international cooperation partners. The ongoing digitization of the complete microfilms of the Archive for the History of Quantum Physics has for the first time enabled web-based finding aids and full electronic access to the materials of the archive. It constitutes a decisive scholarly resource for the international project group on the History of Quantum Mechanics and has been presented on a visit to the American Institute of Physics by the head of the Library.

The expansion of the scope of the Digital Research Library is continued by the Library's involvement with establishing the workflow of primary text acquisition and XML structuring to support XML annotations and lexical analyses performed on historical texts, e. g. on mechanics. This work is performed in cooperation with the IT-group and the XML-Workflow project, a group funded by the MPDL and hosted at the MPIWG. The Library has commissioned transcriptions of texts to two Chinese companies specializing in converting texts both from old western prints as well as classic Chinese.



Ryff, Walther Hermann [ed.], *Vitruvius Teutsch. Erstmals verteutschet, vnd in Truck verordnet Durch D. Gualtherum H. Riuium Medi. & Math.* 1548

→ p. 63

Support of the scholarly publication and alternative dissemination process

The research results of MPIWG members are disseminated in print as well as in electronic form.

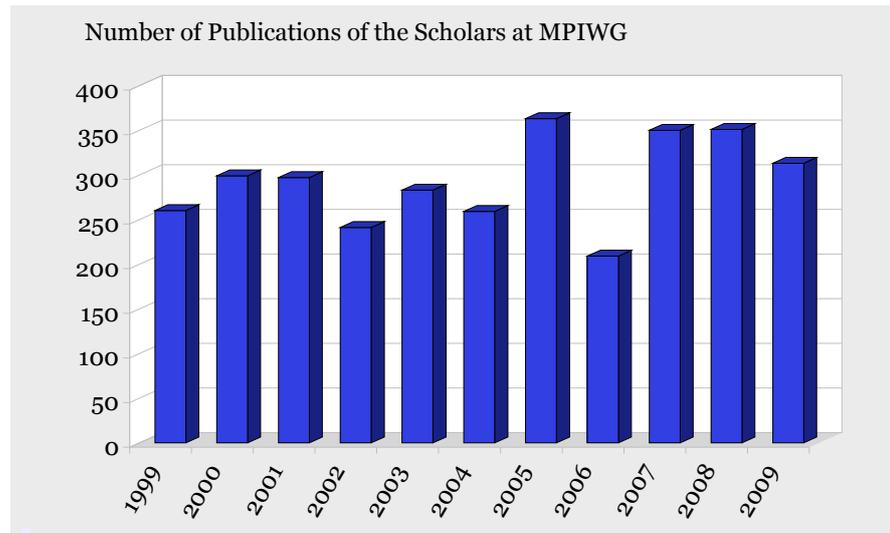
To give our authors adequate support in dealing with copyright issues, transfer agreements and publishing contracts, the Library has established a copyright clearing service and offers advice to authors on contracts and copyright transfer agreements.

From opening up new fields of research to covering topics from a comparative perspective—challenges that invite collective rather than individual scholarship—, many MPIWG research projects publish their principal results in form of a collaborative Working Group Book.

The limitations and rising costs of the traditional channels of disseminating results with commercial publishers are felt more and more, and novel ways that are more adequate to research needs are sought. The Max Planck Society is committed to the principle that the results of fundamental research should be accessible to all. The Society has publicly demonstrated its commitment to Open Access by initiating “The Berlin Declaration on Open Access to Knowledge in the Sciences and the Humanities” in 2003 (see <<http://oa.mpg.de/openaccess-berlin/berlindeclaration.html>>). Recently, the Harvard Faculty of Arts and Sciences adopted a similar open access requirement. Following up on this policy to make available as many research results as possible on the Internet, the Library took responsibility for uploading the Institute's bibliography and publication output (metadata and documents) to the MPG's central electronic repository for the documented research output of all institutes, the eDoc server. On this server, the searchable bibliographic data and—depending on the individual authors' agreements—the full text of the research results, presentations etc. are made

available for either internal or open use. To foster the awareness and the acceptance of open access publishing, the Library is preparing guidelines for MPWIG scholars with information about the open access process, electronic publishing in repositories, legal issues, copyright transfer agreements, and recommendations of what rights to retain. Alternative publication possibilities involving the combination of a technical platform to publish on the Internet with a book-on-demand service are under consideration.

The head of the Library follows up closely on the international implementation of open access and is actively involved in the annual “Berlin Process” conferences of the signatories of the Berlin Declaration.



Outreach

The Library was involved in several collaborative projects. The two main aims of cooperating with research and cultural institutions is on the one hand the sharing of rare and manuscript materials to enhance access to these resources for research purposes and on the other hand the transfer of skills by sharing the expertise in maintaining digital projects to make these resources available on the internet. At the MPG level, the ongoing cooperation with both the Bibliotheca Hertziana—MPI for Art History in Rome and with the Art History Institute—MPI in Florence is particularly relevant in these respects.

In a number of international cooperations the Library’s expertise was involved in digitizing and making available cultural heritage materials on the Internet. The Library is working intensively with the MPIWG’s partner group at the Institute for the History Natural Sciences at the Chinese Academy of the Sciences in Beijing to digitize a collection of historic Chinese mathematical texts and to bring them to the Internet. The cooperation includes advisory meetings and training sessions in Beijing as well as in Berlin.

In the framework of several delegation visits to Mongolia on behalf of the MPG, the Library has further explored and prepared the creation of a Competence Center for Digitizing Cultural Heritage in Ulaabaatar. The necessary infrastructure was determined and a selection of materials to be digitized in the pilot phase was made. The Library will offer advisory meetings and training sessions for the Mongolian scholars in Ulaanbaatar and in Berlin. → p.25

Together with “The Collegium for the Advanced Study of Picture Act and Embodiment” at Humboldt University the head of the Library was involved in consulting the digitization of the Edgar Wind papers at Oxford University.

The Library’s key concepts are advertised in several ways. In particular, the basic ideas could be conveyed during several expert visits from Germany and from abroad, and at a conference of the Max Planck librarians of the Humanities’ section held at the MPIWG.

Also in library education the Library assumes a special responsibility: it successfully offers internships for students in library and information science to prepare for a career in modern library management. This has proved to be an efficient means of transferring the concepts into library education, a fact which is reflected in subsequent master and diploma theses. In addition, the head of the Library regularly gives lectures at the Humboldt University, the University of Applied Sciences in Potsdam, and at the Berlin State Library.

Most recently, the head of the Library was appointed to the expert advisory task force of the planned German Digital Library.

Finally, the Library is actively involved in discussions on the concept of the Max Planck Digital Library (MPDL), which has now consolidated the central information management services of the MPG and hosts the eSciDoc infrastructure project, to which the MPIWG information services provided by the Library form a model counterpart at the level of the MPG Institutes. 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 scholarly results in a reliable environment.



Digitization campaign in Beijing

Library Team. Left to right:
Sabine Bertram, Ralf Hinrichsen,
Ellen Garske, Matthias Schwerdt,
Urte Brauckmann, Urs Schoepflin,
Beate MacPhail, Monika Sommerer,
Anke Pietzke. Absent: Ruth Kessentini



Cooperation and Outreach



→ Other projects participating in the Network, p. 110, p. 121

Dr. Hansjakob Ziemer has been a new research fellow at the MPIWG since January 2008. As detailed below, he manages the MPIWG's cooperation with the Berlin universities and coordinates the general outreach activities of the MPIWG. Ziemer's own research focuses on two main projects: one on the cultural history of journalistic knowledge and a second on the cultural history of music. In 2008 he published a book-length study on the cultural history of concert life in the beginning of the 20th century in Frankfurt am Main (*Die Moderne hören: Das Konzert als urbanes Forum, 1890–1940*, Campus Verlag). The book shows how the concert hall of the last century served as a site where society struggled to come to terms with the cultural and social consequences of modernity. From a microhistorical perspective, the study connects listening practices in the concert hall, the contemporary discourse on the social meaning of music and the institutional organization of performances. In connection with this research, Hansjakob Ziemer is a founding participant in the Berlin Network for the History of Listening which was created in 2009 as a forum for scholars from the MPIWG, HU, FU and other universities working on the history of listening to discuss their work from different disciplinary and methodological perspectives. His current research on journalistic knowledge in the 19th and 20th centuries further develops his interest in phenomena of the public sphere. In that project he studies the establishment of journalistic practices as cognitive tools to describe, reflect and transform social and cultural knowledge of the everyday.

1. Toward an International Center for the History of Knowledge in Berlin: Present State and Future Perspectives

In 2007, the MPIWG entered a formal cooperation agreement involving the Max Planck Society, the Humboldt University, and the Free University, with the aim of establishing an international center for the history of knowledge. This new center strengthens the history of science in Berlin's universities and research institutions. Specifically, as a forum for historians of science, it pursues three interrelated objectives: interdisciplinary dialogue toward a comprehensive cultural history of knowledge; the cultivation of relations between the natural sciences on the one hand and the humanities and social sciences on the other; and the forging of networks among historically-oriented humanities and social science disciplines. The history of knowledge serves as a node among these disciplines.

The agreement yielded initial results in 2008 and 2009, including new staff hires and the strengthening of ties among those scholars working on the history of science in Berlin. The Max Planck Society has initiated two new research groups, and, together with its university partners, successfully concluded two search committees resulting in formal job offers. While one candidate, Professor Joachim Kurtz, was appointed a W3-Professor at Heidelberg University shortly after accepting the offer of the Max Planck Society, Dr. Veronika Lipphardt successfully launched her research group on *Historicizing Knowledge About Human Biological Diversity in the 20th Century* this

past fall. Dr. Lipphardt is expected to be appointed S-Professor for the History of Life Sciences at the Free University in 2010, allowing Dr. Lipphardt to assume her teaching obligations in that partner university's history department. A joint search committee of the Free University and the Max Planck Society will soon name a second research group director. Two additional appointments deserve mention in this context: The Free University has appointed Professor Mark Geller in the TOPOI excellence cluster as a new W3-Professor for the History of Knowledge. The Humboldt University will soon appoint a new Junior Professor for the History of the Human Sciences.

The partners' goal remains to create dual appointments—at both the MPIWG and respective partner universities—enabling scholars to define future research. In 2010, the agreement will be expanded to include Berlin's Technical University. The Technical University Berlin has one of the oldest chairs in the history of science in Germany, and the university has recently placed new emphasis on our field with the establishment of its *Innovation Center for the Study of Knowledge*. These developments were actively supported by the Berlin Center's cooperation council, established in 2007 and consisting of scholars in relevant disciplines from all partners in Berlin. The advisory board also includes representatives from other institutions with an abiding interest in the history of knowledge, including the Prussian Cultural Heritage Foundation and the Center for Human and Health Sciences at the Charité, the medical school for both the Humboldt University and the Free University.

The initial hires made possible by the 2007 agreement have occurred amid both heightened interest and dynamic changes in the history of science in Berlin. The research field received further impulses via new projects and positions set in motion at the Humboldt University and the TU Berlin. The partners have also begun to coordinate research-oriented teaching. Together, they seek to make the wealth of themes and methods developed in the history of science relevant to many different university departments and disciplines. To this end, the cooperation partners will soon issue a first joint course reading list. Further initiatives for 2010 and 2011 include a website underscoring the commitment of Berlin's institutions to the history of science. The partners also plan to hold joint events to mark each new academic semester, including a new workshop for assistant professors in Berlin.



Freie Universität Berlin, Henry-Ford-Bau.
Photo: Reinhard Görner, FU Berlin

Humboldt-Universität zu Berlin.
Photo: Heike Zappe, HU Berlin

Technische Universität Berlin,
Photo: Ulrich Dahl, TU Berlin

Members of the Cooperation Council

Regular Members

- Prof. Dr. Rüdiger vom Bruch, Humboldt-University
- Prof. Dr. Christof Rapp, Humboldt-University
- Prof. Dr. Hartmut Böhme, Humboldt-University
- Prof. Dr. Herfried Münkler, Humboldt-University
- Prof. Dr. Erika Fischer-Lichte, Free University
- Prof. Dr. Julia Müller-Tamm, Free University
- Prof. Dr. Christine Keitel-Kreidt, Free University
- Prof. Dr. Wilhelm Schmidt-Biggemann, Free University
- Prof. Dr. Jürgen Renn, MPIWG
- Prof. Dr. Lorraine Daston, MPIWG
- Prof. Dr. Hans-Jörg Rheinberger, MPIWG
- Prof. Dr. Peter Hammerstein, Humboldt-University
(representative of the MPIWG-advisory board)

Guest Members

- Prof. Dr. Volker Hess, Humboldt University
- Prof. Dr. Hermann Parzinger,
The Prussian Cultural Heritage Foundation
- Prof. Dr. Gerhard Wolf, Kunsthistorisches
Institut in Florence-MPI
- Prof. Dr. Günter Abel, Technical University

2. Outreach Activities of the Institute



Public Events

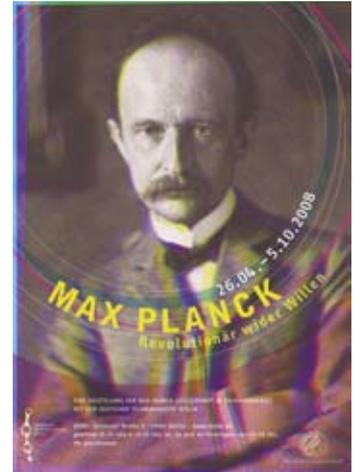
Left: Poster announcing the two panel discussions with Marcel Beyer, who was the “writer-in-residence” at the MPIWG in May 2008. The two events with him focused on the relationships of literature and biological knowledge and consisted first of a reading by Marcel Beyer followed by a discussion with Hans-Jörg Rheinberger and Safia Azzouni on “*Naturkunde: Poetisches trifft biologisches Wissen.*” The second event was a discussion of Marcel Beyer with Peter Berz and Christoph Hoffmann on “*Poetische treffen biologische Sprachen.*” Both events were coordinated by Safia Azzouni and Christoph Hoffmann as part of the project “Knowledge in the Making.”

→ p. 136

Right: Poster announcing a panel discussion that formed part of the Darwin Year 2009 and convened historians of art, science and literature at the MPIWG on “*Survival of the Prettiest. Evolution, Kunst und Ästhetik nach Darwin.*” (“Survival of the Prettiest. Evolution, Art and Aesthetics after Darwin”). Discussants were Peter Berz (University Vienna), Pamela Kort (curator-in-residence at the MPIWG and curator of the exhibition “*Darwin. Art and the Search for Origins.*”), Winfried Menninghaus (Freie Universität Berlin), Hans-Jörg Rheinberger (MPIWG) and Barbara Wittmann (MPIWG), who also coordinated the event as part of the project “Knowledge in the Making.”

The Quantum History Project contributed the texts to the spring 2008 exhibition “Max Planck: Revolutionär wider Willen” (“Max Planck: Reluctant Revolutionary”) organized by the Max Planck Society at the Deutsches Technik Museum in honor of the 150th birthday of Max Planck. These texts were published in a special issue of the popular science journal *Spektrum der Wissenschaft*.

→ Quantum Physics Project, p. 38



Physiology of the Piano: Lectures and Concerts on the Common History of Science and Music, II and III

Since 2006 MPIWG historians of science, musicians, and musicologists have analyzed the issue how and why piano playing has been a paradigm for the investigation of human physiology and psychology since the 19th century. In 15 concerts and lectures, they explored historicity and mutability of musical tuning in the sciences and in performance practice. Some of the results of those evenings were published in the MPIWG preprint series (No. 366). This series was coordinated by Julia Kursell. It is part of the project “Experimentalization of Life” that investigates the emergence of experimental cultures after 19th century physiology had introduced experimentation as its basic methodology. In this process, piano playing was considered to be a rich topic for the investigation of cognitive and motor skills, sensory perception and emotion. Pianists were invited into the scientists’ laboratories as experimental subjects and collaborators. The series centered on such examples of collaboration, which continue to this day: they asked for the feedback between science and aesthetics, and explored the possibility not only to talk about performance and sound, but to make them accessible to a broader audience.

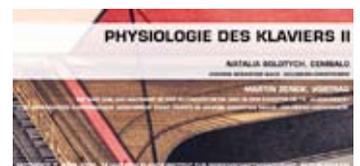
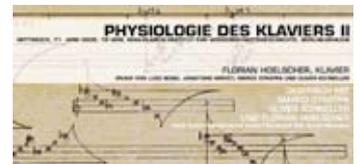
→ Experimentalization of Life, p. 120

MAX-PLANCK-INSTITUT FÜR WISSENSCHAFTSGESICHTE, BERLIN-DAHLEM 2007 2008

24.10.2007	22.01.2008	06.03.2008	09.04.2008	11.06.2008
SEBASTIAN CLAREN	BERNHARD GÄL	FLORIAN HOELSCHER	XENIA HU	HEATHER O'DONNELL
ENNO POPPE	HANS-JÖRG RHEINBERGER	NATALIA SOLOTYCH	MARCO STROPPA	ERNST SURBERG
JOSEPH VOGL	MARTIN ZENCK			

PHYSIOLOGIE DES KLAVIERS II
VORTRÄGE UND KONZERTE ZUR WISSENSCHAFTSGESICHTE DER MUSIK

19 UHR KONFERENZSAAL, MAX-PLANCK-INSTITUT FÜR WISSENSCHAFTSGESICHTE, BOLTZMANNSTRASSE 22, 14195 BERLIN



In 2007/2008 and 2009, the following events took place:

October 24, 2007: Composer Bernhard Lang, pianist Heather O'Donnell, and philosophers Hans-Jörg Rheinberger (MPIWG) and Joseph Vogl (professor for German Literature at Humboldt University) discussed the topic of repetition in music and scientific experimentation. Their point of departure was Lang's cycle of composition "*Differenz und Wiederholung*" ("*Difference and Repetition*"), which was performed by Heather O'Donnell.

January 23, 2008: Ernst Surberg, piano and keyboard, performed music by Sebastian Claren, Reinhard Febel and Enno Poppe. Composers Claren and Poppe discussed two of their compositions that challenge the motor skills of the pianist. Claren's *Alkan* is a collage from 19th-century virtuoso Charles Valentin Alkan's fiendishly difficult music; Poppe reprogrammed a keyboard instrument, forcing the pianist to 'reprogram' the internal scheme of finger use.

March 6, 2008: An evening devoted to the relationships of music and space. Xenia Hu, piano, performed the sound installation *Mount Blanc* for piano and sound projection (2002) as well as further compositions by Bernhard Gál. Thomas Ertelt, director of the State Institute for Music Research, discussed with the two artists about this piece, which was especially designed for the institute's concert hall.

April 9, 2008: Martin Zenck's lecture on the concepts of taste and touch in 18th-century was juxtaposed to Johann Sebastian Bach's Goldberg Variations. After playing Bach's cycle of variations in its entirety, Natalia Solotych introduced the audience to the various national styles of 18th-century keyboard music.

June 11, 2008: Florian Hoelscher, pianist in residence at the MPIWG, performed music by Luigi Nono, Oliver Schneller, Jonathan Harvey and Marco Stroppa for piano and electronics. Following the concert, he and the composers Stroppa and Schneller discussed the extension of instrumental music by live electronics.

May 13, 2009: Major figures in the history of physics such as Galilei, Kepler, Helmholtz, and Max Planck have been involved in the question that was discussed on this evening: the search for the ideal key board tuning system. Wolfgang Auhagen, the leading specialist on this topic, gave an introductory lecture, followed by a concert featuring the tuning systems invented by composer Edu Haubensak from Zurich. Tomas Bächli, piano, performed his pieces "Suite" and "Halo" for scordatura piano.

June 10, 2009: Hans-Christian Jabusch, professor at the Department of Music Medicine (IMM) at Dresden's Hochschule für Musik Carl Maria von Weber and pianist Ragna Schirmer gave two lectures about practicing the piano. Jabusch introduced the audience to the neurological processes accompanying successful practicing. Schirmer discussed the practical aspects of practicing, accompanied by performances of Chopin's Etudes and Liszt's Hungarian Rhapsodies.

Feature Stories online

As part of the MPIWG website relaunch in 2008, the institute started to establish a new format of feature stories as a portal to ongoing research activities at the MPIWG. Research fellows frequently present individual contributions of one relevant aspect of their research, or regarding a central aspect of the institute's research agenda at the front page of the institute's website. This format makes use of the opportunities of the Internet to make the latest research easily available and to offer links to sources, databases, audio-visual material, publications, authors and partner institutions. In 2010, these feature stories will be republished in a printed version.



Feature 1 **What (Good) is Historical Epistemology?** Reflections on a Conference at the MPIWG, July 2008 (by Thomas Sturm)



Feature 2 **Microscope Slides: An Object of the History of Science?** The Rediscovery of a Historical Resource (by Hannah Lotte Lund)



Feature 3 **Telling Instruments.** The Material Culture of Hugo Münsterberg's Laboratories in Freiburg and at Harvard (by Henning Schmidgen)



Feature 4 **New Ways of Using Digital Images.** Recommendations Concerning the Free Use of Visual Media for Scholarly Purposes (by Christine von Oertzen)



Feature 5 **Numbering Bees—A History of the Bee Language.** Karl von Frisch, the Honeybee Dances, and Twentieth-Century Sciences of Communication (by Tania Munz)



Feature 6 **The Physiology of the Piano—Keystroke Experiments During the 1920s.** The Moscow Neurophysiologist Nikolai Bernstein Brought Piano Virtuosos into the Laboratory (by Julia Kursell)



Feature 7 **Who Were Einstein's Opponents?** Popular Opposition to the Theory of Relativity in the 1920s (by Milena Wazeck)



Feature 8 **Dreaming in and of Neurophilosophy.** An Anthropological Investigation of Brain Research and Philosophy in the Sleep Laboratory (by Nicolas Langlitz)



Feature 9 **Historicizing Knowledge about Human Biodiversity.** An Independent Research Group Is Investigating the History of the Biosciences during the Twentieth Century (by Veronika Lipphardt)



Feature 10 **Galileo and the Others—Background to a Revolution in Astronomy.** To mark the anniversary of Galileo's discovery of Jupiter's moons *Sterne und Weltraum* will publish a special issue (by Matteo Valleriani, Jakob Staude and Jürgen Renn)

Overviews

Researchers and Guests

Oscar João Abdounur, Ph. D., Professor Associado, Universidade de São Paulo, Brazil (Visiting Scholar, February 1, 2008–January 31, 2009 and December 12, 2009–January 9, 2010): The Effect of Epistemological Principles in the Historical Development of Mathematical Ideas

Naamah Akavia, University of California, Los Angeles, U.S.A. (Predoctoral Research Fellow, January 1, 2008–March 31, 2008 and October 2008–December 2008, funded by UCLA and MPIWG): The Aesthetics of Psychotherapeutic Dynamics

Gadi Algazi, Ph. D., Associate Professor for History at Tel Aviv University, Israel (Visiting Scholar, July 1–August 31, 2009): Households of Knowledge: Reshaping the Scholarly Habitus, 1300–1600

Kirsti Andersen, Dr., Professor at the Department of Science Studies, Aarhus University, Denmark (Visiting Scholar, August 3–October 28, 2009, funded by the Aarhus University, Denmark): The Early History of the Logarithms

Daniel Andersson, Ph. D. (Postdoctoral Research Fellow, September 1, 2007–August 31, 2010): Styles of Observation and Experience in Renaissance Aristotelianism

Lígia Arantes Sad, Dr., Professor of the History of Mathematics at the Federal University of Espírito Santo, Brazil (Visiting Scholar, October 15–December 14, 2008): Mathematics Education in an Intercultural Perspective for Native Brazilians (Indians) in the State of Espírito Santo

Mitchell G. Ash, Ph. D., Ordentlicher Universitätsprofessor für Geschichte der Neuzeit, Universität Wien, Austria (Visiting Scholar, June 2–July 24, 2009, funded by the Universität Wien, Austria): Scientific and Political Changes in 20th-Century Germany and Austria—1918, 1933/38, 1945, 1989/90

Safia Azzouni, Dr. (Karl Schädler Postdoctoral Research Fellow, October 1, 2008 – June 30, 2010, funded by the Liechtenstein Fonds for the History of Science): The Popular Science Book: A New Genre between Literature and Science in the Late Nineteenth and Early Twentieth Centuries

Nikolaus Bacht, Dr. (Emmy Noether Research Group Director, October 1, 2008 – September 30, 2011, funded by the Deutsche Forschungsgemeinschaft): Philosophy and History of Listening

Massimiliano Badino, Ph. D. (Postdoctoral Research Fellow, June 1, 2005 – September 30, 2011): Thermodynamics and Statistical Mechanics from Boltzmann to Planck

Manuela Bauche, Leipzig University, Germany (Predoctoral Research Fellow, January 1 – March 31, 2010): Science, Metropole and Colony: The Medical Discourse on Malaria between Germany and Africa, ca. 1880–1920

Susanne Bauer, Dr. (Research Scholar, September 1, 2009 – August 31, 2012): Micropolitics of Difference: Soviet/Russian Biomedical Sciences from the Atomic Age to Genomics

Antonio Becchi, Dr.-Ing. (Visiting Scholar (intermittent), May 15, 2002 – September 30, 2010): Epistemic History of Architecture

Viola van Beek, Humboldt-Universität zu Berlin, Germany (Predoctoral Research Fellow, July 1, 2007 – June 30, 2009): Codes of Experimenting and Experimental Spaces around 1900

Domenico Bertoloni-Meli, Ph. D., Professor of History and Philosophy of Science, Indiana University, Bloomington, U.S.A. (Visiting Scholar, May 1 – June 30, 2009): Observing Life Processes: Vivisection from Colombo to Haller

Peter Beurton, Dr. (Research Scholar, September 1, 1994 – March 31, 2006, associated): Research Strategies in Biological Evolutionary Theory; Modern Darwinism and the Philosophy of Science

Marcel Beyer, (Author in Residence, April 21 – May 31, 2008): Explorations and the Nature of Language: Research as a Process

Charlotte Bigg, Ph. D., Centre Alexandre Koyré/CNRS, Paris, France (Visiting Scholar, January 1 – April 30, 2009): Brownian Motion Research c. 1900

Estelle Blaschke, E.H.E.S.S./Université Paris I—Sorbonne, France (Predoctoral Research Fellow, November 1, 2009 – September 30, 2010): From the Picture Archive to the Image Bank: Commercializing the Visual through Photography

David Bloor, Ph. D., Professor of Sociology of Science at the University of Edinburgh, U.K. (Visiting Scholar, April 1–June 30, 2008): Rival Theories of Aerofoil, 1904–1926

Hans Erich Bödeker, Dr. (Research Scholar, December 1, 2006–November 30, 2009): The Emergence of the Modern Social and Human Sciences

Bernhard Bolech, Universität Wien, Austria (Predoctoral Research Fellow, May 1–June 30, 2009, funded by the Universität Wien, Austria): Brain Research and the Human Sciences in Vienna around 1900

Stefan Borchers, Dr. des. (Karl Schädler Postdoctoral Research Fellow, March 1, 2009–February 28, 2011, funded by the Liechtenstein Fonds for the History of Science): Propagation of the Soul—Inheritance of the Sin

Francesca Bordogna, Ph. D., Associate Professor, Northwestern University, U.S.A. (Visiting Scholar, October 1, 2009–May 31, 2010): The Pragmatist Hotel: Psychology as a Way of Life

Arianna Borrelli, Dr. (Visiting Scholar, September 1, 2005–January 31, 2010, funded by the Fritz-Haber-Institut der Max-Planck-Gesellschaft): The Role of Molecules in the Development of Quantum Mechanics, with a Special Regard for the Contribution of Michael Polanyi and Eugene Wigner

Henk Bos, Ph. D., Prof. em. Aarhus University, Denmark and University of Utrecht, The Netherlands (Visiting Scholar, August 3–October 28, 2009, funded by the Aarhus University, Denmark): The Early Modern Tradition of Geometrical Problem Solving

Adam Bostanci, PHG Foundation Lecturer in Social Sciences, University of Cambridge, U.K. (Visiting Scholar, June 1–August 31, 2009): Social Dimensions of Human Genomics, and of (Non-Invasive) Prenatal Diagnosis

Marie-Noëlle Bourguet, Dr., Professeur d'histoire moderne, Université Paris 7, France (Visiting Scholar, February 1–June 30, 2009): À la vue des choses: The Scientific Traveller's Notebook (18th–19th Century)

Robert Brain, Ph. D., Assistant Professor, Department of History, University of British Columbia, Canada (Visiting Scholar, October 1–October 31, 2009): The Pulse of Modernism: Experimental Phonetics and the Invention of Free Verse and All-Sound Performance

Katharina Brandenberger, Universität Zürich, Switzerland (Predoctoral Research Fellow, November 1, 2009–April 30, 2010, funded by the Schweizerischer Nationalfonds): Psychotropic Drugs in Clinics and Society, 1950–1970

Thomas Brandstetter, Dr. (Visiting Scholar, August 1–August 31, 2008): Knowledge and Imitation. Mimetic Experiments in the Sciences around 1900

Christina Brandt, Dr. (Research Scholar, June 1, 2003–January 31, 2011, funded by the Minerva Program of the Max Planck Society): Reproduction in Biology. Configurations between Science and Culture, 1900–2000

Jean-François Braunstein, Ph. D., Professor of Philosophy at the University of Paris 1, France (Visiting Scholar, June 1–July 31, 2008): The History of Historical Epistemology in the French Context.

Francesca Bray, Ph. D., Professor of Social Anthropology, University of Edinburgh, U.K. (Visiting Scholar, October 15–November 30, 2009): Significant Technologies: Rethinking Technology as a Heuristic in Chinese History

Marco Bresadola, Ph. D., Assistant Professor at the University of Ferrara, Italy (Visiting Scholar, May 1–June 30, 2008): Practices of Observation in Italian Anatomy and Life Sciences, ca. 1660–1720.

Charlotte Brives, Ph. D., Université Victor Segalen, Bordeaux II, France (Visiting Scholar, June 15–September 15, 2008): Yeast *Saccharomyces Cerevisiae* as a Model Organism: Co-emergence of a Natural Entity and an Epistemic Community

Mirjam Sarah Brusius, M.A., Ph. D. Candidate, University of Cambridge, U.K. (Predoctoral Research Fellow, April 1, 2009–June 30, 2010, funded by the Gerda Henkel Stiftung, AHRC, Cambridge Trust): Preserving the Forgotten—William Henry Fox Talbot, Photography and the Antique

Jochen Büttner, Dipl. Phys. (Research Scholar, July 1, 2004–December 31, 2012, funded by the Deutsche Forschungsgemeinschaft): Early Modern Mechanics

Raúl Cabello, Universidad Autónoma de Madrid, Spain (Predoctoral Research Fellow, February 4–April 25, 2008 and May 2–July 27, 2009, funded by the Gobierno Vasco/Basque Government, Spain): Science-War Relations in Wilhelminian Germany.

Silvia Caianiello, L'Istituto per la Storia del Pensiero Filosofico e Scientifico Moderno (ISPF), Napoli, Italy (Visiting Scholar, August 27, 2007–July 31, 2008, funded by the Consiglio Nazionale delle Ricerche, Italy): History and Philosophy of the Notion of Modularity in the Life Sciences

Luis Campos, Ph. D. (Postdoctoral Research Fellow, October 1, 2007–September 30, 2008): Synthetic Biology: Engineering Life in the Test Tube

Jimena Canales, Ph. D., Assistant Professor of the History of Science, Harvard University, U.S.A. (Visiting Scholar, June 1–June 30, 2009): Individual Differences in Observation and Reaction

John Carson, Ph. D., Associate Professor for History at the University of Michigan, U.S.A. (Visiting Scholar, January 5–July 31, 2009): Mental Ability and the Birth of Medical Jurisprudence

Giuseppe Castagnetti, (Research Scholar, April 1, 2003–September 30, 2011): History of Institutions of Physics in the 20th Century; Political and Social Context of Albert Einstein’s Activities in Berlin.

Robert Casties, Dr. (Research Scholar since January 1, 2002): Information Technology Group

Francesco Paolo de Ceglia, Ph. D. (Visiting Scholar, October 1–December 31, 2009): Signs of Death

Grégoire Chamayou, Ph. D. (Research Scholar, September 1, 2009–August 31, 2012): The History and Philosophy of “Traceability”

Yue CHEN, Institute for the History of Natural Sciences, Chinese Academy of Sciences, Beijing, China (Predoctoral Research Fellow, April 1–September 30, 2008)

Tobias Cheung, PD Dr. (Visiting Scholar, April 1–December 31, 2009, funded by the Deutsche Forschungsgemeinschaft—Heisenberg Programm): Stimulus-Reaction-Schemes in Psychologies, Anthropologies, Urban Systems, and the Life Sciences 1830–1950.

Suparna Choudhury, Ph. D. (Research Scholar, September 1, 2008–August 31, 2014, funded by the Minerva Program of the Max Planck Society): Constructions of the Brain: Critical Neuroscience and the Adolescent Brain

Pingyi CHU, Ph. D., Associate Research Fellow, Institute of History & Philology, Academia Sinica, Taipei, Taiwan (Visiting Scholar, September 1–October 15, 2009): Construction of Disease and Narrating the Pain

Alix Cooper, Ph. D., Associate Professor of History at the State University of New York at Stony Brook, U.S.A. (Visiting Scholar, September 1–November 30, 2008, funded by the SUNY-Stony Brook): Domestic Matters: Family, Household, and the Labors of Observation in Early Modern Europe

Jacob Lebovitch Dahl, Ph. D., Lecturer of Oriental Studies at the University of Oxford, U.K. (Research Scholar, October 1, 2005–September 30, 2008): Sumerian, Pre-classical Socio-economic History, and Early Near Eastern Writing Systems

Peter Damerow, PD Dr. (Research Scholar, January 1, 1997–December 31, 2005, associated): History of Science and Education, Individual and Historical Development of Cognition, Genesis of Writing and Arithmetic, History of Mathematics and Physics in Ancient and Early Modern Period

Lorraine Daston, Ph. D., Professor, Committee on Social Thought, University of Chicago, U.S.A., Honorarprofessorin für Wissenschaftsgeschichte an der Humboldt-Universität zu Berlin, Germany (Director at the MPIWG since July 15, 1995): History of Scientific Observation, Cognitive Practices of Science

Didier Debaise, Ph. D. (Postdoctoral Research Fellow, October 1, 2008–January 31, 2011, funded by the Alexander-von-Humboldt-Stiftung): Pragmatism and the Life Sciences. The Emergence of an Evolutionary Philosophy

Elisabeth Decultot, Dr., Directrice de recherche au Centre national de la recherche scientifique, Paris, France (Visiting Scholar, May 1–May 31, 2008, funded by the Alexander-von-Humboldt-Stiftung): Aesthetics and History of Art in the Eighteenth Century (particularity Winckelmann, Sulzer)

Tamás Demeter, Ph. D. (Lorenz Krüger Postdoctoral Research Fellow, June 1, 2008–October 31, 2010): Hume and the Ideology of the Scientific Revolution

Emmanuel Didier, Ph. D., Research Fellow at the French National Center for Scientific Research, France (Postdoctoral Research Fellow, March 23–August 8, 2008): US Survey Statistics during the Interwar Period

Otniel E. Dror, MD, Ph. D., Senior Lecturer at the Hebrew University Jerusalem, Israel (Visiting Scholar, August 30–September 19, 2009): The Adrenaline Century, 1900–2000

Stéphanie Dupouy, Ph. D., Institut d'histoire et de philosophie de sciences et des techniques, Université Paris 1, France (Visiting Scholar, February 1–March 31, 2009): History of Experimentation in Psychology, 19th–20th Century

Maarten van Dyck, Dr. (Visiting Scholar, September 1, 2007–February 29, 2008, funded by the Research Foundation–Flanders): Early Modern Mechanics from Guidobaldo del Monte to Christiaan Huygens

Elizabeth Edwards, Professor and Senior Research Fellow at the University of the Arts London, U.K. (Visiting Scholar, February 19–March 28, 2008): Camera as Historian: Photography, Survey, and the Construction of an Historical Topography. 1885–1918

Miki Elazar, (Postdoctoral Research Fellow, September 1, 2009–December 31, 2010): Jesuit Science in the 17th Century

Eric J. Engstrom, Ph. D., Research Associate, Department of History, Humboldt-Universität zu Berlin, Germany (Visiting Scholar, November 1, 2009–January 31, 2010): Emil Kraepelin's Research on Native and African American Psychiatric Patients and his Trip to the United States in 1925

Rand B. Evans, Ph. D., Professor at the Department of Psychology, East Carolina University, U.S.A. (Visiting Scholar, May 1–May 31, 2009): Wilhelm Wundt and the Astronomers: Stellar Transits and the Measurement of Prior Entry in the Beginning of Experimental Psychology

Aude Fauvel, Ph. D. (Postdoctoral Research Fellow, September 1, 2009 – August 31, 2010): Women, Madness, and Psychiatry in France. From ‘Insane Females’ to Women Doctores

Andrew M. Fearnley, Cambridge University, U.K. (Predoctoral Research Fellow, September 1, 2009 – February 28, 2010): Methods to Madness: Race, Knowledge and American Psychiatry, 1880–2000

Johannes Fehr, Dr. phil., Titularprofessor, Leiter des Ludwik Fleck Zentrums am Collegium Helveticum der ETH Zürich, Switzerland (Visiting Scholar, February 15–May 15, 2009): The Role of Language in Fleck’s Thinking on Science and Cognition

Rivka Feldhay, Ph. D., Associate Professor at the Cohn Institute for the History and Philosophy of Science and Ideas at Tel Aviv University, Israel (Visiting Scholar, July 22–August 31, 2008 and August 1–September 1, 2009): Jesuits on Statics, Dynamics, Mathematics, and Astronomy between Galileo and Newton

Jiren FENG, Ph. D., School of Languages and Cultures, Victoria University of Wellington, New Zealand (Postdoctoral Research Fellow, October 1, 2006–September 30, 2008): History of Chinese Art and Architecture—Cultural Traditions of Architectural Technology as Reflected in Chinese Building Manuals of the 15th to 19th Century

Erna Fiorentini, Dr. Dr. (Visiting Scholar, January 1, 2003 – December 31, 2008, funded by the Freie Universität Berlin): Vision and Representation between Aesthetic Experience and Scientific Objectivity

Maja Fjaestad, Royal Institute of Technology, Sweden (Predoctoral Research Fellow, September 12, 2008 – September 1, 2010, funded by the Bank of Sweden, Tercentenary Foundation): Nuclear Power History. Utopian Aspects of the Swedish Nuclear Breeder Program

Ragnar Fjelland, Ph. D., Professor of Theory of Science at the University of Bergen, Norway (Visiting Scholar, July 1–July 31, 2008): 1. On the Lifeworld Foundation of Science: Einstein and the Special Theory of Relativity 2. Newton and Goethe on Reality and Scientific Method

Martha Fleming, Ph. D., Natural History Museum/King’s College London, U.K. (Visiting Scholar, January 1–February 29, 2008): Intermittence and Inspiration: Flicker, Pulse, Scintillate

Fabio Freitas, Universidade Estadual de Feira de Santana, Brazil (Predoctoral Research Fellow, June 30–July 30, 2008 and December 1, 2009–February 28, 2010): The Emergence of Decoherence: The Many Ways of a Physical Phenomenon

Gideon Freudenthal, Dr., Professor of Philosophy at the Tel Aviv University, Israel (Visiting Scholar, August 25–September 25, 2008 and September 1–September 30, 2009): “Ars Inveniendi” in the 18th Century

Vivette García Deister (Predoctoral Research Fellow, March 16–April 12, 2009, funded by the CONACyT)

Rodolphe Gasché, Ph. D., Distinguished Professor & Eugenio Donato Chair of Comparative Literature, University at Buffalo, The State University of New York, U.S.A. (Visiting Scholar, June 15–July 30, 2009): The Concept of Process in Alfred N. Whitehead and Hannah Arendt

Bernd Gausemeier, Dr. (Research Scholar, October 1, 2004–May 31, 2010): Genealogy and Human Heredity from the 18th to the Early 20th Century

Oliver Gaycken, Ph. D., Assistant Professor at Temple University, Philadelphia, U.S.A. (Visiting Scholar, January 1–June 30, 2009, funded by the Temple University, Philadelphia): Popular Scientific Cinema 1890–1918

Florentina Badalanova Geller, Ph. D. (Visiting Scholar, December 17, 2007–January 16, 2008; June 23–September 10, 2008 and June 25–September 25, 2009): Oral Tradition and Holy Writ: The Folk Bible

Mark Geller, Ph. D., Professor of Hebrew and Jewish Studies at the University College London, U.K. (Visiting Scholar, December 17, 2007–January 16, 2008; June 23–September 10, 2008 and June 25–September 25, 2009): Babylonian Astral Medicine and Melothesia

Hannah Ginsborg, Ph. D., Professor of Philosophy at the University of California, Berkeley, U.S.A. (Visiting Scholar, June 1–August 16, 2008, funded by the University of California, Berkeley): Primitive Normativity and Rule-Following

Amanda Jo Goldstein, Department of Comparative Literature, University of California, Berkeley, U.S.A. (Predoctoral Research Fellow, November 1–November 30, 2009, funded by the Deutscher Akademischer Austauschdienst): Tender Empiricism and Improper Bildung: Goethe’s Counter-Disciplinary Morphology

Michael Gordin, Ph. D., Professor of History at Princeton University, U.S.A. (Visiting Scholar, September 1, 2007–August 15, 2008): International History of the Atomic Monopoly, 1945–1949

Jean-Baptiste Gouyon, Ph. D. (Postdoctoral Research Fellow, September 1, 2009–August 31, 2010): Archiving the Doomed. Fashioning a Public Science of Conservation

Mathias Grote, Dr. (Postdoctoral Research Fellow, January 1–December 31, 2009): Transformations of Scientific Objects: Cells, Membranes, and Molecules (1970–1990)

Angela Grünberg, D. Phil. (Oxon), University of Sheffield, U.K. (Postdoctoral Research Fellow, September 1–December 31, 2009): Virtues as Sensibilities: The Tone of the German Language

Katja Guenther, Ph. D., Princeton University, U.S.A. (Postdoctoral Research Fellow, June 29–July 17, 2009): A Body Made of Nerves—Reflexes, Body Maps and the Limits of the Self in Modern German Medicine

Nils Güttler, Humboldt-Universität zu Berlin, Germany (Predoctoral Research Fellow, November 1, 2008–December 31, 2010, funded by the Studienstiftung des Deutschen Volkes): The Role of Maps in 19th Century Plant Geography

David Gugerli, Dr., Professor für Technikgeschichte an der ETH Zürich, Switzerland (Visiting Scholar, June 1–July 31, 2009, funded by the ETH Zürich): Dealing with Human Capital 1950–2000

Ximo Guillem-Llobat, Ph. D. (Postdoctoral Research Fellow, October 1, 2009–March 31, 2010): New Concepts of Food Quality and Safety in the Late Nineteenth and Early Twentieth Century. Artificial Sweeteners, Municipal Laboratories, and the Search for International Standards

Fuxiang GUO, Ph. D., Department of the Court History, The Palace Museum, Beijing, China (Visiting Scholar, July 1–August 31, 2008 and July 8–September 30, 2009): History and Art of the Court in the Ming and Quing Dynasty. The Clocks and Watches in the Quing Dynasty

Michael Hagner, Dr., Professor für Wissenschaftsforschung an der ETH Zürich, Switzerland (Visiting Scholar, February 1–June 30, 2009): What is Dippoldism? On Sexuality, Criminality and Media around 1900

Carmen Hammer (Research Scholar, April 1, 2008–September 30, 2011): Scientific Supervision of Research Infrastructures Used within Projects: Development and Coordination of Archive Material

Yi HAN, Ph. D., Institute for the History of Natural Science, Chinese Acedemy of Sciences, Beijing, China (Visiting Scholar, April 10–June 8, 2008): Silk Production, Geographical Distribution and Technology Transfer in the Song Dynasty

Jonathan Harwood, Ph. D., Professor in the History of Science and Technology at the University of Manchester, U.K. (Visiting Scholar, September 1, 2007–April 30, 2008, funded by the Leverhulme Trust): *Europes Green Revolution: the Rise and Fall of Peasant-Friendly Plant-Breeding in Central Europe, 1890 – 1945*

Gary Hatfield, Ph. D., Professor of Philosophy at the University of Pennsylvania, U.S.A. (Visiting Scholar, May 25 –June 24, 2009): *Crisis in Psychology; Internal Senses in Descartes; Diagram from Descartes’ Dioptrique.*

Juan HE, Ph. D., Institute for the History of Natural Science, Chinese Academy of Sciences, Beijing, China (Visiting Scholar, July 7–August 31, 2008): *The Manipulation of Fire in Chinese Alchemy*

Daniela Helbig, Harvard University, U.S.A. (Predoctoral Research Fellow, September 1–December 31, 2009): *Turbulence in Flight and Fluid Dynamics between the World Wars*

Ina Heumann, Universität Wien, Austria (Predoctoral Research Fellow (intermittent), July 1, 2009–December 31, 2010): *Styles of Science Communication. German-American Transfer Histories, 1945/1964*

Philipp von Hilgers, Dr. phil. (Postdoctoral Research Fellow, February 1, 2006–April 30, 2008): *Mapping the Field of Vision. From Experimental Investigations of Reading to Pattern Recognition, 1860 –1960*

Florian Hoelscher (Pianist in Residence, April 15–June 15, 2008): *Electro-acoustic Expansions of Piano Sound*

Christoph Hoffmann, PD Dr. (Research Scholar, November 1, 2004–February 28, 2010): *Epistemic Writings*

Dieter Hoffmann, Dr., Außerordentlicher Professor an der Humboldt Universität zu Berlin, Germany (Research Scholar since December 1, 1995): *History of Physics in the 19th and 20th Centuries, esp. Institutional History of Quantum Theory and Modern Metrology; History of Science in the GDR.*

Martin Hofmann, Dr. (Postdoctoral Research Fellow, June 1, 2007–August 31, 2009): *Philology of Master Craftsmen*

Anna Holterhoff, Humboldt-Universität zu Berlin, Germany (Predoctoral Research Fellow, June 1, 2009 –May 31, 2011, funded by the Excellence Cluster TOPOI): *The Establishment and Reconstruction of Copernicanism from the 16th to the 18th Century*

Giora Hon, Ph. D., Professor for Philosophy and History of Science at the University of Haifa, Israel (Visiting Scholar, September 1–September 30, 2008 and Summer

2009): 1. On Magnification; 2. Dissymmetry and Polarization in Biot and Pasteur. A Tale of Conceptual Analysis

Thierry Hoquet, Dr., Maître de Conférences. Université Paris 10, France (Visiting Scholar, April 15–May 15, 2008 and April 14–May 11, 2009): Sexual Selection. The Long Century of Absence, 1871–1972

Brad Hume, Ph.D., Assistant Professor, Department of History, University of Dayton, U.S.A. (Visiting Scholar, September 1–November 15, 2009): Heredity and the Temporality of the Body

Ludmila Hyman, Ph.D. (Postdoctoral Research Fellow, September 1, 2007–August 31, 2010): The Role of Concepts in Scientific Reasoning

Malcolm Hyman, Ph.D. (Research Scholar, 2004–2009): Text Processing, General Linguistics, Dissemination of New Research Methods

Anja Skaar Jacobsen, Ph.D. (Postdoctoral Research Fellow, November 15, 2008–January 31, 2009): Foundations of Quantum Theory and Marxism: Bohm versus Rosenfeld

Michel Janssen, Ph.D., Associate Professor for the History of Science at the University of Minnesota, U.S.A. (Visiting Scholar, June 1, 2008–May 31, 2009): History of the Relativity and Quantum Revolutions in Physics

Christian Joas, Dr. (Research Scholar, February 15, 2007–October 15, 2010, funded by the Fritz-Haber-Institut der Max-Planck-Gesellschaft): The Origins of Wave Mechanics: Schrödinger's Notebooks; the Advent of Quantum Field Theoretical Methods in Solid State Physics; the History of Computational Materials Science

Marta Jordi, University of Barcelona, Spain (Predoctoral Research Fellow, March 1–October 31, 2008 and February 1–December 31, 2011, funded by the Regional Government of Catalonia (Spain), the Deutscher Akademischer Austauschdienst, and the Institute): History of Optical Dispersion, from Classical to Quantum Physics

Edward Jurkowitz, Ph.D. (Visiting Scholar, June 15, 2008–June 15, 2010, funded by the Fritz-Haber-Institut der Max-Planck-Gesellschaft): The Role of Computation in Solid-state Physics

Stephan Kammer, Dr. (Visiting Scholar, March 1, 2008–December 31, 2009, funded by the Deutsche Forschungsgemeinschaft): Strokes and Expressions: The History of Graphological Knowledge (1750–1950)

Hyo Yoon KANG, Ph.D. (Postdoctoral Research Fellow, October 1, 2006–June 30, 2009): Patent Classification and Scientific Taxonomies: Law as a Space of History of Science?

Horst Kant, Dr. (Research Scholar since October 1, 1995): History of Physics in the 19th and 20th Centuries (esp. Atomic Physics and Institutional and Social Aspects)

Shaul Katzir, Ph. D. (Visiting Scholar, August 1, 2008–July 31, 2010, funded by the Alexander-von-Humboldt-Stiftung): The Transformations of Scientific Research Towards and Following Technological Application: Piezoelectricity during the First World War and its Aftermath

Doris Kaufmann, Dr., Professorin für Geschichte an der Universität Bremen, Germany (Visiting Scholar, September 1–December 31, 2008, funded by the Deutsche Forschungsgemeinschaft): ‘Extending Understanding Beyond Existing Borders’: The Discourse on Primitivism in the Cultural Sciences 1880–1930

Theresa M. Kelley, Ph.D., Professor of English at the University of Wisconsin-Madison, U.S.A. (Visiting Scholar, October 1–December 15, 2009, funded by the University of Wisconsin at Madison): Color Theory, Color Systems and the Status of Color in Taxonomic Systems and Botanical Illustration

Hartmut Kern, M.A. (Research Scholar since December 1, 2001): Project: Visualization and Publishing Scientific Content with Internet Technologies

Andreas Killen, Ph.D., Associate Professor of History at the City College of New York, U.S.A. (Visiting Scholar, June 15–July 15, 2008): The History of Early Cinema as a Discourse of Hypnosis and Suggestion

Philip Kitcher, Ph. D., Professor of Philosophy of Science at the Columbia University New York, U.S.A. (Visiting Scholar, October 1, 2007–May 31, 2008, funded by the Columbia University): Evolution, Altruism and Ethics

Stefanie Klamm, Humboldt-Universität zu Berlin, Germany (Predoctoral Research Fellow, May 1, 2006–September 30, 2009, funded by the MPIWG and the Gerda-Henkel-Stiftung): Strategies of Visualization in German Archaeology, 19th–20th c. As of October 2009: Predoctoral Fellow, The Getty Museum Research Institute, Los Angeles, U.S.A.

Ursula Klein, Dr., Außerordentliche Professorin an der Universität Konstanz, Germany (Research Scholar since July 1, 1998): Technoscience avant la lettre—Science and Technology in Prussia

Falk-Juri Knauff, Dr. forest. Dipl.-Forstwirt (Research Scholar, September 1, 2008–August 31, 2010): Geo Information System

Fabian Krämer, Ludwig-Maximilians-Universität München, Germany (Predoctoral Research Fellow, September 1, 2006–May 5, 2010, as of December 2009 funded by the FAZIT-Stiftung, Germany): Reference Structures in the Study of Nature

Arie Krampf, Ph. D. (Postdoctoral Research Fellow, July 1, 2008–June 30, 2010, funded by the Research Network “History of Scientific Objects”): Translation of Economic Knowledge to Developing Countries and History of Central Banking

Karin Krauthausen, Dr. des. (Postdoctoral Research Fellow, April 1, 2008–January 31, 2011): Valéry’s Cahiers (1984–1945)—Drawing and Writing as a Practice of Thought

Manfred Krebernik, Dr., Professor für Altorientalistik an der Friedrich-Schiller-Universität Jena, Germany (Visiting Scholar, April 1–December 31, 2008, funded by the Excellence Cluster TOPOI): Edition of the Lexical Texts from Fára in Connection with CDLI

Maria E. Kronfeldner, Dr. phil. (Karl Schädler Postdoctoral Research Fellow, March 1, 2006–September 30, 2008, funded by the Liechtenstein Fonds for the History of Science): The Anthropological Concept of Culture in the Context of Evolutionary Debates

Julia Kursell, Dr. phil. (Research Scholar, April 1, 2004–October 31, 2011, funded by the Initiative Pro Geisteswissenschaften): Historical Epistemology of Hearing (1850–2000)

Joachim Kurtz, Dr., Professor at the Ruprecht-Karls-Universität Heidelberg, Germany (Research Group Director, January 1–June 30, 2009): Rhetoric of Innovation in Late Imperial Chinese Texts

Nicolas Langlitz, Dr. med., Ph. D. (Postdoctoral Research Fellow, September 1, 2007–December 31, 2009): Neurophilosophers, Neuroscientists, and the Dreaming Brain

Manfred Laubichler, Ph. D., Professor of Theoretical Biology and History of Biology at the Arizona State University, U.S.A. (Visiting Scholar, April 1–July 31, 2008, funded by the Arizona State University, U.S.A.): Regulation and the Origin of Theoretical Biology

Mike Laufenberg, Technische Universität Berlin, Germany (Predoctoral Research Fellow, August 5–October 31, 2009 and December 1, 2009–March 31, 2010, funded by the Hans Böckler Stiftung /MPIWG): The Government of Sexuality: Subjectivity, Truth, and Power in the Age of Biology

Wolfgang Lefèvre, Dr., Außerordentlicher Professor an der Freien Universität Berlin, Germany (Research Scholar, July 1, 1994–February 28, 2006, associated): History of Science in Connection with History of Philosophy on the Basis of Social History; Sciences in Greek Antiquity; Early Modern Physics and Chemistry; History of Biology (15th–18th Centuries)

Christoph Lehner, Ph. D. (Research Scholar, January 1, 2004–September 30, 2011):
History and Philosophy of Modern Physics

Daryn Lehoux, Ph. D., Associate Professor for the History and Philosophy of
Science and Technology at the Queen’s University, Canada (Visiting Scholar, August
1, 2007–July 31, 2008): Ancient Science. The Roles of Observation in Theory
Formation and Epistemology

Xiaojuan LI, Institute for the History of Natural Science, Chinese Academy of
Sciences, Beijing, China (Visiting Scholar, May 1–May 18, 2008): Visual Library and
Digitization of Chinese Texts

Yuqun LIAO, Professor, Director of the Institute for the History of Natural Science,
Beijing, China (Visiting Scholar, May 1–May 18, 2008): History of Traditional
Chinese Medicine

Harry Liebersohn, Ph.D., Professor of History at the University of Illinois, U.S.A.
(Visiting Scholar, May 19–June 27, 2008): Observing the Gift: the Making of a Social
Scientific Category

Claudia Linhares Sanz, Universidade Federal Fluminense, Rio de Janeiro, Brazil
(Predoctoral Research Fellow, September 4–December 28, 2008, funded by the
Deutscher Akademischer Austauschdienst): The History of Scientific Photography
and Current Historical and Sociological Research on Neuroimages

Veronika Lipphardt, Dr. (Research Group Director, March 1, 2009–August 31,
2014): Historicizing Knowledge about Human Biological Diversity in the 20th
Century

William Lockhart, Humboldt-Universität zu Berlin, Germany (Predoctoral
Research Fellow, October 1, 2008–September 30, 2010): Listening and Musical
Analysis during the 19th Century

Pablo Lorenzano, Dr. phil., Professor for the Philosophy of Science at the National
University of Quilmes, Argentina (Visiting Scholar, January 1–February 28, 2009):
Theoretical Incommensurability and Empirical Comparability in the History of
Genetics

Hannah Lotte Lund, (Research Scholar, September 1, 2005–August 31, 2010):
Berlin Jewish Salons, Coordination of the “Network History of Scientific Objects”

Wenhua LUO, Ph. D., Department of the Court History, The Palace Museum,
Beijing, China (Visiting Scholar, July 1–September 30, 2009): Technical Exchange
between Qing Court and Tibet

Xingbo LUO, Institute for the History of Natural Science, Chinese Academy of Sciences, Beijing, China (Visiting Scholar, May 1–May 18, 2008): Data Entry Specifications and Digitization of Chinese Texts

Rui Magone, Ph. D. (Postdoctoral Research Fellow, March 1, 2009–April 30, 2010): Late Imperial China: The Relevance of Archival Practices to the Genesis and Evolution of Knowledge

Costas Mannouris, University of Athens, Greece (Predoctoral Research Fellow, September 1–September 30, 2009, funded by the Deutscher Akademischer Austauschdienst): Darwin’s Eight-Year Study of Barnacles: Rethinking the “Long Wait”

Silvia Manzo, Ph. D., Professor of History of Early-Modern Philosophy, Universidad Nacional de La Plata; Research Scholar CONICET, Argentina (Visiting Scholar, September 1–December 31, 2009): Probability and Certainty in Francis Bacon

José Ramon Marcaida, Institute of History, CISC, Madrid, Spain (Predoctoral Research Fellow, September 1–October 31, 2009, funded by the Spanish National Research Council): Nature, Art and Knowledge in Seventeenth-Century Spain

Claudia Mareis, Berner Fachhochschule—Hochschule der Künste Bern, Switzerland (Predoctoral Research Fellow, February 1–July 31, 2009, funded by the Schweizerischer Nationalfonds): Interferences between Discourses of Design and Knowledge

Lydia Marinelli, Dr., Sigmund Freud Museum Wien, Austria (Visiting Scholar, May 1–July 31, 2008): The Couch: From a Living Room Furnishing to a Site of Observation of the Unconscious

Alexander John Marr, Ph. D. (Visiting Scholar, February 4–May 4, 2008): Mathematics and Material Culture in Late Renaissance Italy

Brendan Matz, Yale University, New Haven, U.S.A. (Predoctoral Research Fellow, September 8–December 31, 2008, funded by the Deutscher Akademischer Austauschdienst): Animal Breeding and the Study of Heredity in Germany and the United States, 1850–1929

Andreas Mayer, Dr. (Research Scholar, March 1, 2007–October 31, 2010): History of Modern Dream Research and its Epistemic Values

Peter McLaughlin, Dr. phil., Professor für Philosophie, Universität Heidelberg, Germany (Visiting Scholar, July 1–October 31, 2008 and July 1–October 31, 2009): History of Mechanics. Aristotle’s “Mechanical Questions” in 16th and 17th Century Mechanics

Gordon R. McOuat, Ph. D., Associate Professor for the History of Science and Technology at the University of King's College/Dalhousie University, Canada (Visiting Scholar, January 12–March 8, 2009, funded by the Social Sciences and Humanities of Canada Research Grant): *Rewriting the History of Essentialism: Logic, Kinds and Place*

Marietta Meier, Dr. phil., University of Zurich and Collegium Helveticum, Switzerland (Visiting Scholar, August 18–September 12, 2008): *“The Emotional Sting”—Psychosurgery after the Second World War*

Maurizio Meloni, Ph. D., Università degli Studi di Roma *La Sapienza*, Italy (Postdoctoral Research Fellow, March 1–May 31, 2008): *Molecular “Dasein.” Living and Thinking in a Neurobiological Era*

Erika Milam, Ph. D. (Postdoctoral Research Fellow, September 1, 2007–December 31, 2008): *Animal Models of Behavior: Anthropomorphism, Zoomorphism, and Cultures of Observations*

Gregg Mitman, Ph. D., Professor of History of Science, Medical History & Bioethics, and Science and Technology Studies at the University of Wisconsin-Madison, U.S.A. (Visiting Scholar, January 1–June 30, 2008, funded by the Alexander-von-Humboldt-Stiftung): *American Rubber Empire*

Daniela Monaldi, Ph. D. (Postdoctoral Research Fellow, April 25, 2006–March 31, 2009): *The Early History of Bose-Einstein Statistics*

Amos Morris-Reich, Ph. D., University of Haifa, Israel (Visiting Scholar, January 18–February 25, 2008 and September 1–September 30, 2008, funded by the Van Leer Foundation Israel): *Race and Humanism: The Epistemology of Arthur Ruppin*

Annette Mülberger, Ph. D., Professor for History of Psychology, Universitat Autònoma de Barcelona, Spain (Visiting Scholar, August 12–September 12, 2008, April 5–April 12 and June 1–July 20, 2009, funded by the Universitat Autònoma de Barcelona, Spain): *Discussions about Crisis in Psychology in the Early Decade of the 20th Century*

Kathrin Müller, Dr., Kunsthistorisches Institut Florenz, Italy (Visiting Scholar, July 16–August 8, 2008, funded by the KHI Florenz): *Diagram and Ornament in Boethius’ “De institutione arithmetica”*

Staffan Müller-Wille, Dr. phil., Senior Lecturer, University of Exeter, U.K. (Visiting Scholar, August 1–August 31, 2009): *The Dark Side of Evolution: Caprice, Deceit, Redundancy*

Tania Munz, Ph. D. (Research Scholar, August 1, 2007–July 31, 2010): *The Dancing Bees: Karl von Frisch, the Honeybee Dance, and 20th Century Sciences of Communication*

Omar W. Nasim, Ph. D. (Postdoctoral Research Fellow, April 1, 2007– March 31, 2008): Constructing the Heavens: Drawings of Nebulae in Victorian Science

Jaume Navarro, Ph. D. (Visiting Scholar, January 1, 2009 – June 30, 2010, funded by the Alexander-von-Humboldt-Stiftung): Early Quantum Physics in Britain

Elio Nenci, Dr. phil. (Visiting Scholar, March, 27– August 7, 2008 and July 1, 2009 – December 31, 2010): The Relationship between Scientific Reflection and Practical Knowledge during the Renaissance and the First Decades of the 17th Century: The Case of Hydraulic Machines

Elizabeth Neswald, Ph. D., Associate Professor of History of Science and Technology, Brock University, St. Catharines, Canada (Visiting Scholar, January 1 – March 31, 2009, funded by the Canadian Institute of Health Research): Engineering the Body. Thermodynamics, Social Technologies and the Practice of Nutrition in the Late Nineteenth and Early Twentieth Centuries

Winifred Elyse Newman, Harvard University, U.S.A. (Predoctoral Research Fellow, September 1 – December 31, 2008): History and Philosophy of Aesthetics, Psychology and Perception

Kärin Nickelsen, Dr. phil.-nat., Assistenzprofessorin für Wissenschaftstheorie und -geschichte an der Universität Bern, Switzerland (Visiting Scholar, September 1 – December 31, 2008, funded by the Universität Bern): Of Light and Darkness: Modelling Photosynthesis 1840–1960

Sybilla Nikolow, PD Dr. (Research Scholar, April 1 – September 30, 2009): “Words Divide, Pictures Unite.” Otto Neurath’s Pictorial Statistics in Historical Context

Horst Nowacki, Dr.-Ing., Dr.h.c., Prof. em. of Ship Design (Visiting Scholar since August 1, 2001): Publications on the History of Ship Theory and Ship Design (Archimedes, Euler, Bouguer)

Christine von Oertzen, PD Dr. (Research Scholar since June 15, 2005): Gender, Science, Internationalism: A Transnational History of Female Academic Networking

Kathryn Olesko, Ph. D., Associate Professor for History at the Georgetown University, U.S.A. (Visiting Scholar, December 12 – December 22, 2008, funded by the Georgetown University): Prussian Precision, 1648–1947

Frederico D’ Onofrio, Universiteit van Amsterdam, The Netherlands (Predoctoral Research Fellow, May 1 – June 30, 2009, funded by the University of Amsterdam, Netherlands): Political Economy in Eighteenth-Century Naples

Javier Ordóñez Rodríguez, Ph. D., Professor of History of Science at the Faculty of Philosophy and Letters of the Autonomous University of Madrid, Spain (Visiting

Scholar, February 1, 2009–February 1, 2010): *Studies on War and Science. Consequences of the Standardization in the German Science and Industry between 1880 and 1914 in Subsequents War in Europe*

Francisco Javier Guerrero Ortega, Dr. phil., Professor at the Institute for Social Medicine, State University of Rio de Janeiro, Brazil (Visiting Scholar, January 1–January 31 and July 1–July 31, 2009): *History of the Body, History of the Self*

Ernst-Wilhelm Osthues, Dr. (Research Scholar, December 1, 2005–December 31, 2009): *Epistemic History of Architecture*

Laura Otis, Ph. D., Professor at the Emory University Atlanta, U.S.A. (Visiting Scholar, July 1, 2007–August 14, 2008, December 15, 2008–January 15, 2009, May 1–August 15, 2009 and December 9, 2009–January 12, 2010, funded by the Alexander-von-Humboldt-Stiftung): *Thinking with Images, Thinking with Words. Expressing Sensation in Language*

José M. Pacheco, Ph. D., Professor for Applied Mathematics at the University of Las Palmas de Gran Canaria (Visiting Scholar, March 1–August 31, 2008 and July 5–August 30, 2009): *The Study of 19th Century Spanish Mathematics*

Cathleen Paethe, Freie Universität Berlin, Germany (Predoctoral Research Fellow, October 15, 2008–September 30, 2009): *The Bibliophile Qi Chenghan: Book Consumption and Commercialization in Late Ming China*

Claudia Passos Ferreira, Dr., Universidade do Estado do Rio de Janeiro, Brazil (Visiting Scholar, January 1–January 31, 2008, funded by the Deutscher Akademischer Austauschdienst): *Moral Psychology. The Impact of the Discovery of Mirror Neurons in Developmental Psychology Study of Morality*

Manolis Patiniotis, Ph. D., Assistant Professor in History of Science at the Department of Philosophy and History of Science, Athens University, Greece (Visiting Scholar, September 1, 2007–February 29, 2008): *Periphery Reassessed: Greek Science in the Eighteenth Century*

Trevor Pearce, University of Chicago, U.S.A. (Predoctoral Research Fellow, January 1–March 31, 2008): *Nature as Technology: A Philosophical Investigation of Biomechanics*

Dario Perinetti, Dr., Professeur agrégé, Université du Québec à Montréal, Canada (Visiting Scholar, June 15–August 15, 2008): *Moral Certainty and Empirical Knowledge in Early-modern Philosophy*

Anna Perlina, Excellence Cluster 264 “TOPOI” (Predoctoral Research Fellow, September 1, 2008–August 31, 2010): *The Role of Language in the History of Transmission and Transformation of Psychological Concepts*

Trevor Pinch, Ph. D., Professor, Department of Science and Technology Studies and Department of Sociology, Cornell University, U.S.A. (Visiting Scholar, June 1–June 30, 2009): Sound Studies and the Digitization of Audio

Christopher Plumb, University of Manchester, U.K. (Predoctoral Research Fellow, September 1, 2009 – February 28, 2010): Exotic Animals in Eighteenth-Century Britain

Irina Podgorny, Ph. D. (Research Scholar, October 1, 2009–September 30, 2010): America's Mighty Skeletons

Gianna Pomata, Ph. D., Professor, Institute for the History of Medicine, Johns Hopkins University, Baltimore, U.S.A. (Visiting Scholar, September 15–December 31, 2009): Medical Observation in Early Modern Europe

Theodore M. Porter, Ph. D., Professor for the History of Science at the University of California, Los Angeles, U.S.A. (Visiting Scholar, June 16–July 31, 2008): How Le Play Defined Scientific Observation as a Tool of Conservative Social Reform

Daniel T. Potts, Ph. D., Professor of Middle Eastern Archaeology at the University of Sydney, Australia (Visiting Scholar, June 27–July 27, 2008): Proto-Elamite and Linear Elamite Texts of Southwestern Iran

Sandra Pravica, Freie Universität Berlin, Germany (Predoctoral Research Fellow, July 1, 2007–June 30, 2010): Tentative Transgressions. Gaston Bachelard's Experimental Epistemology

Albert Presas i Puig, Dr. (Research Scholar, August 12, 2008 – March 17, 2010): Scientific Relationship between Germany and Spain: Science, Technological Transfer, and International Policy in the 20th Century

Michael Puett, Ph. D., Professor of Chinese History at Harvard University, U.S.A. (Visiting Scholar, February 16–March 16, 2009): Changing Conceptions of Knowledge and Expertise in Early Medieval China

Valentina Pugliano, University of Oxford (Mansfield College), U.K. (Predoctoral Research Fellow, August 25 – October 12, 2008): Practical Botanisers and Experienced Observers: Apothecaries and the Study of Nature in Venice and London, 1550 – 1630

Dhruv Raina, Ph. D., Professor at the Jawaharlal Nehru University in New Delhi, India (Visiting Scholar, June 1–June 30, 2009): Historiography of Non-Western Mathematics. Social Theory of Science

Vincent Ramillon, Ph. D., Assistant Professor in History of Science at the Department of Philosophy and History of Science, Athens University, Greece

(Postdoctoral Research Fellow, November 1, 2006–October 31, 2008): Norms and Practices in Genomic Research, ca. 1985–2003

Matteo Realdi, University of Padova, Italy (Predoctoral Research Fellow, March 24–May 4, 2008, funded by the University of Padova, Italy): History of Early Relativistic Cosmology

Christian Reiß, Friedrich-Schiller-Universität Jena, Germany (Predoctoral Research Fellow, July 1, 2007–June 30, 2010): The Way into the Laboratory—the Mexican Axolotl’s Long History as an Experimental Animal

Jürgen Renn, Executive Director since July 2009, Dr., Honorarprofessor für Wissenschaftsgeschichte an der Humboldt-Universität zu Berlin, Germany, Adjunct Professor for Philosophy and Physics at the Boston University, U.S.A. (Director at the MPIWG since March 1, 1994): History of Early Modern Mechanics, History of Relativity Theory; Interaction between Cognitive and Contextual Factors in the History of Science

Maria Rentetzi, Ph. D., Assistant Professor in Sociology of Science at the National Technical University of Athens, Greece (Visiting Scholar, June 23 – August 8, 2008 and February 17–March 3, 2009): Cultures of Evidence in Physics: Visualizing the Subatomic World

Hans-Jörg Rheinberger, Executive Director up to June 2009, Dr., Honorarprofessor für Wissenschaftsgeschichte an der Technischen Universität Berlin, Germany (Director at the MPIWG since January 1, 1997): 1. History and Epistemology of Experimentation 2. History of Heredity

Simone Rieger (Academic Officer, March 1, 2008 – February 28, 2013, funded by the MPG): Press and Public Relations of the Max Planck Society; Open Access Initiative “European Cultural Heritage Online” (ECHO)

Harriet Ritvo, Ph. D., Professor of History at the Massachusetts Institute of Technology, U.S.A. (Visiting Scholar, November 1–November 30, 2009): Making Animals Wild

Raja Rosenhagen, Zentrum für Logik, Wissenschaftstheorie und Wissenschaftsgeschichte, Universität Rostock, Germany (Predoctoral Research Fellow, October 1, 2009–June 30, 2010): Individual Experience and its Role in the Transformation of Knowledge Systems

Sophie Roux, Dr., Maitre de conférences, Université Grenoble II, France (Visiting Scholar, January 19–April 25, 2009, funded by the Institut universitaire de France): Edition of Galileo’s *Mechanica*

Bruce Rusk, Ph.D., Assistant Professor of Chinese Literature at Cornell University (Visiting Scholar, January 1–June 30, 2010): Making things in Ming (1368–1644) and Qing (1644–1911) China

Donald Salisbury, Ph.D., Associate Professor of Physics, Austin College, Texas, U.S.A. (Visiting Scholar, January 12–August 15, 2008 and June 1–July 30, 2009): Max and Peter Bergmann plus the History of Quantum Field Theory

Imad Samir, Dr., Professor at the Damascus University, Syria (Visiting Scholar, August 1–September 30, 2008): Editing of Group of Economic Texts from Ebla-Archive L.2769

Nina Samuel, NCCR Iconic Criticism, Basel, Switzerland and Humboldt University Berlin, Germany (Predoctoral Research Fellow, February 15 – May 31, 2009): Shaping Chaos. Otto Rössler's Drawings

Helga Satzinger, Dr. rer. nat., Wellcome Trust for the History of Medicine at University College London, U.K. (Visiting Scholar, July 1–August 29, 2008, funded by the WTCHOM at UCL): Heredity and Difference: Gender Orders in Genetics and Hormone Research, 1890–1950

Tilman Sauer, PD Dr. (Visiting Scholar, June 15–August 31, 2009): Einstein's Work on Quantum Theory

Dagmar Schäfer, PD Dr. (Research Group Director, May 1, 2006–September 30, 2011): The Concepts and Modalities of Practical Knowledge Transmission: the culturally specific traits that drive alternative trajectories in the history of scientific and technological thinking, 10th–18th century China

Matthias Schemmel, Dr. (TOPOI Research Group Director (Excellence Cluster 264), April 1, 2008–October 31, 2012): Long-term Development of Spatial Cognition; History of Early Modern Mechanics; History of Modern Physics and Astronomy; History of Chinese Science

Jutta Schickore, Dr., Department of History and Philosophy of Science, Indiana University, Bloomington, U.S.A. (Visiting Scholar, May 15–June 15, 2009): Vipers, Venom, and the Vagaries of Experimentation

Wulf Schiefelhövel, Dr., Prof. em., Human Ethology Group, MPI for Ornithology (Visiting Scholar, March 1–May 31, 2009, funded by the Excellence Cluster TOPOI): Spatial Practices and Languages in Non-literate Societies: A Comparison between EIPO and DENE

Arne Schirrmacher, Dr. (Visiting Scholar, September 1, 2007–August 31, 2008 and December 23, 2008–May 31, 2009, Research Scholar December 1, 2009–November 30, 2010): History of 20th Century Science Communication; History of Quantum Physics

Wolfgang Schivelbusch, Ph. D. (Visiting Scholar, August 1–August 31, 2008 and July 1–August 31, 2009, funded by the Deutsche Forschungsgemeinschaft):
Historicizing Concepts of Air

Oliver Schlaudt, Philosophisches Seminar, Universität Heidelberg, Germany (Predoctoral Research Fellow, April 15–September 30, 2008): Measurement as Concrete Activity. Investigations on the Formation of Quantitative Concepts in the Natural Sciences

Thomas Schlich, Dr. med., Associate Professor at McGill University, Canada (Visiting Scholar, September 1, 2009–August 31, 2010, funded by the McGill University): The Perfect Machine: The Body and Modernist Surgery in Early Twentieth Century Vienna

Henning Schmidgen, Dr. phil. (Research Scholar, July 1, 2006–January 31, 2011):
Machines and Bodies without Organs in the History of Science

Wolfgang Schmidle, Dr. (Research Scholar, September 1, 2008 – August 31, 2010):
Max Planck Digital Library

Urs Schoepflin, Dipl. Soz. (Head of the Library since September 1, 1994): Scientific Information Systems, Scientific Communication, Sociology and History of Science, Scientometrics

Peter Schöttler, Dr. phil., Directeur de recherche, CNRS, Institut d'histoire du temps présent, Paris, France; Honorarprofessor für Neuere Geschichte an der Freien Universität Berlin, Germany (Visiting Scholar, June 1, 2008 – May 31, 2010):
Marc Bloch and Scientism

Volkmar Schüller, Dr. (Research Scholar since September 15, 1994): History of Mathematics and Physics (16th and 17th Centuries)

Jeffrey Schwegman, Ph. D. (Postdoctoral Research Fellow, October 1, 2008 – September 30, 2010): Metaphysics for an Enlightened Age: Condillac and the Construction of the Eighteenth-Century Human Sciences

Alexander von Schwerin, Dr. (Research Scholar, November 1, 2008 – March 31, 2009): Making Mutations: Objects, Practices, Contexts

Zur Shalev, Ph. D., Lecturer at the University of Haifa, Israel (Visiting Scholar, September 1 – September 30, 2009, funded by the University of Haifa):
Learned Travel in the Early Modern Levant

Grace Yen SHEN, Ph. D. (Postdoctoral Research Fellow, August 1, 2009–July 31, 2011): Song to Mid-Qing Coal Culture: Cultural Identity and Innovation

H. Otto Sibum, Dr., Hans Rausing Professor of History of Science & Director, Office for History of Science, Uppsala University, Sweden (Visiting Scholar, June 15 – August 31, 2009): Developmental History, Theoretical Cinematographs, and Physicist's Practices of Theorizing around 1900

Martina Siebert, Dr. (Research Scholar, October 1, 2006 – November 15, 2009): Data Entry Specifications and Digitization of Chinese Texts

Marcel Sigrist, Ph. D., Professeur à l'École Biblique et Archéologique Française, Jerusalem, Israel (Visiting Scholar, April 19 – July 19, 2009): List of Year Names in Southern Mesopotamia

Skúli Sigurdsson, Ph. D. (Rathenau Senior Fellow since April 1, 2007): History of Science after 1800: Mathematics, Physics, Philosophy

Circe Mary Silva da Silva Dynnikov, Ph. D., Professor at the Universidade Federal do Espírito Santo, Brazil (Visiting Scholar, October 15 – December 14, 2008): Mathematics Education in an Intercultural Perspective for Native Brazilians (Indians) in the State of Espírito Santo

Ana Simões, Ph. D., Assistant Professor for the History of Science at the University of Lisboa, Portugal (Visiting Scholar, January 21 – March 31, 2008): Revisiting the History of Quantum Chemistry from an Historiographical Perspective

Robyn Smith, Ph. D. (Postdoctoral Research Fellow, October 1, 2007 – April 30, 2009, funded by the Social Sciences and Humanities Council of Canada): Encountering Hermes in the Unknown: Exploring Experimental Vitamin Research during World War I

Lingping SONG, Ph. D., Department of the Court History, The Palace Museum, Beijing, China (Visiting Scholar, July 15 – August 22, 2009): Ritual Objects and Vessels of the Qing Dynasty

Max Stadler, Imperial College London, U.K. (Predoctoral Research Fellow, November 1, 2008 – February 12, 2009, Postdoctoral Research Fellow, October 1 – June 30, 2010): Assembling Life. Models, the Cell, and the Reformations of Biological Science, 1920 – 1960

Kai Stalman, Dr. (Research Scholar, March 5, 2007 – May 31, 2008): Semantic Cluster Project

Ida Harmina Stamhuis, Dr., Faculty of Science, Vrije Universiteit, Amsterdam, The Netherlands (Visiting Scholar, September 29 – October 24, 2008 and May 3 – May 15, 2009): Women Investigators at the Institute for Heredity Research in Berlin

Thomas Sturm, Dr. phil. (Research Scholar, October 1, 2005–September 30, 2009): Rationality in Philosophy and Psychology; Perceptual Illusions; Crisis Debates in Psychology; Kant and the Human Sciences

Edna Maria Suárez Díaz, Dr., Professor for the History of Biology and the Philosophy of Technology at the National Autonomous University of Mexico, Mexico (Visiting Scholar, August 1, 2005–July 31, 2008, funded by the National University of Mexico): Representation and the Construction of Knowledge in Molecular Evolution

Xiaochun SUN, Ph. D., Professor for History of Science at the Chinese Academy of Science, Beijing, China (Visiting Scholar, May 1–May 18, 2008 and January 3–February 28, 2009): History of Astronomy, History and Sociology of Science

Andrej Svorencik, Universiteit van Amsterdam, The Netherlands (Predoctoral Research Fellow, May 1–June 30, 2009, funded by the University of Amsterdam): History of Observational Practices in Economics, Particular Experimental Economics

Mary Terrall, Ph. D., Associate Professor of the History of Science at the University of California, Los Angeles, U.S.A. (Visiting Scholar, June 1–July 30, 2008): The Practice of Natural History in the 18th Century

Martin Thiering, Ph. D., TOPOI Research Group E II, Excellence Cluster 264 (Visiting Scholar, September 14, 2008–October 14, 2010): Cognitive- and Psycholinguistics, Spatial Language and Concepts of Space, Topological Relations, Semiotics, History of Linguistics, Philosophy of Language, Linguistic Relativity

Georg Christoph Tholen, Dr., Professor für Medienwissenschaften an der Universität Basel, Switzerland (Visiting Scholar, October 1, 2009–January 31, 2010): Imagination and the Imaginary. Epistemological Studies on Concepts of Aesthetics and Mediality

Miao TIAN, Ph. D., Professor at the Chinese Academy of Sciences, Beijing, China (Visiting Scholar, February 1–August 15, 2009, funded by the Excellence Cluster TOPOI)

Margareta Tillberg, Dr., Associate Professor for History and Theory of Art and Design at the University of Växjö, Sweden (Visiting Scholar, April 21, 2006–December 31, 2010, funded by the Swedish Research Council): Observer and Observed in Soviet State Design Institutes 1960's–1990's

Magaly Tornay, Universität Zürich, Switzerland (Predoctoral Research Fellow, November 1, 2009–April 30, 2010, funded by the Schweizerischer Nationalfonds): History of Psychoactive Drugs: Psychoactive Drugs and Personality Concepts in Switzerland (1950–1990)

John Tresch, Ph. D., Assistant Professor at the University of Pennsylvania, U.S.A. (Visiting Scholar, December 1–December 31, 2009): *The Romantic Machine: Technology and Metamorphosis in France, 1820 – 1851*

Stefan Trzeciok, Freie Universität Berlin, Germany (Predoctoral Research Fellow, October 1, 2008 – September 30, 2010): *Knowledge Transfer in the Renaissance: Thomas Alvarus, Natural Philosophy and the Artist's Faculty*

Christina Tsouparopoulou, Ph. D. (Postdoctoral Research Fellow, December 1, 2008 – March 31, 2011, funded by the Mellon Foundation): *Establishment of a Database for Ancient Near Eastern Seals, Sealings, and Seal Impressions for the CDLI*

Irina Tupikova, Ph. D. (Research Scholar, September 15, 2008 – September 14, 2010): *The Impact of Geographical Knowledge on the Generalization of Spatial Concepts*

Sophia Vackimes, Ph. D. (Postdoctoral Research Fellow, April 18, 2006 – May 31, 2008 and January 2 – February 28, 2009): *Genetic Engineering in Cinema*

Matteo Valleriani, (Research Scholar, October 15, 1998 – December 31, 2012, funded by the Deutsche Forschungsgemeinschaft): *Relation between Practical and Theoretical Mechanics from Antiquity to the Early Modern Period*

Fernando Vidal, PD Dr. (Research Scholar since September 1, 1999): *The Cerebral Subject: Brain, Self and Body in History and Contemporary Culture*

Annette Vogt, Dr. (Research Scholar since September 15, 1994): *History of Mathematics and Science in the 19th and 20th Centuries, esp. in Germany; Gender Studies*

Roy Wagner, Ph. D., Tel Aviv University, Israel (Visiting Scholar, September 1, 2008 – January 31, 2009): *Semiotics of Mathematical Language*

Bettina Wahrig, Dr., Professorin für Geschichte der Naturwissenschaften und Pharmaziegeschichte an der Technischen Universität Braunschweig, Germany (Visiting Scholar, May 1–July 31, 2008): *Poisons, Toxicologies, and the Figurations of the Abject, 1700 – 1900*

Renate Wahsner, Dr., Professorin für Wissenschaftsgeschichte (Research Scholar, October 1, 1995 – March 31, 2003, associated): *History of Philosophy in Connection with History of Science; Epistemological Fundamentals and Problems of Physics; German Idealism; Classical Natural Philosophy*

Silvia Waisse Priven, Ph. D. (Visiting Scholar, July 1–July 31, 2009): *From Signs to Remedies: Medical Ways of Knowing in the Eighteenth Century*

Sonja Walch, Universität Wien, Austria (Predoctoral Research Fellow, January 1–April 30, 2008, funded by the Universität Wien, Austria): Sex Hormones in Laboratory Practice: Eugen Steinach's Development of a Sex Hormone Theory, his Experimental Methodology and his Cooperation with Schering (1910–1938)

Guangyao WANG, Ph. D., Department of the Court History, The Palace Museum, Beijing, China (Visiting Scholar, June 4–August 31, 2008 and July 15–September 30, 2009): The History and Art of Porcelain and Ceramics, Bronze Vessels, the History of the Ancient Court. The Tinctorial Kilns during Quianlong and Jiaging Reign of Qing Dynasty

Jinyu WANG, Researcher of the Conservation Institute of the Dunhuang Academy, China (Visiting Scholar, March 1–March 31, 2009)

Daniel Warren, Ph. D., Associate Professor of Philosophy at the University of California, Berkeley, U.S.A. (Visiting Scholar, May 19–August 17, 2008)

Eric Watkins, Ph. D., Associate Professor of Philosophy, University of California, San Diego, U.S.A. (Visiting Scholar, August 5–September 5, 2009): Immanuel Kant: Natural Philosophy

Cecelia Watson, University of Chicago, U.S.A. (Predoctoral Research Fellow, April 1–June 30, 2008 and September 1, 2008–March 31, 2009): A Historical Treatment of the Artist and Art Critic John La Farge's Impact on William James's Intellectual Development, Considered in the Context of Late 19th and Early 20th Century Exchanges between Art and Science

Milena Wazeck, Dr. (Research Scholar, February 15, 2004–December 31, 2010): Opposition to the Theory of Relativity in the 1920s: History of Science Policy

Mai Wegener, Dr. (Visiting Scholar, October 1, 2008–March 31, 2009): Three Undiscovered Epistemologists: Paul Valéry, Kurt Goldstein, Jacques Lacan

Christina Wessely, Ph. D. (Postdoctoral Research Fellow, March 1, 2009–August 31, 2010): Welteis. Science, Pseudoscience and the Limits of Cosmological Knowledge 1894–1945

Kelly J. Whitmer, Ph. D. (Postdoctoral Research Fellow, June 1, 2008–May 31, 2010): Models and the Middle Way: Performing Philanthropy in the Early Enlightenment

Alexandra Widmer, Ph. D. (Postdoctoral Research Fellow, September 1, 2009–August 31, 2011): Human Bio-diversity, Colonial Relations, and the Sociality of Science: Indigenous and Scientific Knowledge of Heredity and Fertility in Vanuatu

Kelley E. Wilder, Ph. D., De Montfort University, Leicester, U.K. (Visiting Scholar, July 21–August 31, 2009): The Nature of Photographic Evidence

Josef Willenborg, Dr. (Research Scholar, September 1, 2008 –August 31, 2010): Max Planck Digital Library

Lambert Williams, Harvard University, U.S.A. (Predoctoral Research Fellow, September 15, 2008 –March 15, 2009): Historical and Philosophical Issues in Complex Systems: Models and Simulations

Christof Windgätter, Dr. (Postdoctoral Research Fellow, April 1, 2007– June 30, 2009): Knowledge through Print. Layout-Strategies and Book-Design in Scientific Publishing

Dirk Wintergrün, Dipl. Phys. (Research Scholar since January 1, 2000): Head of Information Technology Group

M. Norton Wise, Ph. D., Ph. D., Professor of History at the University of California, Los Angeles, U.S.A. (Visiting Scholar, July 12 –August 15, 2008)

Barbara Wittmann, Dr. (Research Scholar, November 1, 2003 – October 31, 2005 and May 1, 2006 –January 31, 2011): Meaningful Scribbles. Children’s Drawings as Psychological Instruments, 1880 –1950

Charles T. Wolfe, Ph. D. (Postdoctoral Research Fellow, December 1, 2007–January 31, 2008): History and Philosophy of the Concept of Organism, 1650 –1950

Monika Wulz, Dr. phil. (Postdoctoral Research Fellow, October 1, 2008 –December 31, 2010): Collective Theories of Knowledge around 1930: Edgar Zilsel’s Epistemology of Mass Phenomena

Barbara Wurm, Mag. phil., IFK Wien, Austria (Visiting Scholar, June 1 –September 15, 2009, funded by the IFK Wien): Beyond the Film Strip. Numerical-graphical Notation Procedures of the Medium Film

Xiaodong XU, Ph.D., Department of the Court History, The Palace Museum, Beijing, China (Visiting Scholar, June 4 –August 31, 2008 and July 1 –September 13, 2009): Ancient Chinese Jades, Gold and Silvers, Ambers, Enamels. History of Exchange of Craft Techniques between the Imperial Court and the Folk

Xiaodong YIN, (Postdoctoral Research Fellow, October 1, 2007– September 30, 2008): Quantum Mechanics in West and Development of Mechanical Knowledge in China

Sebastian Zacharias, University of Rostock, Germany (Predoctoral Research Fellow, September 1, 2009 – October 31, 2010, funded by the Stiftung der Deutschen Wirtschaft): The Structure of Scientific Theories

Karin Zachmann, Dr. rer. oec., Professorin für Geschichte der Technik an der Technischen Universität München, Germany (Visiting Scholar, February 16–March 14, 2009, funded by the Technische Universität München): Atomic Food for Peace? Materializing a Radiant Idea in a Transnational Network of Research and Development

Gábor Áron Zemplén, Ph. D., Hungarian Academy of Science, Budapest, Hungary (Visiting Scholar, October 1, 2009–January 31, 2010): Scientific Debates around the Modificationist Theories of Colour

Baichun ZHANG, Ph. D., Professor, Chinese Academy of Sciences, Beijing, China (Visiting Scholar, September 3–September 30, 2008, funded by the Technische Universität Berlin): History of Mechanics. History of Technology. Project: Development of Mechanical Knowledge in China and its Interaction with other Cultural Traditions

Qiong ZHANG, Ph. D., Department of the Court History, The Palace Museum, Beijing, China (Visiting Scholar, June 4–August 31, 2008 and July 1–September 30, 2009): Textile History—The Court Costume and Textile Technology in Qing Dynasty

Shuxian ZHANG, Ph. D., Department of the Court History, The Palace Museum, Beijing, China (Visiting Scholar, June 4–August 31, 2008 and July 1–September 30, 2009): History and Art of Chinese Architecture during the Ming and Qing Dynasty. History of Exchange of Craft Techniques between the Imperial Court and the Folk

Joseph Ziegler, Ph. D., Haifa University, Israel (Visiting Scholar, September 1, 2008–February 28, 2009, funded by the Yad Hanadiv Foundation): Medieval and Early Renaissance Physiognomy

Hansjakob Ziemer, Dr. (Research Scholar since January 1, 2008): Outreach and Cooperation, Cultural History of Music

Anne Ziemke, Max-Planck-Institut für demografische Forschung, Rostock, Germany (Predoctoral Research Fellow, July 1, 2008–March 31, 2010): Aging Research in 19th Century Biology

Rafaela Zorzanelli, Dr., Universidade do Estado do Rio de Janeiro, Brazil (Postdoctoral Research Fellow, September 1–September 30, 2008, funded by the CAPES (Brazilian Agency for the Advanced Training of University Personnel): The Impact of Neurosciences in the Psychosomatic Field

Collaborations and Other External Activities

Memberships

The Institute is member of the Agricola-Gesellschaft, the Gesellschaft für Wissenschaftsgeschichte and the Deutsche Gesellschaft für Geschichte der Medizin, Naturwissenschaft und Technik.

Professorships

Lorraine Daston is honorary professor at the Humboldt-Universität zu Berlin,

Dieter Hoffmann is außerplanmäßiger Professor at the Humboldt-Universität zu Berlin,

Ursula Klein is außerplanmäßige Professorin at the Universität Konstanz,

Wolfgang Lefèvre is außerplanmäßiger Professor at the Freie Universität Berlin,

Jürgen Renn is adjunct professor at Boston University and honorary professor at the Humboldt-Universität zu Berlin,

Hans-Jörg Rheinberger is honorary professor at the Technische Universität Berlin.

Cooperation Partners

American Council of Learned Societies, U.S.A.

Berliner Medizinhistorisches Museum der Charité

Bibliotheca Hertziana—Max-Planck-Institut für Kunstgeschichte, Rome, Italy

Biblioteca Nacional de Portugal

Centre Alexandre Koyré, Paris, France

The Cohn Institute for the History and Philosophy of Science and Ideas, Tel Aviv University, Israel

Comenius Garten, Berlin

Consejo Superior de Investigaciones Científicas, Spain

Deutsche Physikalische Gesellschaft

Deutsches Technikmuseum, Berlin

Excellence Cluster 264, TOPOI: The Formation and Transformation of Space and Knowledge in Ancient Civilizations

Fakultät Medien, Bauhaus-Universität Weimar

First National Archive, Beijing, China

Freie Universität Berlin

Friedrich-Schiller-Universität Jena

Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin

Humboldt-Universität zu Berlin

Indiana University Bloomington, U.S.A.

Institut für Wissenschaft und Kunst, Wien, Austria

Institute for the History of Natural Sciences, Chinese Academy of Sciences, Beijing, China

Kunsthistorisches Institut in Florenz, Max-Planck-Institut, Italy
Max-Planck-Institut für ausländisches öffentliches Recht und Völkerrecht, Heidelberg
Max-Planck-Institut für Astronomie, Heidelberg
McGill University, Montreal, Canada
Monash University, Melbourne, Australia
Mongolian Academy of Science, Ulan Bator, Mongolia
Moritz-Schlick-Forschungsstelle, Universität Rostock
Museum für Naturkunde, Berlin
The Newton Project at the University of Sussex, U.K.
Opera di Santa Maria del Fiore, Florence, Italy
Palace Museum, Beijing, China
Staatsbibliothek zu Berlin-Preußischer Kulturbesitz
Stiftung Bibliothek Werner Oechslin, Einsiedeln, Switzerland
Technische Universität Berlin
Universidad Nacional Autónoma de México
Universidade do Estado do Rio de Janeiro, Brazil
Universidade Federal da Bahia, Brazil
Universiteit van Amsterdam, Netherlands
University of California at Los Angeles, U.S.A.
University of Chicago, U.S.A.
Zentrum für Literatur- und Kulturforschung, Berlin

Hosted Scholars

The institutions listed below funded 44 scholars in 2008 and 54 scholars in 2009.
The average duration of their stay was 5 months.

Aarhus University, Denmark
Alexander-von-Humboldt-Stiftung
Bank of Sweden, Tercentenary Foundation
Cambridge European Trust
Canadian Institute of Health Research
CAPES (Brazilian agency for the advanced training of university personnel)
Columbia University, New York, U.S.A.
Consejo Nacional de Ciencia y Tecnología, Mexico
Consiglio Nazionale delle Ricerche, Italy
Deutsche Forschungsgemeinschaft
Deutscher Akademischer Austauschdienst
Excellence Cluster Topoi, Berlin
Freie Universität Berlin
Fritz-Haber-Institut der Max-Planck-Gesellschaft
Fritz-Thyssen-Stiftung
Georgetown University, U.S.A.
Gerda Henkel Stiftung
German-Israeli Foundation for Scientific Research and Development

Gobierno Vasco (Basque Government), Spain
 Hans-Böckler-Stiftung
 Hans Rausing Scholarship
 Internationales Forschungszentrum Kulturwissenschaften, Wien, Austria
 Institut universitaire de France
 Kunsthistorisches Institut in Florenz
 Leverhulme Trust, U.K.
 Liechtenstein Fonds for the History of Science
 Minerva Foundation
 Princeton Bicentennial Preceptorship, U.S.A.
 Regional Government of Catalonia, Spain
 Research Foundation—Flanders (FWO)
 Schweizerischer Nationalfonds
 Social Sciences and Humanities Research Council of Canada
 Spanish National Research Council
 State University of New York at Stony Brook, U.S.A.
 Stiftung der Deutschen Wirtschaft
 Studienstiftung des Deutschen Volkes
 Technische Universität Berlin
 Technische Universität München
 Swedish Research Council
 Università degli Studi di Padova, Italy
 Universitat Autònoma de Barcelona, Spain
 Universität Wien, Austria
 Universiteit van Amsterdam, Netherlands
 University of California at Berkeley, U.S.A.
 University of California at Los Angeles, U.S.A.
 University of Haifa
 University of Wisconsin–Madison, U.S.A.
 Van Leer Institute, Jerusalem, Israel
 VolkswagenStiftung

Teaching Activities

Winter 2007/2008

Christina Brandt: Lebenswissenschaften um 1800 (together with Prof. Dr. Bettina Wahrig), (Seminar, Technische Universität Braunschweig)
Christoph Hoffmann: Erzählen als Problem. Einführung in das BA-Modul Literaturwissenschaft. (Seminar, Europa-Universität Viadrina, Frankfurt/Oder)
Ursula Klein: Francis Bacon's Philosophy (Seminar, Universität Konstanz)
Dagmar Schäfer: Foreign Kings, Remote Emperors: Legitimation in Imperial rulership (Seminar, Universität Würzburg)
Stefan Trzeciok: Nelio oder der Geschmack des Windes (Lehrwerkstatt Theater, Fachhochschule Fulda)

Annette Vogt: Von der Preußischen Friedrich-Wilhelms-Universität zu Berlin zur Humboldt-Universität zu Berlin: Wissenschaft und Politik in drei Systemen (1932/33-1961). (Proseminar mit PhD Peter Th. Walther, Humboldt-Universität zu Berlin)

Summer 2008

Christina Brandt: Von der Zelltheorie zur Vererbung: Zur Kulturgeschichte bio-wissenschaftlicher Konzepte im 19. Jahrhundert (Seminar, Technische Universität Braunschweig)

Christina Brandt: Geschichte und Wissenschaftstheorie der Biologie (together with Dr. Bernd Gausemeier) (Lecture and Seminar, Freie Universität Braunschweig)

Lorraine Daston: Lives of the Mind (Seminar, University of Chicago)

Bernd Gausemeier: Geschichte und Wissenschaftstheorie der Biologie (mit Christina Brandt), (Vorlesung und Seminar, Freie Universität Berlin)

Christian Joas: Geschichte der Quantentheorie, (Seminar mit Jürgen Renn und Christoph Lehner), Freie Universität Berlin)

Ursula Klein: Philosophy of Science: Toulmin, Kuhn, Feyerabend (Seminar, Universität Konstanz)

Jürgen Renn: Geschichte der Quantentheorie (Seminar, Freie Universität Berlin)

Henning Schmidgen: Probleme der Akteur-Netzwerk-Theorie (Seminar, Bauhaus Universität Weimar)

Dagmar Schäfer: Eigenständige Tradition und Wissenstransfer: Die Geschichte der Wissenschaft in China, (together with Matthias Schemmel) (Seminar, Humboldt-Universität zu Berlin)

Dagmar Schäfer: Tourism: Traditions within New Cultures of Interaction (Seminar, Universität Würzburg)

Annette Vogt: Berlin als Wissenschaftsstadt und Wissenschaftslandschaft—Orte, Räume, Disziplinen (1810 – 2000) (Proseminar mit PhD Peter Th. Walther, Humboldt-Universität zu Berlin)

Winter 2008/2009

Hans Erich Bödeker: Science, Liberalism, and the Brothers Humboldt (Vorlesung und Seminar ab September 2008, Theodor Heuss Gastprofessur an der CIDE, Mexico City)

Arianna Borrelli: Uhren und Zeit: Zeitvorstellungen und Zeitdarstellungen gestern und heute (Seminar/Übung, Technische Universität Braunschweig)

Christina Brandt: Theorien der Wissenschaftsgeschichte: Eine Einführung in klassische Texte (Seminar, Technische Universität Braunschweig)

Christoph Hoffmann: History of Science & Literary Theory (Seminar, Columbia University, New York)

Ursula Klein: History and Philosophy of the Experimental Sciences I (Seminar, Universität Konstanz)

Dagmar Schäfer: Einführung in die Technikgeschichte Chinas seit der Ming Zeit: Denken, Handeln, Schreiben I (Seminar, Technische Universität Berlin)

Arne Schirrmacher: Von der Wissenschaftspopularisierung zur Wissensgesellschaft. Zum Wandel des Verhältnisses zwischen Wissenschaft und Öffentlichkeit im 19. und 20. Jahrhundert (Seminar, Humboldt-Universität zu Berlin)

Peter Schöttler: Französische Geschichtswissenschaft im 20. Jahrhundert (Seminar, Freie Universität Berlin)

Thomas Sturm: Early Modern Philosophy of Mind and Psychology (Master Course in History of Science, Universitat Autònoma de Barcelona)

Thomas Sturm: Naturalized Epistemology and the Psychology of Rationality (Master Course in Philosophy of Science, Universitat Autònoma de Barcelona)

Thomas Sturm: Introduction to Medical Ethics: Ronald Dworkin on Euthanasia and Abortion (Erasmus Master Course on “Dynamics in Health and Welfare,” Universitat Autònoma de Barcelona)

Stefan Trzeciok: Das große Ganze (Lehrwerkstatt Theater, Fachhochschule Fulda)

Annette Vogt: Heimkehr in die Fremde?—Remigranten aus Wissenschaft, Kultur und Politik nach Ost- und Westdeutschland (Proseminar mit PhD Peter Th. Walther, Humboldt-Universität zu Berlin)

Annette Vogt: What is Statistics?—From the Historical Perspective (Seminar, Humboldt-Universität zu Berlin)

Milena Wazeck: Wissenschaftspopularisierung im 19. Jahrhundert (Proseminar, Humboldt-Universität zu Berlin)

Summer 2009

Safia Azzouni: Prosa und Drama des Naturalismus (Seminar, Humboldt-Universität zu Berlin)

Arianna Borrelli: Wind und Wetter: Beobachten, Erklären, Voraussagen (Seminar/Übung, Technische Universität Braunschweig)

Christina Brandt: Geschichte der Evolution (together with Prof. Dr. Norbert Käufer, Prof. Dr. Bettina Wahrig), (Seminar, Technische Universität Braunschweig)

Christina Brandt: Geschichte und Wissenschaftstheorie der Biologie (together with Dr. Bernd Gausemeier), (Lecture and Seminar, Freie Universität Berlin)

Christina Brandt: Reproduction, Replication, and Reprogramming: Cloning in 20th Century Life Sciences (Lecture, Zoological Station, Naples, 11th Ischia Summer School on the History of Life Sciences)

Lorraine Daston: The Passions: A Philosophical History (Seminar, University of Chicago)

Bernd Gausemeier: Geschichte und Wissenschaftstheorie der Biologie (mit Christina Brandt), (Vorlesung und Seminar, Freie Universität Berlin)

Ursula Klein: History and Philosophy of the Experimental Sciences II (Seminar, Universität Konstanz)

Hannah Lotte Lund: DER Markt, DIE Frau, DAS Buch. Geschlechterrollen auf dem deutschen Buchmarkt um 1800 (Pro-Seminar Gender Studies/Geschichtswissenschaften, Humboldt-Universität zu Berlin)

Christine von Oertzen: Studieren im “Dritten Reich”. Going to University During the ‘Third Reich’ (Seminar, Technische Universität Braunschweig)

Dagmar Schäfer: Einführung in die Technikgeschichte Chinas seit der Ming Zeit: Denken, Handeln, Schreiben II (Seminar, Technische Universität Berlin)

Arne Schirrmacher: The American Way of Wissenschaft. Entstehung und Durchsetzung einer neuen Wissenschaftskultur, 1865 – 2000 (Seminar, Humboldt-Universität zu Berlin)

Sonja Walch: Wissenschaft, Kultur und Geschlecht in der Moderne (seminar: contribution with regards to content and guest-lecture, Universität Wien)

Sebastian Zacharias: Einführung in wissenschaftliche Methoden und Arbeitstechnik (Seminar, Freie Universität Berlin)

Winter 2009/2010

Arianna Borrelli: Bilder aus der Maschine: Von Spiegelbild zum Kino (Seminar/ Übung, Technische Universität Braunschweig)

Christina Brandt: On the History of Cloning. Concepts and Practices in 20th Century Life Science and Culture (Seminar, Indiana University, Bloomington (August – October)

Christina Brandt: Geschichte der Reproduktionswissenschaften. Perspektiven der Gender Studies (Lecture, Technische Universität Braunschweig; as Maria Goeppert Mayer Visiting Professor for International Gender Studies)

Christina Brandt: Darwin, biologisches Geschlecht und Gender: Evolutionstheorien des 19. und 20. Jahrhunderts im kulturellen Kontext (Seminar, TU Braunschweig, as Maria Goeppert Mayer Visiting Professor for International Gender Studies)

Christina Brandt: Die Geschichte des Klonens zwischen Fakt und Fiktion: Ein historischer Streifzug durch Biowissenschaft und Literatur (Seminar, TU Braunschweig, Maria Goeppert Mayer Visiting Professor for International Gender Studies)

Christoph Hoffmann: Wissenschaftsforschung (Lecture, Universität Luzern)

Christoph Hoffmann: Biologisches Denken 1 (1800 – 1900) (Seminar, Universität Luzern)

Ursula Klein: Philosophy of Science in Historical Context (Seminar, Universität Konstanz)

Julia Kursell: Musik und Medien. Eine Einführung. (Seminar, Universität Basel, Herbstsemester 2009)

Hannah Lotte Lund: The Politics of Gender: Yesterday Today and Tomorrow (Seminar, IES Abroad Berlin)

Christine von Oertzen: Die Archivierung der Welt. Archiving the World (Seminar, Technische Universität Braunschweig)

Hans-Jörg Rheinberger: Literatur zum Darwin-Jahr: Eine Bestandsaufnahme (Hauptseminar, Technische Universität Berlin)

Arne Schirrmacher: Politik der Exzellenz. Die naturwissenschaftlichen Nobelpreise und ihre politische Rolle im 20. Jahrhundert (Seminar, Humboldt-Universität zu Berlin)

Peter Schöttler: Deutsch–französisches Kolloquium (mit Anne Kwaschik) (Seminar, Freie Universität Berlin)

Martin Thiering: Vom Gebrauch der Zeichen (Proseminar Semiotik und Sprechakttheorie, Humboldt-Universität zu Berlin)

Milena Wazeck: Wissenschaft und Weltanschauung im 19. Jahrhundert (Übung, Humboldt-Universität zu Berlin)

Sebastian Zacharias: Einführung in wissenschaftliche Methoden und Arbeitstechnik (Seminar, Freie Universität Berlin)

Sebastian Zacharias: Erschaffen oder entwickelt? Eine Analyse der Debatte um Evolution und Kreation mit einem Fokus auf wissenschaftliche Arbeitstechniken (Seminar, Humboldt-Universität zu Berlin)

Conferences, Workshops, and Colloquia

Workshops and Conferences

11 January 2008: Scholarly Publishing and the Issues of Cultural Heritage, Fair Use, Reproduction Fees and Copyrights

21–24 February 2008: The Educated Eye: Photographic Evidence in Scientific Observation

28–29 February 2008, 2–3 March 2009: Jesuit Mechanics and Preclassical Mechanics

3–4 March 2008: Giordano Bruno Colloquium: Turning Traditions Upside Down. Rethinking Giordano Bruno's Enlightenment

6 March 2008: History of Science/History of Knowledge: Interdisciplinary Perspectives of Young Researchers

7 March 2008 (Berlin), 16–17 October 2008 (Pisa): The Biography of Ten Scientific Images: An Invisible Seminar

27–29 March 2008: Foreign Scientists under Hitler. Workshop organized with the Union College, Schenectady, NY and the University of Göttingen

28–29 March 2008: History of Plant-Breeding since 1880

16–17 May 2008: Epistemic Objects

26–27 May 2008: Governance of and through Science and Numbers: Notions, Categories and Tools

29–31 May 2008: Living Properties: Making Knowledge and Controlling Ownership in the History of Biology

31 May 2008: History of Quantum Theory. Satellite meeting at the University of Sydney.

10 June 2008: Nachlese/Afterthoughts 2: "Schreibszenen"/"Writing scenes"

11–15 June 2008: Graphic Genes, Cells and Embryos

12–14 June 2008: Cultures of Seeing 3D and Beyond

16–17 June 2008: Scientific Objects and Seriality II: Seriality and scientific objects 1780–1848

7–9 July 2008: History of Scientific Observation

- 11–13 July 2008:** Animal Subjects Under Observation
- 17 July 2008:** Nachlese/Afterthoughts 3: “Kritzeln und Schnipseln”/“Scrips and Scribbles”
- 24–26 July 2008:** What (Good) Is Historical Epistemology?
- 29 August 2008:** Women and Gender in the History of Science, Medicine, and Technology: State of the Arts and Future Perspectives
- 9–11 October 2008:** Müller’s Vision. Das wissenschaftliche Vermächtnis des Naturforschers Johannes Müller
- 10–12 October 2008:** Crisis Debates in Psychology
- 29–31 October 2008:** Writing the History of Genomics
- 5 November 2008:** Einstein revisits Humboldt. Ceremonial event organized by the Humboldt Universität, the Hebrew Universität and the MPIWG
- 5 November 2008:** History of Scientific Observation
- 13–15 November 2008:** Animal Cultures—Human Natures: Participant Observation in the History of the Natural and Social Sciences
- 13–15 November 2008:** Materialprobe 3: “Notes—Sketches—Scribbles: Writing and Drawing as Creative Tools”
- 26 November 2008:** Forgery and the Production of Luxury Commodities in Late-Ming China
- 27–28 November 2008:** The Exhibition as Product and Generator of Scholarship. Co-organized with Deutsches Museum München
- 29 November–1 December 2008, 11–12 May and 28–30 September 2009:** Workshops with the Bibliothek Werner Oechslin, Einsiedeln
- 12 December 2008:** Wissen im Druck: Zur Epistemologie der Buchgestaltung zwischen 1850 und 1950
- 13–15 January 2009:** Workshop on 3D-scanning in Jena
- 9 January 2009:** Traditions—Transmission—Circulation of Knowledge
- 13–15 January 2009:** Making Mutations: Objects, Practices, Contexts
- 31 January 2009:** The Emergence of New Sciences
- 12–14 February 2009:** Darwin als Erzieher: Die Popularisierungsgeschichte der Evolutionstheorie für Kinder und Jugendliche
- 20–22 February 2009:** Neurocultures
- 7 March 2009:** The Knowledge of Doing
- 12–13 March 2009:** Experts and Expertise
- 20–21 March 2009:** The Tenacity of the Nature/Nurture Divide
- 15–16 April 2009:** Scientific Objects and Seriality III: Seriality and Scientific Objects 1848–1919
- 27–28 April 2009:** Observation, Evidence and Reason in Early Modern England: The Arts Course from the Reformation to Newton
- 30 April–2 May 2009:** Writing and The Transmission of Knowledge
- 5–6 June 2009:** Origins: The Historical Sciences in the Age of Darwin
- 19 June 2009:** Nachlese/Afterthoughts 4: “Erschriebene Denkräume”
- 28 June–5 July 2009:** From Generation to Reproduction: Knowledge and Techniques from the Renaissance to the Present Day
- 17 July 2009:** Zwischenräume: Disorders
- 23–25 July 2009:** Epistemic Vehicles in the Human Sciences: A Conference in Memory of Lydia Marinelli

- 4 – 5 September 2009:** Status and Skills: The Portrayal of Individuals in Chinese Historiography, 10th – 18th Century
- 12 – 19 November 2009:** Darwin in Latin America
- 12 – 13 November 2009:** Materialprobe 4: Die Materialität der Konstruktion. Graphische Verfahren der Welterzeugung
- 26 November 2009:** Kolloquium für Hans Erich Bödeker
- 3 – 6 December 2009:** Performing Voices: Between Embodiment and Mediation. Organized with the American Academy in Rome
- 7 – 8 December 2009:** Workshop with the MPG Humanities Section on the Max Planck Digital Library Project
- 14 – 15 December 2009:** Multilingualism, Linguae Francae, and the Global History of Concepts

The Institute's Colloquia

- 30 January 2008** *Lissa Roberts* Discussion on the book “Materials in eighteenth century science” by Ursula Klein and Wolfgang Lefèvre
- 13 February 2008** *John Pickstone* Practices and Disciplines in the History of Science, Technology, and Medicine
- 5 March 2008** *Ruth Leys* How to Do the History of the Emotions
- 19 March 2008** *Lissa Roberts* The Mindful Hand Goes to Japan: Dutch-Japanese Trade During the Eighteenth-century
- 2 July 2008** Project Presentation of the Department 2
- 23 July 2008** Project Presentation of the Department. 3
- 30 July 2008** *Lorraine Daston and Ted Porter* “Objectivity: A Debate”
- 27 August 2008** Project Presentation of the Department. 1
- 15 October 2008** *Gary Hatfield* Descartes' Mechanization of the Sensitive Soul
- 21 January 2009** *Nikolaus Bacht* Presentation of the new Emmy Noether Research Group
- 8 July 2009** *Allan Young* Pro Patria Mori: New light on the Moral Life of Slime Mold
- 30 September 2009** *Zur Shalev* Quantification and the Pilgrim Experience
- 4 November 2009** *Harriet Ritvo* The Animals' Turn?
- 16 December 2009** *John Tresch* La Technésthétique: A Physico-Spiritualist Conception of the Arts in French Romanticism

Scholars' Forum

In cooperation with partner institutions, the Max Planck Institute for the History of Science organizes scholars' forums for doctoral candidates and postdoctoral fellows:

Studenttag Wissenschaftsgeschichte: April 13, 2007 and May 16, 2008

Studenttag Literatur und Wissenschaftsgeschichte: July 19, 2008 and June 13, 2009

ZwischenRäume: April 18, 2008 and February 20, 2009

Reading Groups

Reading groups are a substantial part of the academic life at the MPIWG. They are independently organized by scholars from different departments and focus on one particular theme in the history of science. In 2008 and 2009, reading groups worked on topics such as animals, communicating knowledge, neuroscience and culture, note-taking, ontology, sciences of the senses, re-reading the classics, or quantum history.

Academic Achievements and Scientific Awards

Completed Dissertations

Beat Bächli (ETH Zürich), at the Institute 2006/07; *Björn Brüschi* (see Research Report 2006/07) *Jochen Büttner* (see p. 34); *Christina Ratmoko* (Universität Zürich), at the Institute 2005; *Oliver Schlaudt* (Universität Heidelberg), (see p. 155), *Max Stadler* (see p. 113), *Matteo Valleriani* (see p. 32), *Hansjakob Ziemer* (see p. 230), *Rafaëla Zorzanelli* (see p. 113)

Habilitations

Erna Fiorentini received her *venia legendi* in Kunstgeschichte from the Freie Universität Berlin in November 2009.

Sabine Höhler (at the Institute 1999/2002) received her *venia legendi* in Wissenschafts-, Technik- und Umweltgeschichte from the Technische Universität Darmstadt in January 2010

Christine von Oertzen received her *venia legendi* in Neuere Geschichte from the Technische Universität Braunschweig in January 2010.

Iris Schröder (at the Institute 2000/02) received her *venia legendi* in Neuere und Neueste Geschichte from the Humboldt Universität zu Berlin in June 2009.

Appointments

Viola van Beek (Predoctoral Research Fellow July 1, 2007–June 30, 2009) was appointed as fellow at the art, science & business program of Akademie Schloss Solitude, Germany.

Bernhard Bolech (Predoctoral Research Fellow May 1–June 30, 2009) was appointed as Kollegiat at the Initiativkolleg Naturwissenschaften im historischen Kontext, Universität Wien, Austria.

Luis Campos (Postdoctoral Research Fellow October 1, 2007–September 30, 2008) was appointed as Assistant Professor at the Drew University, Madison, New Jersey, U.S.A.

Jacob Lebovitch Dahl (Research Scholar October 1, 2005–September 30, 2008) was appointed as University Lecturer at the Oxford University, U.K.

Jiren FENG (Postdoctoral Research Fellow October 1, 2006–September 30, 2008) was appointed as Lecturer at the Victoria University of Wellington, New Zealand.

Vivette Garcia Deister (Predoctoral Research Fellow March 16–April 12, 2009) was appointed as Research Associate at the School of Social Anthropology of the University of Manchester, U.K.

Amanda Jo Goldstein (Predoctoral Research Fellow November 1–November 30, 2009) was appointed as Predoctoral Fellow at the Department of Comparative Literature at the University of California at Berkeley, U.S.A.

Mathias Grote (Postdoctoral Research Fellow January 1–December 31, 2009) was appointed as Postdoctoral Research Fellow at the ESRC Research Centre for Genomics in Society (Egenis), University of Exeter, U.K.

Ina Heumann (Predoctoral Research Fellow July 1–October 31, 2009) was appointed as Predoctoral Fellow at the Universität Wien, Austria.

Martin Hofmann (Postdoctoral Research Fellow/Visiting Scholar October 1, 2008–August 31, 2009) was appointed as Research Scholar at the Ruprecht-Karls-Universität, Heidelberg, Germany.

Anja Skaar Jacobsen (Postdoctoral Research Fellow November 15, 2008–January 31, 2009) was appointed as Senior Researcher at the Niels Bohr Archive, Copenhagen, Denmark.

Hyo Yoon KANG (Postdoctoral Research Fellow October 1, 2006–June 30, 2009) was appointed as Oberassistentin at the Universität Luzern, Switzerland.

Stefanie Klamm (Predoctoral Research Fellow May 1, 2006–September 30, 2009) was appointed as Predoctoral Fellow at the Getty Museum Research Institute, Los Angeles, U.S.A.

Maria E. Kronfeldner (Karl Schädler Postdoctoral Research Fellow March 1, 2006–September 30, 2008) was appointed as Research Scholar at the Universität Bielefeld, Germany.

Joachim Kurtz (Research Group Director January 1–June 30, 2009) was appointed as Professor at the Ruprecht-Karls-Universität, Heidelberg, Germany.

Nicolas Langlitz (Postdoctoral Research Fellow September 1, 2007–December 31, 2009) was appointed as Assistant Professor at the New School for Social Research, New York City, U.S.A.

Costas Mannouris (Predoctoral Research Fellow September 1–September 30, 2009) was appointed as Predoctoral Research Fellow and Assistant Editor of *Meta Science* at the University of Athens, Greece.

Claudia Mareis (Predoctoral Research Fellow February 1–July 31, 2009) was appointed as Forschungsdozentin at the Hochschule der Künste Bern, Switzerland.

Brendan Matz (Predoctoral Research Fellow September 8–December 31, 2008) was appointed as Graduate Student at the Yale School of Medicine, Yale University, U.S.A.

Erika Milam (Postdoctoral Research Fellow September 1, 2007–December 31, 2008) was appointed as Assistant Professor at the University of Maryland, U.S.A.

Sybilla Nikolow (Research Scholar April 1–September 30, 2009) was appointed as Research Scholar at the Institut für Wissenschafts- und Technikforschung, Universität Bielefeld, Germany.

Nina Samuel (Predoctoral Research Fellow February 15–May 31, 2009) was appointed as Research Scholar at the Institut für Philosophie, Freie Universität Berlin, Germany.

Oliver Schlaudt (Predoctoral Research Fellow April 15–September 30, 2008) was appointed as Akademischer Rat a. Z. at the Philosophisches Seminar, University of Heidelberg, Germany.

Alexander von Schwerin (Research Scholar November 1, 2008–March 31, 2009) was appointed as Research Scholar at the Technische Universität Braunschweig, Germany.

Martina Siebert (Research Scholar October 1, 2006–November 15, 2009) was appointed as Research Scholar at the Ostasienabteilung, Staatsbibliothek Berlin, Germany.

Robyn Smith (Postdoctoral Research Fellow October 1, 2007–April 30, 2009) was appointed as Assistant Professor at the University of Alberta, Canada.

Thomas Sturm (Research Scholar October 1, 2005–September 30, 2009) was appointed as Faculty Member at the Universitat Autònoma de Barcelona, Spain.

Sonja Walch (Predoctoral Research Fellow January 1–April 30, 2008) was appointed as Predoctoral Fellow at the Institut für Zeitgeschichte, Universität Wien, Austria.

Christof Windgätter (Postdoctoral Research Fellow April 1, 2007–June 30, 2009) was appointed as Postdoctoral Research Fellow at the Kulturabteilung der Stadt Wien, Referat Wissenschafts- und Forschungsförderung, Austria.

Charles Wolfe (Postdoctoral Research Fellow December 1, 2007–January 31, 2008) was appointed as Research Fellow at the Unit for History and Philosophy of Science, University of Sydney, Australia.

Awards

Julia Damerow received a *special award* from the Heinz-Billing-Foundation of the Max Planck Society for her diploma thesis “Entwicklung eines MDD-Tools für eine virtuelle Ausstellung.”

Tamás Demeter won the 2009 *Talentum Prize* by the Hungarian Academy of Sciences.

Miki Elazar won the 2009 *Funkenstein Prize* of the Tel Aviv University for his doctoral dissertation “Honoré Fabri and the Concept of Impetus: A Bridge between Paradigms.”

Together with *Susan Neiman* and *Iris Nachum*, *Peter McLaughlin* was awarded the 2009 *Margherita-von-Brentano-Preis* for the comprehensive edition and publication of the Nachlass of Margherita-von-Brentano.

Arne Schirrmacher was awarded the 2007 *Publikationspreis des Deutschen Museums* for his article “Der lange Weg zum neuen Bild des Atoms. Zum Vermittlungssystem der Naturwissenschaften zwischen Jahrhundertwende und Weimarer Republik.”

Henning Schmidgen was awarded the 2010 *Paul-Bunge-Preis* of the Gesellschaft Deutscher Chemiker for his book “Die Helmholtz-Kurven. Auf der Spur der verlorenen Zeit” and his significant contributions to the internet project “Virtual Laboratory.”

Milena Wazeck was awarded the 2009 *Georg-Uschmann-Preis für Wissenschaftsgeschichte* from the German Academy of Sciences, Leopoldina for her thesis on Einstein’s adversaries.

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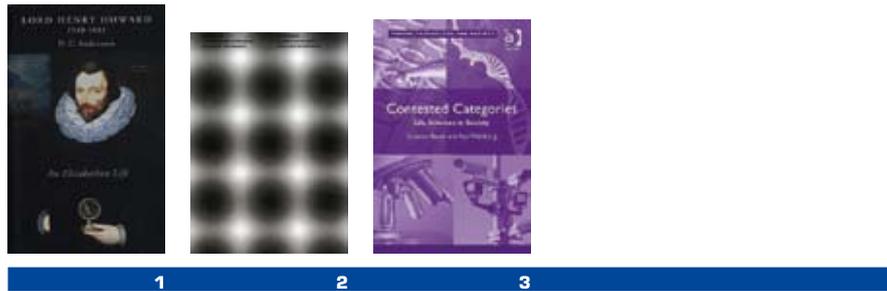
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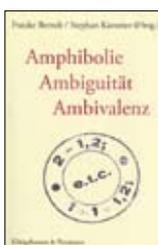
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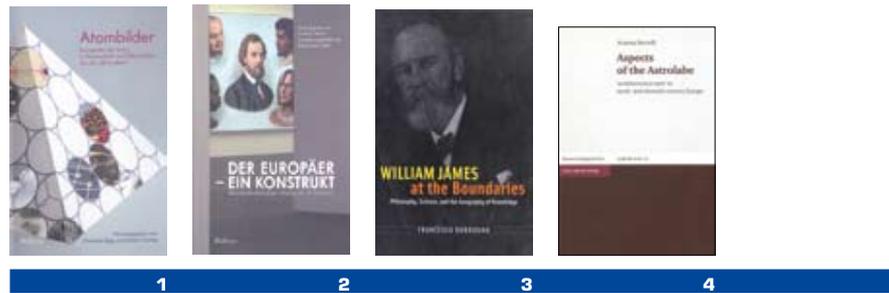
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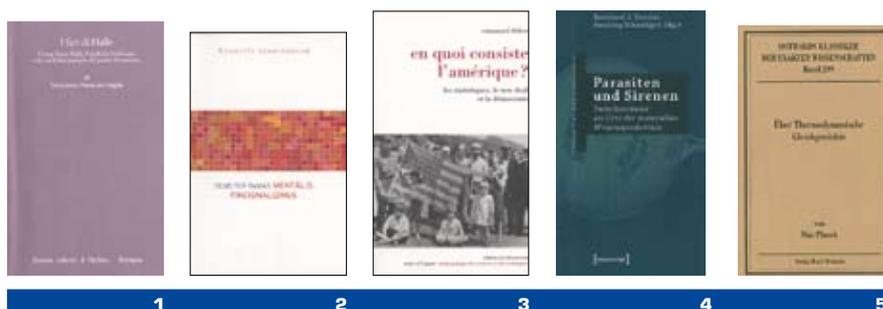
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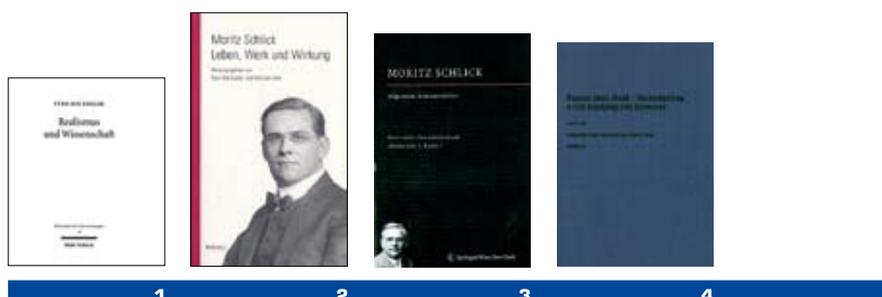
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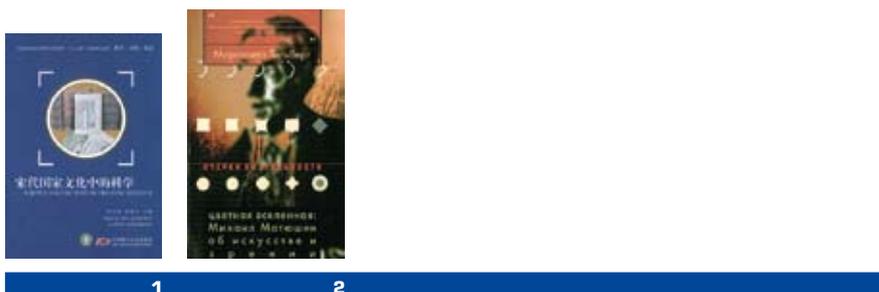
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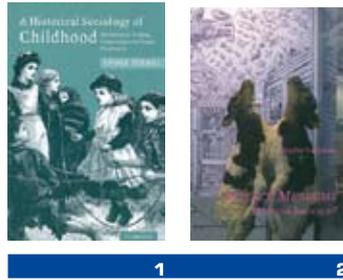
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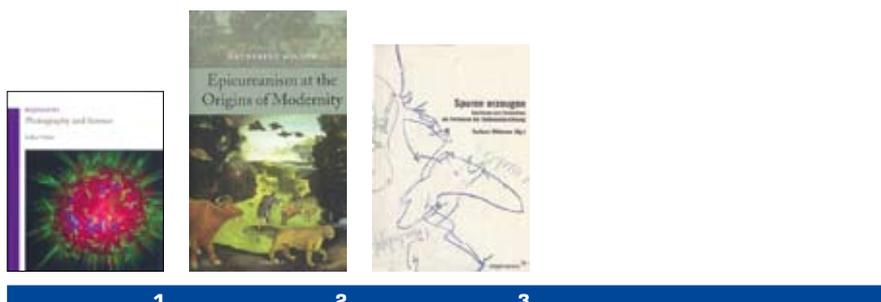
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