

Paper(s) as Epistemic Carrier of Knowledge. A History of Provoking Thought and Memory

22-23 February, 2023

Deutsches Museum, Munich, Museumsinsel 1

Organized by: Michael Friedman and Daniela Zetti

Abstracts

22 Feb:

14:00-14:30

The Transmission of the Almagest in Manuscript Culture

Stefan Zieme

As one of the most important sources of mathematical astronomy Ptolemy's *Almagest* was copied, translated, discussed, and taught for one and a half millennia. Originally written in Greek and referred to as *Syntaxis mathematica*, nowadays it is better known by its mediaeval Arabic name *Almagest*. It was translated several times before the sixteenth century. Today, beyond Greek and Byzantine sources, six different translations are still extant in their entirety that comprise translations from Greek into Arabic, Arabic into Latin, Greek into Latin, and Arabic into Hebrew. In total there about 150 manuscripts still extant through which knowledge about the *Almagest* has been transmitted in different cultures, languages, and times. Over the centuries owners and scribes of these parchment and paper manuscripts compared, annotated, or corrected their manuscripts. Specific parts of the text, tables, and diagrams occasionally were scratched off from the carrier medium and corrected, damaged quires were recopied from other manuscripts, or missing parts were filled in. Moreover, manuscripts originating from different cultures of transmission were sometimes compared to each other and differences noted as marginalia. All these traces off how actors thought with and on paper and parchment are still visible today in the corpus of manuscripts. I will utilize these different paper traces as features of manuscripts of the entire corpus and therewith visualize the transmission of the *Almagest* across space, time, and culture in a network analysis.

15:30 - 16:00

"All of This Was Born on Paper". Producing and Circulating Knowledge in Mine Surveying (1500–1800)

Thomas Morel

Mine surveyors epitomize a culture of craft and instruments that developed in early modern Europe. In this talk, I discuss how paper gradually came to assume a multifaceted role, accompanying and enabling several epistemic transformations. The development and production of knowledge turned underground geometry from an art directly performed on site to a discipline of action and monitoring at distance. Literate surveyors came to master innovative uses of the

written medium, which adapted over time both to think on paper and to circulate their knowledge. Instead of a simplistic opposition between illiterate artisans and prolific scholars, I would like to emphasize how both groups used paper to circulate knowledge, albeit in different ways.

A first part will describe the original constructive geometry of underground surveyors in the 16th century. Their methods mainly relied on cords manipulation and were hardly recorded in writing, as the display of geometry was meant to ensure its social acceptance. Surveys were nevertheless a pillar of the rich written legal culture of the mining states. In a second part, I analyze the epistemic transformations of the discipline in the 17th century. Measurements came to be stored in data table, and many operations could now be realized in an office by working on paper. From then on gestures, actions, and observations could be conserved by centralized administrations instead of being ephemerally performed into the mines. Maps and data table, supplementing the *Augenschein* (visual inspections), realized the old dream of “seeing through stone”, with far reaching epistemic and social consequences.

Paper also came to be used by practitioners in their training, as they established their own *vade mecum*. These handwritten texts were being constantly circulated, updated over decades, and transmitted from master to pupil. In a last part, I describe the crucial role of paper in enabling large-scale planning operations in the 18th century. Instead of recording existing information about nature, surveys and maps now allowed to easily project or test new ideas, as a contemporary noted in 1779 visiting a construction site: “All of this was born on paper, and will be carried out in the deep obscurity of the earth’s entrails”.

16:15-16:45

Paper Technologies Reconsidered

Christine von Oertzen

The concept of paper technologies has been primarily employed to examine processes of scientific, bureaucratic, artistic, or craft work that take place *on* or *with* paper. Consequently, such investigations of knowledge practices, cultural techniques, and the materiality of writing systems have rarely focused on the material substances of the paper stuff in use. Taking the production of the enumeration forms for the Prussian census as a case in point, my lecture expands the concept of paper technologies to include knowledge about the materials themselves, as well as the infrastructures, techniques, and agreements that made it possible for paper of a particular quality and in the required quantities, thicknesses, and grades to be made available for particular purposes. I argue that the enumeration effort of Prussian statisticians went far beyond designing a form, collecting information, noting and tabulating figures, or creating tables. Paper knowledge to define and control the material substance of the forms mattered as much as political impetus and statistical methods in getting the census right.

18:30

Paper Fast and Loose (online)

Lisa Gitelman

My title is a riff on a chapter in Herman Melville's *Moby Dick* which treats customs of ownership regarding whales loose or attached to a whaling ship or its whaleboats. As with whales, paper can be loose or fast according to a host of circumstances. Consider recent work on the histories of knowledge and information, such as Craig Robertson's recent *The Filing Cabinet, A Vertical History of Information*, which discusses the epistemics of looseleaf paper. Or consider Colin Koopman's recent *How We Became Our Data*, which discusses the project of "fastening" information to facilitate administrative control. Drawing on lessons learned from works like these, as well as from several years teaching a course on "The Social Life of Paper," this talk explores some of the affordances of loose paper and its alternatives. Along the way I posit the long history of page images as one way to negotiate the contrasts between fast and loose.

23 Feb:

9:00-9:30

Paper and Power

Michael Zakim

Paper is the material which, until recently, served as the essential medium for translating knowledge into power. I wish to explore two historical examples of this dynamic: the contribution of account books to the production of a market economy in the nineteenth century; and the critical role of census "blanks" during the same period in creating a governable population, consequently organized as civil society. These two events show paper to constitute no less than the very infrastructure of modern politics. They are also revealing of paper's special nature as an insistently material object whose materiality is the key for becoming the opposite, namely, the very medium of abstraction. That Janus-faced quality was vital to humanity's success in transforming the world to suit its needs.

Having assigned paper such an ambitious epistemological role in the making of the social order, I will devote some attention to what can be called its phenomenology, that is, the process by which a "billion slips of paper" were manufactured in what C.W. Mills referred to in his renowned study, White-Collar (1951), as "knowledge factories," or offices. This discussion will focus on technologies for creating documents (handwriting systems, the invention of metal nib pens, and the introduction of the typewriter) as well as the appearance of a giant new class of clerical laborers assigned responsibility for all this paper-work.

As if that isn't enough, I will finish with some observations regarding the relationship of knowledge and power in a paperless future (which has already arrived). Has the replacement of pen and paper by digital technologies changed the nature of knowledge? Of power? And of the relationship between the two? I will suggest that these are some of the most pressing questions of our day.

9:45-10:00

The Epistemic Potential of Artificial Flatness

Sybille Krämer

It is striking that sciences, many arts, complex architecture, and technology depend on the epistemic use of inscribed and illustrated surfaces. The cultural technique of flattening using pictures, writings, graphs, diagrams, and maps is realized in the form of the artificial flatness of paper. Records on paper became workshops of thought, cartographies of knowledge landscapes, and design rooms for aesthetic and technological ideas. We have to understand this flattening to the two-dimensional record as a creative potential.

But what is the reason for its epistemic power? One possible answer lies in the fact that the two-dimensionality of the surface is a medium that, situated between the one-dimensionality of time and the three-dimensionality of space, enables the conversion of time sequences into spatial relations and vice versa.

10:45 - 11:15

Circulation of annotated course manuscripts at the Ecole polytechnique, with the cases of courses by Fourier and Cauchy and that of an examiner like Auguste Comte

Jean Dhombres

It is surprising that despite the publication in book form, which was gradually made compulsory for professors at the Ecole polytechnique, manuscripts of the notes taken by some students were preserved and even continued to circulate. Many such papers exist and lie in the archives. They are rarely studied as such, as generally the printed courses give a much more worked version. Obviously, some students have kept notes with perhaps more interest than for the books that came later from the professor in a printed form. Could the materiality of such manuscripts and the corrections that were made, be a memory of the stages by which technical knowledge was acquired by the student, in comparison with what became a doxa in the written course itself. Would the trouble of writing, and of correcting, remain the proof of a truth not only received, but also mastered, while remaining precisely dated with the very conditions of taking notes.

I obviously do not intend to make a systematic study of this conservation of papers at the Ecole Polytechnique, nor do I have the material possibility of making comparisons at different times since the creation of the School at the end of 1794. I just want to answer a few fairly general questions about the appropriation of knowledge through the practice of writing. I have chosen two examples and a third that is somewhat different, but may be an interesting complement. There are first the analysis courses of Joseph Fourier from 1796 to 1798, of which there are several manuscript versions by different students, but no published courses were issued as Fourier left for Egypt in May 1798, never coming really back to teaching; there is a manuscript on Cauchy's algebraic analysis course from 1814, and notes were taken by the student Auguste Comte, while the famous Cauchy's course was published in 1821. As a result, it seemed to me useful to add to these two sets, which is already quite substantial in terms of number of pages, still other papers in a different form. They are the notes taken by Comte on the questions he asked for the oral entrance exam at the Ecole Polytechnique, to which I associate what was

published in his *Traité élémentaire de géométrie analytique à deux ou trois dimensions*. The homogeneity of the concerned material - these are mathematics courses at a relatively high level and certainly new courses and claiming to prepare a reform - should not transform into a specialized monograph the study of a mass of documentation, which has obviously been preserved throughout a lifetime by their authors. The purpose is the annotated writing on paper as a process of making of a theory.

11:30-12:00

Book-Keeping. From Paper to Casebooks: Materialisation and Production of Medical Knowledge

Axel C. Hüntelmann

Archives of London hospitals contain volumes from the mid 19th century that seem to be a hybrid between paper bricolage, casebooks, and a handbook. Papers and notes were bounded to books, labelled as "Medical Notes" or "Registry of Medical Notes", containing typical case histories. Originally, the patient's history was recorded as part of the daily routine in the hospital ward in so-called casebooks (in chronological order) and later, typical cases were copied by hand, classified and arranged in a systematic order according to the nature of the disease.

On the basis of my work on "bookkeeping" and accounting in medicine I will follow how medical practice at the ward became medical knowledge and analyse the role of casebooks in this process by referring to works on paper knowledge and paper technology of Lisa Gitelman, Anke te Heesen, Volker Hess and Andrew Mendelsohn. I analyse how these paper-based casebooks were produced, based on single pages and papers, and for what purpose they were used.

Cases and casebooks were an eminent source of knowledge in medicine in the 19th and 20th century. Ward or house physicians produced casebooks in the mid 19th century by copying typical cases, adding further data, and classifying them. At first, physicians used these paper tools for their daily work to look up similar cases, to evaluate or compare symptoms or the progression of a disease of current cases. Beyond this, I argue, that the editing physician produced medical knowledge by re-arranging cases on paper, bringing them in a new order, and describing and comparing cases with typical symptoms, characteristics and courses of diseases. After some time, these casebooks were inventoried in the hospital library, and other ward physicians or medical clerks could use them like handbooks or manuals. In addition, some editors of these casebooks published (printed) manuals and textbooks. And finally, the edited casebooks were used to train and educate medical students in the art of medicine, but also in "The art of case-taking" and "bookkeeping".

13:30 - 14:00

Broadsheets at Academic Institutions as Provoking Thought and Memory during the Early Modern Period

Joseph Freedman

The single sheet of paper served as a central component of printed works during the early modern period. When the sheet was folded one or more times, these folded sheets mainly constituted the larger or smaller dimensions of published works (for example, from larger to smaller: 2⁰, 4⁰, 8⁰, 16⁰). Here the focus will be on unfolded sheets that were used as broadsheets. They were often used in connection with academic instruction; included therein - and discussed here - are curriculum summaries and disputations.

Curriculum broadsheets normally were printed prior to the beginning of the semester or year during which that curriculum was to be taught. In the case of pre-university curricula, one can follow the progression from the lowest grade to the highest grade or vice versa. Other broadsheets announce university-level curriculum offerings by individual professors. Still other broadsheets - at multi-level academic institutions - present university and pre-university curriculum side by side or one above the other.

Within these broadsheets the individual parts of their curricula usually comprised a well-ordered epistemic whole. In some cases, illustrations and/or letters to the reader and/or rules pertaining to student behavior are included. Some extant curriculum and disputation broadsheets contain manuscript annotations.

Disputation broadsheets generally presented a group of theses. Sometimes those broadsheets also included a preface and/or verse and/or dichotomous charts and/or illustration(s)/decorative frames/lines. Individual disputation broadsheets normally mention one or more (or: substantially more) student participants. Attention also will be accorded to poster-size "thesis broadsheets" (frequently published in Catholic Europe during the 17th and 18th centuries). They normally consist of high-quality engraved drawings, normally with central focus (a stage, a throne, etc.) and the upper part thereof referring to divinity. The disputation theses, located at the bottom or creatively scattered through any given thesis broadsheet, fill a very small part of its total space. A dichotomy between the disputation theses (science) and the engraved drawing (visual arts) is normally evident.

Frequently these thesis broadsheets - and in some cases also broadsheets containing curriculum summaries and other disputations - were sufficiently large that they required two pages (usually pasted together). Here the following point will be ventured. Broadsheets focus our attention on an object that has clear dimensions - without pages that need to be turned - providing a spatial context in which (to some greater or lesser extent, depending on the actual content of each one) thought and memory can be provoked.

14:15-14:45

Paper Technologies in the Editing Factories of the Big Humanities

Lotte Schüßler

My contribution would like to approach the large-scale German edition projects *Monumenta Germaniae Historica* (1826-present) and *Corpus Inscriptionum Latinarum* (1862-present) with respect to the papers processed within them. The projects, sometimes described by contemporaries as a “factory” or an “industry”, are characterized by a variety of working techniques in which papers of the most diverse kinds were used. The *Monumenta* are a collection of manuscripts from the German Middle Ages that are treated as edited texts, whereby in material terms quite valuable existing editions were cut up for the new editions in the 19th century. During the preparatory work for the *Corpus*’ edition of inscriptions of the Roman Empire, large quantities of different papers were used for squeezes and so-called *schedae*. For the printing of the volumes, on the other hand, care was taken in each case to use paper of the highest possible quality and durability, which would reflect the editions’ long-standing relevance and national importance. All these papers, as I would like to show, played an indispensable role for large-scale scholarship in the humanities, shaping the editing process and decisively determining its factory-like character. At the same time, paper faced a tension between mass wear and the goal of lasting preservation. With a focus on the initial phase of the two projects in the 19th century, my contribution illuminates, by way of example, 1.) the working techniques of editing, squeezing, and publishing, which various actors further developed or first shaped in order to render these sources accessible in the most accurate way and to preserve them, and 2.) the values assigned to the materiality of paper when attempting to meet the competing demands of an exhausting working material and creating a long-lasting print product.