

Bibliotechnica

Humanist Practice in Digital Times

Edited by John Tresch



fondazione
GIORGIO CINÌ

San Giorgio Dialogue 2014



John Tresch, Editor

Bibliotechnica

Humanist Practice
in Digital Times



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Photo on front cover: Holland House Library after Air Raid, 1940, by permission of Historic England Archive.

Photo on back cover: Baldassare Longhena Library, Fondazione Giorgio Cini, Isola di San Giorgio Maggiore, Venice, photo by Matteo De Fina.

Bibliotechnica: Humanist Practice in Digital Times

Edited by John Tresch

San Giorgio Dialogue 2014

How do changing technologies of the library alter the ways we relate to knowledge, nature, and each other? What do we learn about the present and future of data storage, analysis, and retrieval by studying the machines that have made these practices possible, from ancient Greece and China, all the way to contemporary global networks? To answer these questions, historians of science, digital experts, art historians, philologists, library historians, and a poet were brought together in Venice at the Fondazione Giorgio Cini. For three days, they inquired together about how different kinds of buildings, institutions, systems and objects have collected and classified books, manuscripts, artworks, as well as those who make and use them. Linking and comparing past and present, science and humanities, West and East, analog and digital, each chapter is followed by a lively and wide-ranging debate, making surprising connections and raising new puzzles. Set in one of Europe's most remarkable libraries and cultural centers, *Bibliotechnica* explores how today's emerging digital knowledge order depends on earlier techniques of handling information, and suggests the ways in which the ideals of humanist scholarship may continue to serve as guides into strange new worlds.

VI-328 pages; 85 illustrations

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PREFACE

Of Black Angels and Infinite Hexagons

Pasquale Gagliardi

A SHORT HISTORY OF THE 'DIALOGUES OF SAN GIORGIO'

This is the latest in a series of books based on the *Dialoghi di San Giorgio*, organised by the Fondazione Giorgio Cini, a large research and resource centre for humanistic studies on the island of San Giorgio in Venice. These Dialogues, launched in 2004, aim to encourage interdisciplinary debates on key issues of contemporary society that are both thought-provoking and of considerable topical interest in political and cultural terms. The current volume is based on the Dialogue entitled *Bibliotechnica: Digital Arts, Philology, and Knowledge Worlds*, held on San Giorgio from 8 to 11 September 2014.¹

Over the years, the format of the Dialogues—and of the books based on them—has taken on an increasingly original and distinctive aspect, distinguishing them from other more conventional forms of collective academic work. In addition to the emphasis on a) interdisciplinarity, b) an interest in furthering knowledge and c) topicality, the Dialogues have been characterized by d) the greater importance attached to 'conversations' as opposed to 'presentations', and e) a conducive emotional atmosphere created by introducing the intellectual experience through an aesthetic experience.

The Dialogues have usually involved a small and select group of twelve to fourteen experts and scholars from various cultural and professional backgrounds. Over three days, these experts meet and discuss their points of view, visions and experiences in the unique setting of the Island of San Giorgio Maggiore, a place with a

suggestive atmosphere, encouraging quiet reflection and open debate.

As we place greater emphasis on dialogue than on formal written presentations, participants were not asked to write any new papers ahead of the event. Rather, they were simply asked to bring their views to Venice and be willing to discuss them with others. In the invitation letter we always stressed this particular point: our ‘Dialogue’ is not the usual academic meeting at which people appear, give a talk, answer questions and then leave; it is a three-day ‘conversation’ enabling people from different institutions and disciplines to learn from one another. We did request, however, that each invited scholar choose a topic—within the framework proposed in the ‘introductory note’ (or ‘Manifesto’, see below)—that would provide the introduction for one of the sessions of the Dialogue, thus setting the tone of conversation and the agenda for the session.

THE ‘MANIFESTO’

The ‘Introductory Note’ (or the ‘Manifesto’) which was sent to all the experts invited to the 2014 Dialogue, was written by the planning team, composed of John Tresch, Simon Schaffer and Pasquale Gagliardi. It ran as follows:

«Today’s systems of knowledge are undergoing profound changes in content, form and location. New fields emerge and old ones disappear or re-appear through the recombinations of disciplines. Ancient manuscripts and the most recent scholarly publications, as well as objects and artefacts from every place and time, are enriched through metadata and made searchable, crunchable and remotely accessible. Centres of learning in the global south and east stretch and reorder previously established hierarchies of research and expertise.

We propose a dialogue to be held in September 2014 on the Island of San Giorgio in Venice to explore these critical issues around knowledge organisation in the present, past and future. Our discussions will concentrate on a handful of sites in which such tensions have played out and will continue to do so: the library, the art-historical archive and the techniques of philology.

In times of crisis, interconnexions between the content of knowledge and the ways it is produced and organised come under unusual scrutiny and pressure. Diagnoses and prognoses of today’s crises are widely disputed. Some claim that innovative and experimental knowledge forms are unprecedentedly hampered by rigid and insular insistence on disciplinary specialisation, while others argue that disciplinary training and expertise are under major threat from loose notions of inter-

disciplinarity and extramural populism. This argument is evidenced as much in the unruly comments pages of online publications as in concerns about commercial pressures and monopolistic practices within academic publishing.

It is also widely held that established western models of knowledge and their institutions—academies, universities, museums and archives—are now entirely inadequate as sources of novel knowledge and must be at least complemented, perhaps entirely replaced, by unprecedented forms of experimental organisation. These may be transnational, transdisciplinary, open-sourced or open-ended, and range from participatory web-based platforms to poles of excellence or institutes for advanced study. Simultaneously, it is urged that traditional knowledge forms—many of which, scholars increasingly recognise, have been drawn from precedents outside the western cultural sphere, or from a range of different classical precedents—will be reinforced, if not redeemed, by the newest forms of knowledge storage, retrieval and organisation. It is often predicted that digital technologies, for instance, will resuscitate the library, museum and archive as viable systems of knowledge.

The institution of the library and the disciplines of philology and of art history are illuminating examples through which to explore these general themes. The library's history in different cultural spheres and traditions is entirely linked with the knowledge forms of those cultures and their development. We ask how libraries have embodied, or instead transformed, disciplinary organisation, how they have rendered knowledge systems rigid or provided resources for their mutual exchange and radical subversion. Disciplines such as philology, characterised by close attention to the recovery of original sources and identification of authorship, and art history, traditionally involved in questions of attribution as well as of connoisseurship and conservation, have long been intimately associated with the institution of the library. Both have deployed elaborate material apparatus and highly skilled disciplines, employing multiple sensory modalities, to reconstruct lost and distant worlds. Both are currently being transformed and re-invented. This dialogue will ask how new knowledge technologies, such as digital access and archiving, and new geographies of knowledge, such as those involved in institutional forms from outside the western tradition or the revival of forms from earlier knowledge systems, now affect these library-based disciplines and how they may affect their future development.

The Cini Foundation on the island of San Giorgio is an ideal site at which to explore these questions. At once a splendid retreat for intense and wide-ranging inquiry, as well as a library, art museum, and global academic hub, San Giorgio holds close links with museology, curatorship, and the many disciplines of art history and of cultural studies. It also continues Venice's traditional role as publisher and broker among diverse cultures and centre for the innovation, circulation and preservation of objects and ideas.»

THE OPENING EVENT²

Following an established tradition of the Dialogues, on the late afternoon before the first day of the seminar there was a formal opening event, aimed at promoting the Dialogue to the public opinion and the press, and introducing the intellectual experience with an aesthetic experience able to convey our emotions alongside our thoughts. For the 2014 Dialogue we proposed two events intertwined: a performance of *Black Angels*, a string quartet by George Crumb, and the reading of excerpts from “The Library of Babel” by Jorge Luis Borges. Both events took place in the New Manica Lunga, the fifteenth century dormitory of the monks of San Giorgio, recently transformed into a huge library (see illustration).



The reason for the choice and the connections between the two aesthetic experiences and the theme of the Dialogue were explained by myself in a short preliminary speech, which ran as follows:

«In tonight's event two paths intertwine: one literary, that of the Universal Library imagined by Jorge Luis Borges ("The Library of Babel"); and one musical, the Black Angels Quartet of the American composer George Crumb. They are two worlds that communicate in unpredictable ways and that bring us closer, with the power of a responsive image and of pure fantastic models, to the reflections that will occupy us in the coming days.

We will hear, on the one hand, the description of a library whose rooms multiply infinitely, as in a game of mirrors; on the other hand, a musical architecture composed of thirteen "images" that draw a symmetrical design in time and which correspond to a precise numerical plan.

Like mirrors and the infinite, mazes and libraries are some of the symbols of Borges's work. In "The Library of Babel," a story of 1941 later inserted into the famous collection *Ficciones*, the writer imagines a library made in the image and model of the universe. It comprises, he writes, "an indefinite number, and perhaps infinite, of hexagonal galleries, with large ventilation shafts in the middle, hemmed by low railings." "From any hexagon," he continues, "one sees the upper and lower floors, endlessly." The library is thus also a labyrinth, a symbol of puzzlement, an oppressive and hallucinatory construction that recalls—as Mario Praz already mentioned—Piranesi's Prisons of the Imagination. But the fundamental fact is that it is a total library and, somehow, definitive, because it contains all the books that can be written. It represents, that is, the sum of the knowledge and experience of men, foreshadowed in a huge final work—the library itself—which encompasses all possible permutations of the alphabet, whether sensible or absurd. Hence the formless and chaotic nature of almost all of his books: "for one reasonable line," explains the protagonist of the story, "there are leagues of senseless cacophonies." The total library is thus a Babel of books, in whose corridors melancholy librarians roam looking for a complete sentence or the catalogue of catalogues, that is, the Truth.

In an essay written shortly before the story "The Library of Babel," Borges traced the history of the idea of this total library from Democritus to Kurd Lasswitz, one of the fathers of science fiction, through Tullio Cicerone and Lewis Carroll: "One of the habits of the mind," he wrote, "is the invention of horrible imaginings. The mind has invented Hell, it has invented predestination to Hell, it has imagined Platonic ideas, the chimera, the Sphinx, abnormal transfinite numbers (whose parts are no smaller than the whole), masks, mirrors, operas, the teratological Trinity: the Father, the Son and the Unresolvable Ghost, articulated into a single organism ... I have tried to rescue from oblivion a subaltern horror: the vast, contradictory Library, whose vertical wildernesses of books run the in-

cessant risk of changing into others that affirm, deny and confuse everything like a delirious god.” (“The Total Library,” *Sur*, no. 59, 1939.)

Steeped in erudition and irony, the writing of Borges is a laboratory of intertextuality and hybridization, two qualities that are certainly in harmony with the music of George Crumb—also studded with citations, stylistic allusions and references to distant sound worlds in space and time. The musical and cultural spectrum of *Black Angels* is in fact extremely vast: from the medieval reminiscences of the macabre dance to the indications to imitate on the violin the Tibetan prayer stones, passing through that “Night of the electric insects” that opens and closes the composition, evoking the war of Vietnam. *Black Angels* is also a micro-library of musical citations on the theme of death and the fall: from Tartini’s *The Devil’s Trill* to Schubert’s *Death and the Maiden* to the medieval sequence of the *Dies irae*. It includes, at last, an echo of the Babelian confusion, since the musicians are required, in some sections, to count up to seven or thirteen in German, French, Russian, Hungarian, Japanese and Swahili.

Worth mentioning is another aspect in close relationship with the topics that this year will be addressed in the *Dialoghi di San Giorgio*: the new modalities of use made possible by technology. The score of *Black Angels* is destined for an “Electric String Quartet”, a quartet of amplified bowed instruments. The recourse to microphones is frequent in Crumb’s music, that uses them to modify the sonorous equilibria of traditional instruments, to bring the listener closer to the micro structure of the sound, through an effect similar to that of the telephoto lens of the camera.

The artificial projection of sound in space, the expansion of the range of the acoustic instruments and the consequent transformation of the perception of the sound create a situation that we can perhaps compare to that produced by digital technology in accessing the traditional sources of knowledge. The interaction between various means and the proliferation of the channels of communication are in fact modifying the classic models of reading and listening, multiplying the connections incredibly and amplifying, in ways heretofore unknown, the perception of every single detail.

The first evening’s readings and technically-enhanced musical performances resonated throughout the discussions of subsequent days. The questions raised in those debates, now preserved in this book—sparked by the diverse histories and uncertain fates of humanistic libraries and scholarship under the pressure of new communications technologies—will continue to echo for all of us who are engaged in the passionate study, preservation, and continuation of the world’s traditions of knowledge.

NOTES

1. The previous Dialogues (*Atmospheres of Freedom: For an Ecology of Good Government* (2004); *The Architectures of Babel: Creations, Extinctions and Intercessions in the Languages of the Global World* (2005); *Inheriting the Past. Tradition, Translation, Betrayal, Innovation* (2007); *Protecting Nature or Saving Creation? Ecological Conflicts and Religious Passions* (2010); *Revisioning the World. Myths of Universal Knowledge and Aesthetics of Global Imaging* (2012)) led to the publication of the following books, respectively: Latour, B. and P. Gagliardi, eds., *Les atmosphères de la politique. Dialogue pour un monde commun*. Paris: Les Empêcheurs de penser en rond/Le Seuil, 2006; Gagliardi, P., B. Latour and P. Memelsdorff, eds., *Coping with the Past. Creative Perspectives on Conservation and Restoration*. Florence: Leo S. Olschki, 2010; Fabbri, P. and T. Migliore, eds., *The Architectures of Babel. Creation, Extinctions and Intercessions in the Language of the Global World*. Florence: Leo S. Olschki, 2011; Gagliardi, P., A.M. Reijnen and Philippe Valentini, eds., *Protecting Nature, Saving Creation. Ecological Conflicts, Religious Passions, and Political Quandaries*. Basingstoke: Palgrave Macmillan, 2013; Schaffer, S., J. Tresch and P. Gagliardi, eds., *Aesthetics of Universal Knowledge*. London: Palgrave Macmillan, 2017. Excerpts from the Dialogue held in 2006 (*Martyrdoms. Witnesses to Faith, Cultures of Death, and New Forms of Political Action*) were published as ‘Martiri. Testimonianze di fede, culture della morte, nuove forme di azione politica’ in *Studi Veneziani*, n.s. LIX (2010), pp. 17–69.
2. In recent years, the opening events of the Dialogues have been always conceived and realized in close cooperation with Francisco Rocca, senior researcher of the ‘Institute for Music’ of the Giorgio Cini Foundation. I gratefully acknowledge the decisive help of Francisco Rocca in conceiving and realizing these successful events.

INTRODUCTION

The Machine in the Library

John Tresch

THE ELECTRIFIED LECTERN

In many libraries' rare books and manuscripts rooms—familiar habitats for today's workers in the humanities—pens are banned, but computers and cell-phone cameras are allowed. Wooden card-catalogues remain more as aesthetic curios than as tools: catalogues are accessed on screens, and librarians answer questions with the aid of online search engines. In many of these rooms, electrical outlets pop out from the middle of shared tables, and (unlike at many cafés, which discourage computer-using table squatters) the staff eagerly share logins and passwords for getting online. Patrons alternate between tapping out notes on laptops and taking photos of manuscripts, often to the sound of the remediated shutter-whir, borrowed from much older cameras, that tells smart-phone users that a picture has been snapped.

In universities, these rooms are often the sites of class visits. Seasoned rare-book readers, or researchers on a deadline, may roll their eyes as they're forced to overhear over-animated professors straining to awaken sullen undergraduates to the amazement they're meant to feel at touching the past—at turning the pages, for example, of a book of alchemical poems originally owned by Isaac Newton. The biggest student responses come from hearing the sheer cost of the volumes arrayed before them, or from fanciful high-tech prospects of using these books for unexpected purposes: for instance, cloning the ancient book's previous owner from bits of skin on the page.

Yet students' attention may also be captured by the teachers' allusions to more

technical treatments of old books, currently underway in the newer projects of digital humanities. These explanations often come with a subtle recruitment pitch, as such projects require volunteer or low-paid undergraduate or graduate workers for the drudgery of scanning texts, coding key terms, entering metadata, and compiling vocabularies. Reading the past with unprecedented electronic eyes, students are told, will make possible new discoveries and open up pages to remote readers through curated online presentations of rare books. New correlations and statistical patterns will be found within a massive corpus gathered together for the first time; through juxtaposing demographics, geo-positioning, publishing and reception histories, one can trace the gradual drift of meanings, values, and disciplinary borders, the rise and fall of reputations and routes of exchange. Collaborations between designers, programmers, and scholars will create colourful, responsive interfaces for accessing rare objects and texts.

Some of this technical work is undertaken in rare book rooms, transforming them into digital processing and data-entry centers; other tasks are conducted in nearby library workrooms fitted out with bright lights and big scanners, along with the computers that must be kept running for days to process the data sets that have been collated for “mining” and “scraping”. Like university administrators and the Silicon-Valley based alumni donors to whom they pay court, undergraduates are impressed by these opportunities for “technical innovation”: they transform libraries from quiet places for loners and lovers of aged oddities into sites for “big humanities.”¹ Research teams and expensive equipment bring the dusty humanities into the app-happy present. The humanistic arts of close reading, translation, comparing texts, tracing influences, following ideas and linking them to their historical worlds can now become more like “real sciences,” with measurable outputs, obvious public outreach, and big budgets.

Amidst all this electronic sound and fury, our bibliophilic traditionalists at the next table over may shake their heads, and wonder at what is being lost. Have we simply turned Pinocchio back into a puppet, to the cheers of the technologically-deluded? The entrance of the machine into the library seems a cause for both admiration and dismay.

This book, *Bibliotechnica*, began as a three-day dialogue, held in a Venetian library, which sought to bring to light shared concerns, hopes, precursors and predictions about the technologies for storing, organizing, and accessing cultural objects. Our invitation (and now this book’s cover) featured a photograph of the Holland House library in London’s West End in September 1940 during the Blitz. The image evokes the pathos of the “sacked library”—a recurrent image of civilizational crash. This trope goes back at least to the legend of Hypatia’s death at the hands of the Christian mob that sacked the library at Alexandria in 410 C.E., giving “the

dark ages” a precise starting date; it is beautifully revived in Isaac Asimov’s short story, “Night,” a fable of periodic civilizational rebirth and collapse. As Simon Schaffer pointed out during the dialogue, the photo “shows on the one hand, how difficult it has often been when libraries and machines meet each other. But on the other hand, the image also shows how strong and almost immortal the desire to use the library remains, even under the most difficult circumstances.” The morning after a bombing, even before the dust has settled, the men can’t resist pulling volumes from the shelf and following their curiosity.

We invited scholars involved in library science, in digital humanities, in anthropology, classics, and history of science. We focused in particular on two disciplines—philology and art history—which have long defined themselves by their close connection to collections of objects, as well as their expert methods for working with them: cataloguing, tracing provenance, determining the difference between originals, copies, and derivations, and charting influences. We asked our participants how the arrival of new machines into libraries and art historical collections is transforming their disciplines.

While we were concerned with the present and future, we were also looking, deliberately, backward. We began by recognizing that there have always been technologies in libraries. Today, even when our encounters with books don’t use any more electricity than what’s needed for lights and climate control, we still deploy equipment which connects us to past technologies of scholarship: books are carefully placed on lecterns or foam supports, held open with satisfyingly heavy, velvet-covered chains balanced across them. Leaving the room, we might enjoy a pleasing dryness on our thumbs and fingers from touching old paper—a pleasure denied in those sites which ask patrons to wear white cloth gloves. Yet this formality adds another satisfaction: it even more strongly marks our meetings with old texts as an encounter with the sacred, demanding ritual purification and all the emphasis on “technique” which ritual demands.

Books themselves were technological achievements, depending as they did on Gutenberg’s standardized type and recomposable frames, along with the networks of printers and book traders which spread his products and his fame. Before them were manuscripts of various materials, papyrus, vellum, cloth paper, palm leaves, the supply chains to source these materials and the techniques of preparing them; the shelves to store them, ladders and drawers, indexes and card catalogues, filing systems and alphanumerical classifications of various sorts. Since at least Alexandria, there were elaborate systems of notation and filing, methods of inventory and keeping track of new acquisitions, places to sign in and to check out—structuring and regulating encounters between books and readers.

HUMANIST CYBORGS AT WORK

Our dialogue builds on growing work on the material technologies of Renaissance scholarship, which has explored the technical and mechanical supports for those varied forms of learning, teaching, communication and self-transformation known as humanism. Despite the idealist temptation which haunts Western scholarship, humanism tended as much toward the life of action as toward the *vita contemplativa*. As Anthony Grafton has argued, “humanism was neither simple nor impractical. The humanists studied a vast range of texts, issues, and problems. They forged many of the technical methods still applied by the supposedly revolutionary German philology of the late eighteenth century. But they also found practical lessons in the classics—lessons applicable to warfare and administration, as well as oratory and epic poetry. And they continued to find formal Latin eloquence a supple and expressive tool for both technical and literary purposes.”³ The various strands of humanism fed into the scientific revolution as well as later transformations of “the humanities,” and depended on a material and technical infrastructure, which itself was a constant object of reflection.

Along these lines, consider three classic images of early modern humanism. In Machiavelli’s famous letter describing the theatrical scenography for his communion with the past, the library is a kind of time machine, a magic box which requires specific worldly and material practices to leave “the world” behind:

«When evening comes, I return home and go into my study. On the threshold I strip off my muddy, sweaty, workday clothes, and put on the robes of court and palace, and in this graver dress I enter the antique courts of the ancients and am welcomed by them, and there I taste the food that alone is mine, and for which I was born. And there I make bold to speak to them and ask the motives of their actions, and they, in their humanity, reply to me. And for the space of four hours I forget the world, remember no vexation, fear poverty no more, tremble no more at death: I pass indeed into their world.»

Replacing the costumes of physical labor with the “robes of the court and palace”—the study becomes a place outside the world, he partakes of a non-physical food “that alone is mine,” and allows him to commune with the ancients “in their humanity.”

In his engraving of St. Jerome in his study, Dürer similarly suggests a communion or sacramental transport brought by the proper placement of material objects and scholarly equipment.



Figure 0.1. Dürer, “St. Jerome in His Study”. Dresden, 1514. http://www.deutsche-fotothek.de/documents/obj/30105649/df_hauptkatalog_0162261

St. Jerome, whose careful translation from Hebrew and Greek resulted in the Vulgate Bible which brought the word of God to the Latin West, is pictured in a sparse but comfortable room, with hourglass, crucifix, and a few volumes on a bench before the window. In a state of prayerful concentration, the accomplished yet humble rhetorician, grammarian, and historian writes; a holy light radiates from his head—positioned between the cardinal’s hat on the wall behind him marking his worldly position, and a skull before him as a reminder of the transitoriness of earthly life. In the foreground, a lion and lamb quietly share the room; proverbial pets were allowed in the study, apparently. Here the proper use and arrangement of the techniques of scholarship allow this exemplary human an access to the divine, earning him blessings and bringing peace throughout creation.

Arcimboldo’s portrait from the 1570s, traditionally called “The Librarian,” treats more playfully the humanist’s immersion in the technical habitat of the library.



Figure 0.2. Arcimboldo, “The Librarian,” c.1570. Skokloster Castle, Sweden. Source: [https://commons.wikimedia.org/wiki/Category:The_Librarian_\(Giuseppe_Arcimboldo\)#/media/File:Arcimboldo_Librarian_Stokholm.jpg](https://commons.wikimedia.org/wiki/Category:The_Librarian_(Giuseppe_Arcimboldo)#/media/File:Arcimboldo_Librarian_Stokholm.jpg)

Here the worker with words has been thoroughly taken over by the tools of the trade. His limbs, torso, and head are books; fluttering pages are his hair; wax seals, weights, quills, place markers and bindings make up his features; his fingers are bookmarks. The equipment of the library invades and replaces the substance of the man who tends to it, often said to be a humanist historian in the employ of the Habsburg emperors. Though expressed as a jest, the work highlights a process through which the humanist scholar may find his very “humanity” transformed and displaced by dwelling among books and their tools. This playful merger of art and nature, in a court which delighted in displays of automata, is a portrait of the librarian as a Renaissance cyborg.

Hopes such as Machiavelli’s dialogue with past humanity and Dürer’s vision of Jerome’s beatific blessing from the divine in a well-ordered workshop, and fears or jibes such as Arcimboldo’s librarian disappearing into books and their appurtenances continue to haunt discourses of the past and future of the library and its machinery. Thus to question the impact of machines on libraries involves a history

and comparison as much as it does ethnography and prognostication.

Bibliotechnica was directly sparked by an earlier San Giorgio Dialogue, now published as *Aesthetics of Universal Knowledge*.⁴ That dialogue's participants discussed the architectural and display formats that have been used to gather together knowledge and to represent the universe as a whole. We considered World's Fairs, "fact services" around 1900, image books and copyrights, pilgrimages, world maps, GPS devices, and the recent design trope—starting in contemporary art museums but spreading to science museums, libraries, and industry—of framing unlabeled objects in replicable neutral grids to suggest "the unending quantity of objects."

Google industries and online access to "the world of information" were constant points of reference. We realized that digital information management—currently taught in both Computer Science and in information schools, many of them former schools of Library Science—was not just creating new ways of organizing and displaying knowledge, but forcing us to reconsider the history of techniques that have given shape to collections of books and artworks. In the light of computer screens, earlier apparatus and methods used to gather, store, compare, index, and juxtapose facts and ideas all took on a new, uncanny appearance. Seemingly novel techniques of digital humanities—text mining, topic mapping, indexing, collating, excerpting, and copying—appear as updates, albeit in an altered electronic milieu, of techniques from the traditional humanist arsenal and used by librarians, philologists, antiquarians, and art collectors.

Working with the capacious subtitle, "Digital Arts, Philology and Knowledge Worlds," we invented a word for our title—*Bibliotechnica*—and planned a new dialogue, to investigate the technologies of the library and related collections—museums, natural history collections, archives. How have these varied from place to place? How are they replicated, replaced, transformed, or allowed to continue unaltered in the new environments and social relations of twenty-first century scholarship? Within what geographical and institutional coordinates are they set? What old forms of thought or life are returning, and with what modifications? Where does humanism—or humanity—stand in the midst of these new networks and machines?

Such questions, we knew, would overlap with exciting recent work at the intersection of media studies, history of art, and history of science. Art historians have renewed their interest in the processes of making, the material reality and ontology of images.⁵ The history of science has brought new attention to archives and the material formats through which *data* (which etymologically means something "given") is formatted out of *capta* (things "captured").⁶ Such focus on the everyday practices of research has also been central to new histories of the university and the academic disciplines.⁷ It closely connects to new histories of the library.⁸

A re-examination of both traditional and contemporary technologies of the library also resonates with calls to explore the technical methods and broader aims of philology. Often considered a “master discipline” of the 19th century German university, philology wed methods for a rigorous investigation of grammars and words—paleography, stemmatics, source criticism—to questions about the history of ideas and their relationship to historical and cultural lifeworlds. Within this always “belated” and “surpassed” discipline, some historians of scholarship are identifying the original matrix of what we now call the “humanities.”⁹ Others have begun comparative histories of philological traditions to note shared and divergent aims, gestures, practices, and social forms in learned scriptural traditions worldwide.¹⁰ As a novel take on the overblown “two-cultures” debate, some explore links between the methods of philology and those of the natural sciences. Lorraine Daston, for instance, has pointed out that the large-scale, labor- and funding-intensive forms of “big science” often associated with 20th century physical sciences were pioneered by projects of classical antiquities and philology.

A critical history of philology is a powerful and revealing complement to a cautious engagement with digital humanities: to show continuities with earlier research traditions, to parse novelty and continuity, and to reveal blind spots. As literary scholar Jerome McGann has noted, the skills of the philologist are today at least as necessary as those of the programmer: “Python, XSLT, and GIS are important, but one might better think that descriptive bibliography, scholarly editing, theory of texts, and book history are now even more pressing programmatic needs.” Furthermore, despite remote learning, remote access, and ubiquitous computing, both histories of scholarship and the new vistas promised by digital humanities have a familiar, if shifting point of origin: “The library, research as well as local-public, is the storm center of these changes because the library is the home base of general education for the citizen as well as the research and teaching humanist.”¹¹ Thus not only what we know, but how we know, and *why*—the question of the aims of research and education, the place of the library within wider political and ideological frameworks—are questions raised by inquiry into library technologies.

A RAMIFYING DIALOGUE

The conversations that became *Bibliotechnica* took place over three days, clustered around three themes, the three sections of this book. The first, benefitting from the participation of the philologist Filippomaria Pontani, addresses *Ancient Data*. Geoffrey Bowker presents the database as the fundamental cultural form of our time; though it has roots as far back as the passage into written language, the

maps of relations that structure databases both reflect and shape the worlds we inhabit, performatively making natural and social orders effective and real. Glenn Most draws attention to the social practices of philology by evoking a fourth-century Chinese sculpture of two figures engaged in copying and verifying texts; in all scriptural traditions, such scenes—which imply whole worlds of training, hierarchy, and uses of learning—are at play. And they do not disappear in the digital age; as Gregory Crane made clear, current projects to digitize the classical corpus make the practices of learning Ancient Greek texts available to more users in new settings worldwide, while placing a new premium on traditional philological expertise.

Despite many commonalities, every library, archive, or collection registers its cultural and geographical origins. Our location in Venice, as a point of passage for cultural goods and learning from East to West (and, for a long time in only a very limited way, from West to East), made the comparison with East Asia a salient point of reflection. In the next section, which benefits from the contributions of the historian and curator Luca Massimo Barbero, *Re-Orienting Collections*, Dagmar Schäfer examines the challenges of creating a library for the history of Chinese science and technology—when topics such as “mountains” will be spread across genres with no direct Western equivalents (poetry, diaries, imperial gazetteers). More recent East-West translation challenges animate Aihwa Ong’s discussion of the “mobile cosmopolitanism” of contemporary Chinese artists who are redefining the space of action, recognition, and valuation of both “Chinese art” and “Chineseness” for both Chinese and Western audiences. Focused on the 18th century, Stéphane Van Damme reconstructs the networks of booksellers and buyers, informants and philologists, royal explorers and traders connected France to South and East Asia who gave form to “the virtual library” which only later came to occupy the physical building of Paris’ Bibliothèque Royale. In each case, the acquisition of cultural objects serves national and imperial power and representations.

To collate and compare collections in different settings is a longstanding problem of library science. The third section, *Accessing Archived Materials*, which examines the mechanics of identifying, labeling, and putting hands on archived objects, shows how digital cataloguing offers no simple solution. Murtha Baca shared the fascinating challenges she has faced as a director of the Getty Institute’s digital art history projects in aligning the vocabularies for art and archival objects and in making digitized presentations of objects. Ann-Sophie Lehmann’s contribution challenges the notion that the digital replaces the physical, arguing instead that our experiences with artworks weave together images and three-dimensional objects, in a diverse media environment with a precursor in Pestalozzian pedagogy. Matthew Battles similarly underlines the unshakeable material base of today’s digital information order, showing and telling the industrial (and in some places, robotic) pro-

cesses of storing books offsite; he offers a vision of contemporary *bibliotechnica* as a form of realist science fiction. Ruth Padel's concluding poems also enquired about the imperfect mirroring between ideas and objects, copies and originals, passing imaginatively through the alchemical tradition, the history of language decipherment, and the heavy political and physical cost of extracting rarities.

Questions which appeared and returned, echoing through the three sections, addressed the changing status of humanism, humanities, and the human. Walter Benjamin's observations on the loss of aura in the age of mechanical reproduction may have had it backwards: the object's aura now is enhanced by, or even directly embodied in its proliferating copies. The digital version, properly formatted, may offer more to the student than the original. Instead of the replacement of the cultic object by its digital copy, we are urged to consider their complex forms of cohabitation, and the gestures and habits of action which bind these multiple media together. We are also challenged to learn to read databases: to see past the objects collected to the logic structuring their presentation. We can read different classification schemes for their metaphysical and national investments, and the rival conceptions of "the universal" they inscribe.

Yet if libraries are often part of projects for building nations and cultures, they also arise from and contribute to various markets attributing value to books, artworks, and learning. There is a politics of access that all collections must face, and the glib rhetoric of "crowd-sourcing," and "democratic access" may mask more than it reveals. From this perspective, the conditions of knowledge collection and access—the red thread of *Bibliotechnica*—involve shifting meanings of openness and inclusion, and the variable mechanisms of exclusion found in every technique of access. And if the library is a kind of citadel of knowledge, just what is the ideal of "civilization" that is being built, in 3rd century Alexandria, in 18th century France, in 21st century China? What ideal of the reader, scholar, or citizen? What other ideals are being left out?

The discussions frequently referred to J.L. Borges' "Library of Babel" and its images of an infinite library with an imperfect filing system, an endless hive of hexagonal rooms and stacks echoing to an ever-receding horizon, containing not just every book but every variation, translation, or modification of every book. We all were led to think about the tools of indexing, cataloguing, storing and delivering books that would make such a collection useful.¹² But hearing Borges' tale this time, I was struck not so much by the dazzling grandeur of the library, but by the pathos of the individuals who have to wander its halls, never knowing if they will find the edition they seek. Even in the age of "big humanities" we are bound by the frame and scale of the human. Our work remains small and personal, not only in our questions and interpretations, but in the day-to-day tasks of making dictionar-

ies, scanning texts, correcting OCR, and the endless, ever-imperfect task of creating and collating metadata. We don't escape the human simply by adding machines.

As the chapters of this book present images of infinite, universal, and eternal libraries, we are brought back again and again to the finitude and the limitations of the technical and social structures that attempt to frame that immensity. This tension calls up one of Ruth Padel's poems, which she read to us at the dialogue. "The Letter to the Portuguese Cosmologist" begins with mention of Gödel's proof, which probed the limits of formal systems. It continues with uncertainties about the universe's symmetry and origin:

*We don't know, you say, how the first stars
were born. If the universe wraps round itself
we should see tapestries of repeating lights,
distant copies of ourselves, our galaxy
and neighbours, as they were in the past...*

The poem ends with a journey through the universe and back.

We close our prayers, most inward when
most looking out, on open numbers, three, five,
seven, nine. We come home to ourselves
following a silver-paper-trail
among elliptic nebulae, light-paths
through strings of misalignment,
rough space that's never empty.
Fire at the synagogue.
The hot dense core of stars.¹³

The poet's conversation with the astrophysicist evokes a feeling that most citizens of today's digital cosmopolis have probably had: we find ourselves displaced, doubled, replicated, and recklessly transmitted through the new technologies that are rewriting the book of nature. Reading with the tools at our disposal, we know ourselves at once as living, breathing, thinking human bodies, and, by the same token, as impersonal packets of data, as sky-trails of numbers and clouds of flashing lights. Yet sometimes, when conditions are right, in the study, the museum, the library, listening to a poem, facing a painting, in the encounter with the traces of all those others in the labyrinth, "we come home to ourselves," and find ourselves again—"most inward when most looking out."

NOTES

1. Wellmon Chad, "Loyal Workers and Distinguished Scholars: Big Humanities and the Ethics of Knowledge." *Modern Intellectual History* (2017): 1-40.
2. Grafton Anthony, *Defenders of the Text: The Traditions of Scholarship in an Age of Science, 1450-1800*. Harvard University Press, 1994, p. 4; Blair Ann, "Humanist Methods in Natural Philosophy: The Commonplace Book." *Journal of the History of Ideas* 53, no. 4 (1992): 541-551; Grafton Anthony, *The Footnote: A Curious History*. Harvard University Press, 1999.; Blair Ann M., *Too Much to Know: Managing Scholarly Information before the Modern Age*. Yale University Press, 2010.
3. Schaffer, Simon, John Tresch, and Pasquale Gagliardi, *Aesthetics of Universal Knowledge*. London: Palgrave, 2017. On the aesthetics of the empty grid, see especially Anke Te Heesen, "The Unending Quantity of Objects: An Observation on Museums and Their Presentation Modes," pp. 115-133.
4. See discussions in Curtis, Neil, ed., *The Pictorial Turn*. London: Routledge, 2012; Moxey, Keith, *Visual Time: The Image in History*. Duke University Press, 2013; Fricke, Beate, "Presence Through Absence." *Representations* 130, no. 1 (2015): 1-27.
5. See Daston, Lorraine, *Sciences of the Archive*. Chicago: University of Chicago Press, 2017; the recent *Osiris* Collection, *Data Histories*, with its introduction by editors Elena Aronova, Christine von Oertzen, and David Sepkoski, "Historicizing Big Data," *Osiris* 32 (2017): 1-17. See also Kittler, Friedrich A., *Discourse Networks 1800/1900*. Trans. Michael Metteer. Palo Alto: Stanford University Press, 1990; Kittler, Friedrich, *Discourse Networks*, See also Krajewski, Markus, *Paper Machines: About Cards & Catalogs, 1548-1929*. Trans. Peter Krapp. Cambridge: MIT Press, 2011.
6. Chandler, James, Arnold Davidson, and Harry Harootunian, *Questions of Evidence*; James Chandler, 'Doctrines, Disciplines, Discourses, Departments', *Critical Inquiry*, 35 (2009) pp. 729-46. William Clark, *Academic Charisma and the Origins of the Research University*. Chicago: Univ. of Chicago Press, 2006; Wellmon, Chad. *Organizing Enlightenment: Information Overload and the Invention of the Modern Research University*. JHU Press, 2015; Rens Bod, *A New History of the Humanities: The Search for Principles and Patterns from Antiquity to the Present*. Oxford: Oxford Univ. Press, 2013.
7. Mays Sas, *Libraries, Literatures, and Archives*. Routledge, 2013. Springer, Anna-Sophie and Turpin, Etienne, *Fantasies of the Library*. Cambridge, MA: MIT Press, 2016; Battles, Matthew, *Library: An Unquiet History*. WW Norton & Company, 2004; Schnapp, Jeffrey, and Matthew Battles, *The Library beyond the Book*. Harvard University Press, 2014.
8. See Andrew Hui, "The Many Returns of Philology: A State of the Field Report." *Journal of the History of Ideas*, vol. 78 no. 1, 2017, pp. 137-156; J. Ziolkowski (ed.) *On Philology*. University Park: Penn State University Press, 1990; James Turner, *Philology: The Hidden Origins of the Modern Humanities*. Princeton: Princeton Univ. Press, 2014. G. Harpham, 'Roots, Races, and the Return to Philology', *Representations*, 106 (2009) pp. 34-63.
9. Anthony Grafton and Glenn W. Most, ed., *Canonical Texts and Scholarly Practices*:

- A Global Comparative Approach*. Cambridge: Cambridge University Press, 2016; Sheldon Pollock, Benjamin A. Elman, and Ku-ming Kevin Chang, *World Philology*. Cambridge: Harvard University Press, 2015.
10. Jerome McGann, "Philology in a New Key," *Critical Inquiry* 39, no. 2 (Winter 2013): 327-346; quotes on p. 344, p. 327. See also the growing recognition that the human sciences of the 20th century emerged out of a confluence of Marshall-Plan era funding, systems-theorizing of cybernetics and its avatars, and new techniques of data storage: anthropologists' Microcards of culture and personality, Levi-Strauss's IBM punchcards, the microfilmed archives that allowed Braudel to speak of the "zoom lens of history" as more than a metaphor. On Braudel and other mid-century technologies, see Kyle Stine, "Other Ends of Cinema: Powers of Ten, Exponential Data, and the Archive of Scientific Images," *Journal of Cinema and Media Studies* (forthcoming); Geohegan, Bernard Dionysius "From Information Theory to French Theory: Jakobson, Lévi-Strauss, and the Cybernetic Apparatus." *Critical Inquiry* 38, no. 1 (2011): 96-126.; Lemov Rebecca, *Database of Dreams: The Lost Quest to Catalog Humanity*. Yale University Press, 2015; see also See David Wellbery, 'The General Enters the Library: A Note on Disciplines and Complexity', *Critical Inquiry*, 35 (2009) pp. 982–94.
 11. Grimmelman, James. "Information Policy for the Library of Babel." *J. Bus. & Tech. L.* 3 (2008): 29.
 12. From "Letter to a Portuguese Cosmologist," in Ruth Padel, *The Mara Crossing*. London: Chatto & Windus, 2012, p. 196.

PART I

ANCIENT AND MODERN DATA

CHAPTER 1

Performing the Database

Geoffrey Bowker



Figure 1.1. Tower of Babel of 30,000 Books, Buenos Aires, by Marta Minujin, part of the election of Buenos Aires as UNESCO World Capital of the Book, 2011. Source: https://commons.wikimedia.org/wiki/File:Torre_de_Babel_de_Libros.jpg

The system of knowledge production, transfer, and maintenance that was established during the Enlightenment has irrevocably shaped our current knowledge and information paradigm(s); the book, and indeed, the written word of any kind, was and is still king. The image above came to my mind after reading Borges' short story, the "Library of Babel." I think of it as a visual metaphor for our moment in knowledge and information history—one that is characterized by a distinct turning away from the primacy of the written word and the lone scholar, towards the primacy of the database and the collaborative, interdisciplinary team.

Beginning in the 19th century, people began believing that there was a finite amount of knowledge about the world such that we would be able to know everything knowable. In the 1830s, Charles Babbage declared that one of the wonders of the printing press was that it brought the finite set of great and good advances of all the ages together in dialogue. Or, take August Comte—the image below is his universal calendar, wherein the final month is devoted to scientists.

(D)

CALENDRIER POSITIVISTE
POUR UNE ANNÉE QUELCONQUE
OU
TABLEAU CONCRET DE LA PRÉPARATION HUMAINE.

PREMIER MOIS. JANVIER. LA TRÉPÉNÉRATION NÉCESSAIRE.		DEUXIÈME MOIS. FÉVRIER. LA PÉNÉTRATION AGISSANTE.		TROISIÈME MOIS. MARS. LA PHILOSOPHIE AGISSANTE.		QUATRIÈME MOIS. AVRIL. LA MÉTHODE AGISSANTE.		CINQUIÈME MOIS. MAI. LA CIVILISATION NÉCESSAIRE.		SIXIÈME MOIS. JUIN. LA CIVILISATION AGISSANTE.		SEPTIÈME MOIS. JUILLET. LA CIVILISATION NÉCESSAIRE.	
Lundi...	1 Frontin...	Héliodotus...	Assolant...	Théophraste...	Milade...	Saint Jérôme...	Théodoric le Grand...	Saint Jérôme...	Théodoric le Grand...	Théodoric le Grand...	Théodoric le Grand...	Théodoric le Grand...	Théodoric le Grand...
Mardi...	2 Hérodote...	Tyrtaïe...	Héraclite...	Marcellin...	Artaud...	Saint Cyrille...	Artaud...	Saint Cyrille...	Artaud...	Saint Cyrille...	Artaud...	Saint Cyrille...	Artaud...
Mercredi...	3 Olympe...	Virgile...	Democrite...	Galien...	Artaud...	Saint Ambroise...	Artaud...	Saint Ambroise...	Artaud...	Saint Ambroise...	Artaud...	Saint Ambroise...	Artaud...
Jeudi...	4 Lycurgue...	Lucrèce...	Épicure...	Platon...	Artaud...	Saint Augustin...	Artaud...	Saint Augustin...	Artaud...	Saint Augustin...	Artaud...	Saint Augustin...	Artaud...
Vendredi...	5 Socrate...	Socrate...	Socrate...	Platon...	Artaud...	Saint Augustin...	Artaud...	Saint Augustin...	Artaud...	Saint Augustin...	Artaud...	Saint Augustin...	Artaud...
Samedi...	6 Socrate...	Socrate...	Socrate...	Platon...	Artaud...	Saint Augustin...	Artaud...	Saint Augustin...	Artaud...	Saint Augustin...	Artaud...	Saint Augustin...	Artaud...
Dimanche...	7 Socrate...	Socrate...	Socrate...	Platon...	Artaud...	Saint Augustin...	Artaud...	Saint Augustin...	Artaud...	Saint Augustin...	Artaud...	Saint Augustin...	Artaud...
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
31	32	33	34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55	56	57	58
59	60	61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84	85	86
87	88	89	90	91	92	93	94	95	96	97	98	99	100
101	102	103	104	105	106	107	108	109	110	111	112	113	114
115	116	117	118	119	120	121	122	123	124	125	126	127	128
129	130	131	132	133	134	135	136	137	138	139	140	141	142
143	144	145	146	147	148	149	150	151	152	153	154	155	156
157	158	159	160	161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180	181	182	183	184
185	186	187	188	189	190	191	192	193	194	195	196	197	198
199	200	201	202	203	204	205	206	207	208	209	210	211	212
213	214	215	216	217	218	219	220	221	222	223	224	225	226
227	228	229	230	231	232	233	234	235	236	237	238	239	240
241	242	243	244	245	246	247	248	249	250	251	252	253	254
255	256	257	258	259	260	261	262	263	264	265	266	267	268
269	270	271	272	273	274	275	276	277	278	279	280	281	282
283	284	285	286	287	288	289	290	291	292	293	294	295	296
297	298	299	300	301	302	303	304	305	306	307	308	309	310
311	312	313	314	315	316	317	318	319	320	321	322	323	324
325	326	327	328	329	330	331	332	333	334	335	336	337	338
339	340	341	342	343	344	345	346	347	348	349	350	351	352
353	354	355	356	357	358	359	360	361	362	363	364	365	366
367	368	369	370	371	372	373	374	375	376	377	378	379	380
381	382	383	384	385	386	387	388	389	390	391	392	393	394
395	396	397	398	399	400	401	402	403	404	405	406	407	408
409	410	411	412	413	414	415	416	417	418	419	420	421	422
423	424	425	426	427	428	429	430	431	432	433	434	435	436
437	438	439	440	441	442	443	444	445	446	447	448	449	450
451	452	453	454	455	456	457	458	459	460	461	462	463	464
465	466	467	468	469	470	471	472	473	474	475	476	477	478
479	480	481	482	483	484	485	486	487	488	489	490	491	492
493	494	495	496	497	498	499	500	501	502	503	504	505	506
507	508	509	510	511	512	513	514	515	516	517	518	519	520
521	522	523	524	525	526	527	528	529	530	531	532	533	534
535	536	537	538	539	540	541	542	543	544	545	546	547	548
549	550	551	552	553	554	555	556	557	558	559	560	561	562
563	564	565	566	567	568	569	570	571	572	573	574	575	576
577	578	579	580	581	582	583	584	585	586	587	588	589	590
591	592	593	594	595	596	597	598	599	600	601	602	603	604
605	606	607	608	609	610	611	612	613	614	615	616	617	618
619	620	621	622	623	624	625	626	627	628	629	630	631	632
633	634	635	636	637	638	639	640	641	642	643	644	645	646
647	648	649	650	651	652	653	654	655	656	657	658	659	660
661	662	663	664	665	666	667	668	669	670	671	672	673	674
675	676	677	678	679	680	681	682	683	684	685	686	687	688
689	690	691	692	693	694	695	696	697	698	699	700	701	702
703	704	705	706	707	708	709	710	711	712	713	714	715	716
717	718	719	720	721	722	723	724	725	726	727	728	729	730
731	732	733	734	735	736	737	738	739	740	741	742	743	744
745	746	747	748	749	750	751	752	753	754	755	756	757	758
759	760	761	762	763	764	765	766	767	768	769	770	771	772
773	774	775	776	777	778	779	780	781	782	783	784	785	786
787	788	789	790	791	792	793	794	795	796	797	798	799	800

Jour complémentaire... Jour bissextile...

Figure 1.2. Auguste Comte's Positive Calendar. Source: gallica.bnf.fr

Once again, we see this idea that there is a singular set of great scientists, and thus we must immortalize them in place of saints in our reckoning. In reality, most of us won't recognize many of the figures on the calendar. What makes it significant, though, is that it represents the traditional idea of a finite system, a closed

canon of knowledge and figures. It has been claimed—possibly apocryphally—that Lord Kelvin announced the end of physics, that we have now discovered everything that we can possibly discover, in the early 1900s. And the Count of Buffon, a hundred and twenty years earlier, spoke of a finite number of geniuses, globally and across time. In this antiquated understanding of knowledge, everything else we produce from now on is going to be just, in Henri Poincaré’s conception, building on the great work of the geniuses of the past.¹

PHILOSOPHICAL
TRANSACTIONS:
GIVING SOME
ACCOMPT
OF THE PRESENT
Undertakings, Studies, and Labours
OF THE
INGENIOUS
IN MANY
CONSIDERABLE PARTS
OF THE
WORLD.

Vol I.

For Anno 1665, and 1666.

In the SAVOY,
Printed by T. N. for John Martyn at the Bell, a little with-
out Temple-Bar, and James Allestry in Duck-Lane,
Printers to the Royal Society,

THE HORSELESS AGE

A MONTHLY JOURNAL

PUBLISHED IN THE INTERESTS OF THE MOTOR VEHICLE INDUSTRY.

VOLUME ONE. NUMBER ONE.

A COMPILATION,

SHOWING THE

MOTOR VEHICLES, VEHICLE MOTORS AND SYSTEMS OF

PROPELLING AND CONTROLLING VEHICLES

BROUGHT OUT IN THE UNITED STATES

IN

1894 AND 1895.

Figure 1.3. *Philosophical Transactions of the Royal Society*, 1665-66. Source: https://commons.wikimedia.org/wiki/File:Philosophical_Transactions_-_Volume_001.djvu

Figure 1.4. *Horseless Age* journal. Source: https://commons.wikimedia.org/wiki/Category:The_Horseless_Age,_1895#/media/File:Horseless_Age_v1-1.jpg

All this finite knowledge would be—and is—stored in the journal system, which again pictures a limited conversation; 19th century journal titles such as the *Archives for the Natural Sciences*, and *Annals of the Sciences*, exemplify this mode of thought. Throughout the 19th century, these journals proliferated. So before the wireless age, within a year or two the invention of the internal combustion engine, journals devoted to the horseless age were generated. Journals were cropping up everywhere, about every possible subject, all of the time.

So, why were journals produced at unprecedented rates throughout the century? Well, to answer this, we turn to a new tool, albeit a highly problematic one: a Google N-gram of “knowledge,” “information,” and “data.” As you see above,

knowledge is green and in slight decline. It isn't until the white-hot technological revolution of the 1960s, however, that “data” and “information” surpass “knowledge”—although by then, they do so exponentially.

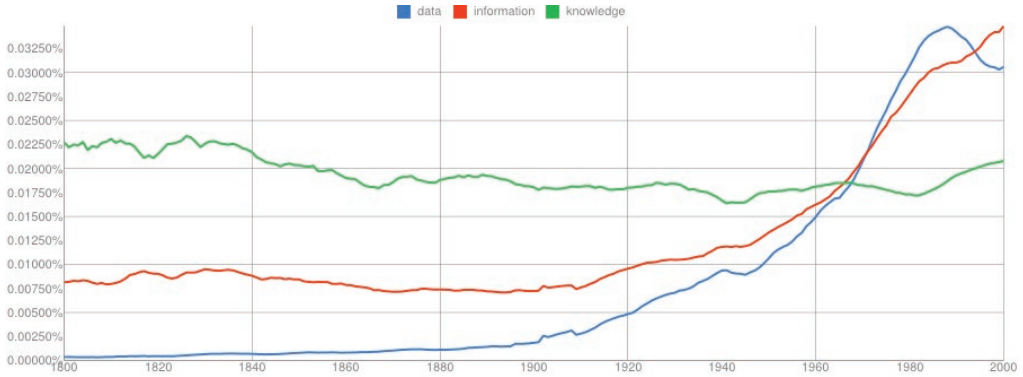


Figure 1.5. Google N-Gram for “data”, “information”, “knowledge”.

Intriguingly, “wisdom” peaks in about 1820 or 1822 and has steadily declined ever since.

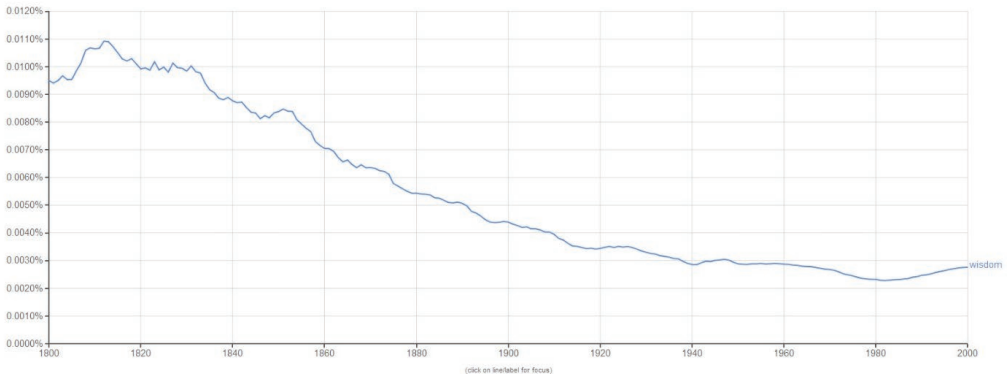


Figure 1.6. Google N-Gram for “wisdom”.

What this shows, and what I’m going to lay out for you, is that when we talk about “knowledge” and its role in society, we often neglect to consider what knowledge is *for*. The image below illustrates an example of one apotheosis toward which we might be heading. It’s called the Human Memome Project²—Gabriel Tarde would have loved it. The idea behind the project is this: select geniuses devise novel ways of living, which we actively disseminate in the hopes that we can all imitate the “great and good.” Its knowledge infrastructure is, in one sense, about rendering

us smarter and, in another, about rendering us more stupid because we don't need to actively or critically engage; instead, we make our surrounding environment so intelligent, distributing our intelligence between ourselves and our machines, that we don't actually need to think much for ourselves. We don't need to work out healthy ways of being. We simply allow the Human Memome Project to do it for us.

center for human emergence
initiating action for global transformation

HOME VISION ORGANIZATION CORE TECHNOLOGIES PROGRAMS INTERVIEWS ESSAYS & RESOURCES EVENTS

Programs

- Human Memome Project
- Surprise Anticipation Center

MeshWORKS
Participate/Contact

GlobalNews Update

Centers

Copenhagen Netherlands USA

Emerging Centers

HUMAN MEMOME PROJECT

The Human Memome Project develops a way to map the memetic codes (stages or levels of consciousness) of the major peoples, drivers, institutions, movements, and organizations of the world.

The Human Memome Project will thus create a synthesis of all of the various viewpoints on cultural transformation, societal change, the nature of conflict, forms of conflict prevention, and development, in order to generate sophisticated electronic maps designed to monitor, at the deepest level, waves of chaos and order, change and stability, and progress and regression within our collective selves. These maps will help us identify problem nodes throughout the world and allow us to predict major issues before they occur. In order to construct this global memetic, the project will:

1. Insert the memetic indicators identified during the research phase into specific locations.
2. Isolate the size and shape of memetic variables and points of convergence with other memes.
3. Visually represent these memetic spaces using topographical maps.
4. Integrate this with other data and indicators for assessment.

Figure 1.7. The Human Memome Project <http://www.thehumanmemomeproject.com>

In this essay, I will first explore the epoch of the database, arguing that the database is the fundamental cultural form of our time. Second, I will present some new forms of knowledge dissemination that are direct departures from previous paradigms—they are performative and expressive. There is a cartoon by the great Australian cartoonist Michael Leunig depicting a family of early cave dwellers mesmerized by the first cave drawings while nature in all its splendor languishes outside. When we talk about databases, we often get similarly mesmerized by the technology that we fail to see the world around it, and us. We look at the picture instead of the sky outside. Yet archives are very important and are often very basic. We cannot escape the reality that this moment is an instauration of a new archival

paradigm for all of our knowledge—a new archive for our 21st century ways of learning. To quote Jacques Derrida,

*The word “arkhe” names at once the commencement and commandment. This name apparently coordinates two principles in one: the principle according to nature or history, where things commence, physical, historical, or ontological principle. But also the principle according to the law. There where men and gods command. There where authority, social order are exercised in this place from which order is given.*³

Antoine Lavoisier, a central figure in the French chemical revolution of the 18th century, uses order to assert authority by deliberately employing a new vocabulary in his famous chemistry textbook, *Traité élémentaire de chimie*. Now, one of the joys of a new vocabulary implemented by someone of his import is that it will be used by the public from the moment they ingest it. However, in developing the vocabulary, Lavoisier broke from tradition, deliberately omitting terms from the alchemical cannon. This meant that Lavoisier’s readers suddenly had no conception of what the alchemists were talking about and thinking about, despite the fact that there was great continuity between chemistry and alchemy. Thus, Lavoisier put into place a new archive, determining both the commencement and the commandment: *When thou speakest in future thou shalt use the word oxygen; thou shalt not call the precious metal Diana’s metal——thou shalt call it silver.*

So, is this archive a database? Why am I, like Lev Manovich, pushing back the epoch of the database to the time of the Enlightenment?⁴

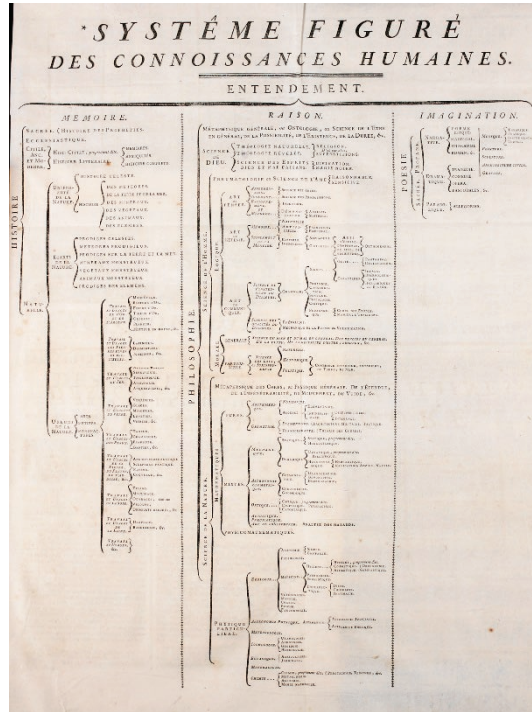


Figure 1.8. Organization of the *Encyclopédie*. Source: https://commons.wikimedia.org/wiki/File:ENC_SYSTEME_FIGURE.jpeg

Well, knowledge abounded at the time of the Enlightenment, as illustrated by this anachronism: “at about this time, as a consequence of overseas discoveries, early modern scientists were faced with what has been termed ‘the first bioinformation crisis.’”⁵ To make sense of an overwhelming mass of information, you must order it—for example, in a tree structure. The tree structure above shows the organization of *l’Encyclopédie*.

With this new ordering of knowledge co-evolved a new information technology. Information technology of this kind was used by the *encyclopédistes*: loose scraps of paper hanging on hooks, under which novel, relevant articles of scholarship were placed. This is a clear example of the prevailing paradigm—new form of knowledge, new information infrastructure.

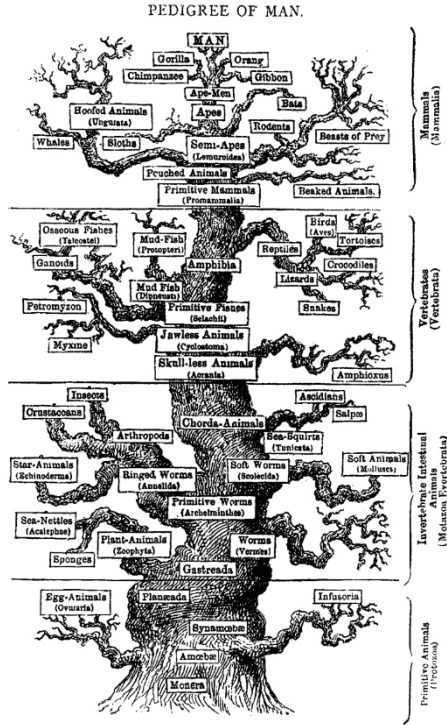


Figure 1.10. Ernst Haeckel, “Pedigree of Man.” Source: [https://commons.wikimedia.org/wiki/File:Pedigree_of_man_\(Haeckel_1874\).jpg](https://commons.wikimedia.org/wiki/File:Pedigree_of_man_(Haeckel_1874).jpg)

During the 19th century, the tree structure becomes dominant. Above is Ernst Haeckel’s “Pedigree of Man”, a canonical image displaying the popular taxonomic structure.

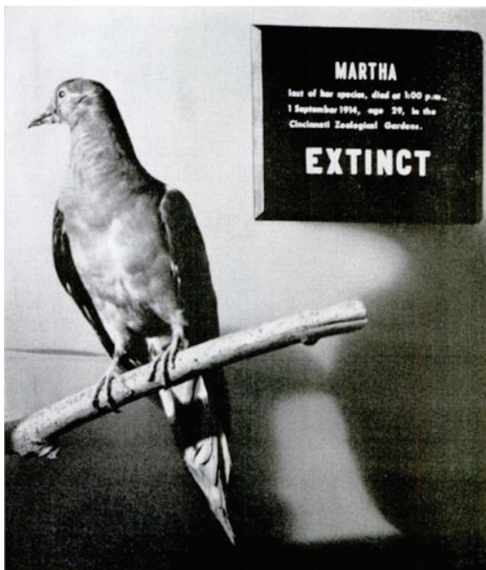
The philosophers Gilles Deleuze and Felix Guattari appear exceptionally bohemian in Manuel Lima’s representation of them in his wonderful RSA animation on ‘trees’.⁶ This work, created by a popular, emerging scholar of today, gives evidence that the tree form is still very much with us; and that trees are justly being supplanted by rhizomatic forms in both the social and natural sciences.

Modern representations of the tree of love, often in circular form, retain this branching structure, remorselessly binary, in which each species breaks off into another and another until you’ve moved from the *ur*-organism to the twigs, which we’re sitting on top of. Intriguingly, when cladistics took off in the 1950s and 1960s, scholars recognized that evolution does not occur in this pattern. In reality, genes essentially jump between species, creating a sort of recursive evolution; there’s backwards evolution as well as forward evolution. Thus, it’s not clear whether certain entities, such as viruses, evolve in any meaningful sense—maybe they devolve.

Unfortunately though, the branching, representational form is still fairly dominant in our social and scientific cultures.



Figure 1.11. Svalbard Global Seed Vault. Source: [https://commons.wikimedia.org/wiki/Category:Svalbard_Global_Seed_Vault#/media/File:Svalbard_Global_Seed_Vault_\(16064027324\).jpg](https://commons.wikimedia.org/wiki/Category:Svalbard_Global_Seed_Vault#/media/File:Svalbard_Global_Seed_Vault_(16064027324).jpg)



This popular representational form has very real consequences in our world. On Svalbard, an island off Norway, the world's seeds are being stocked in the event of future incursion from Al-Qaeda. The seed is the only item being stocked there; that is the unit with which they are concerned. However, biological life

Figure 1.12. The Last of the Passenger Pigeons. Source: http://2.bp.blogspot.com/-zzHZ-VWLKQA4/TyPyrvCPaII/AAAAAAAAAB3s/V_Kk9N1RmGM/s1600/Martha-Life+Photo.jpg (accessed 3/25/2018)

can't be reduced to single units. Ninety percent of the cells in our body are made up of microorganisms. We are part of our metagenome. We are part of our "interactome," a horrible-sounding term that comprises the things that we interact with. But the unit that we're saving in the event of mass disaster is singular, similar to the units into which we place knowledge.

For example, Stewart Brand and his colleagues are currently attempting to genetically re-create the passenger pigeon, the last of which was died in captivity in America in the 1920s. While it's clear that they're trying to recreate an extinct animal, there remains an unanswered question about what kind of a creature they will actually create in practice. For one thing, the pigeons won't be situated in their native environment. They were once so numerous that they influenced the structure of the forests across Canada and the East Coast of the United States. As their numbers dwindled and their eating habits changed, the forest changed as well. So, ethically, should Brand and his colleagues reproduce an animal for which nature has no obvious purpose any longer?

On a granular level, genes themselves can be unruly. In this image, we move from Mendel and the great genius on the one side, to genetics banks and computers on the other. In this image, jumping genes are represented both in the animal form and in the machine form.

Genes Jump Silicon Barrier

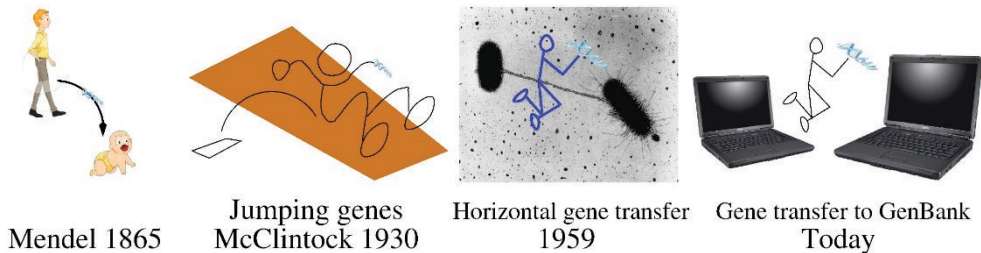


Figure 1.13. http://www0.cs.ucl.ac.uk/staff/w.langdon/WBL_2011.html (accessed 3/25/2018).

To deal with the vast amounts of information with which we are confronted today, we need to use thoughtful, relevant techniques to comprehend, draw upon, and analyze that knowledge. Most often, we turn to techniques developed and popularized by both businesses and for-profit organizations. "Nature's barcode," from a project called the International Barcode of Life,⁷ is a fine example of this application of commercial methodologies in scholarly fields. The conceptual underpinning of this project is the idea that knowledgeable, specialized naturalists

would be replaced by a handheld device that would provide instant feedback about a specimen with just a snippet of its genome. I argue that this is a commercialized organization of knowledge that grew out of the business community, moved across into science, and has now proliferated into human affairs, both social and political. Another example of this comes from Michael Witzel's book, *The Origins of the World's Mythologies*.⁸ In it, he uses cladistic analysis to resurrect the original Eurasian and Gondwanan mythic structures from about 60,000 years ago and even before. He uses this case study to claim that he can uncover, genetically, the stories humans were telling each other well before the invention of writing.

There is an argument that when we're dealing with data—which we do in practices such as barcoding nature and cladistics—that we don't need to go through the whole “knowledge process thing,” to put it crudely. Chris Anderson of *Wired* magazine puts it this way: “the end of theory, the data deluge, makes the scientific method obsolete.”⁹ As Bruno Latour has acknowledged, this idea is very Tardean. It's the idea that you do not need to have reified categories or ways of comprehending the world; you can simply create whatever you need on the fly and then examine all the connections, just by working with a very large database.¹⁰ Taking this Tardean idea into consideration, it becomes clear that this impulse to consolidate all the world's knowledge, which came out of the Enlightenment, is still alive today.

For instance, there was Paul Otlet's electromechanical system of knowledge storage, and his fact service, in the late nineteenth/early twentieth century.¹¹ There is also the *World Brain*, which is H.G. Wells' fairly fascist book from the late 1920's, and the Memex of Vannevar Bush. The *Encyclopédie* is the first marker of this push to consolidate all knowledge. The difficulty, however, of holding knowledge in one place is that we have, historically, assumed an ontological stability of knowledge and information objects. We assume they'll be appropriately connected by one single ontology. Despite having evolved from the impulse it was in the time of the *Encyclopédie*, that drive is visible in the hype surrounding the semantic web, which, significantly, simply won't work until a fundamental ontology has been agreed upon.

Lisa Gitelman's collection, *Raw Data is an Oxymoron*, reminds us that when we're working with data, we also need to know how to interpret it.¹² Because data is quantifiable, numerical—something that for most people appears neutral and mathematic—we forget that there's no such thing as raw data, much less bias—or error-free data. Data is inherently theory-driven, and always has been. It says things about the world, where it came from, and how. This is something we are culturally and socially having a difficult time addressing; we have not yet learned how to efficiently read databases and their data, even though they are seminal in our time.

In light of this, a quote from Walter Benjamin is particularly pertinent: “Today...the current scientific method teaches us the book is an archaic intermediate

between two different card systems. For everything substantial is found in the slip box of the researcher.”¹³ Long ago, we organized our knowledge using Bristol cards, duly tagged to different topics or themes. Between two different card index systems, everything could be found in the slip box of the researcher who wrote it and the scholar who studied it, assimilated into its own card index. Now what’s interesting about this is that Benjamin posits that knowledge travels from database to database, and it’s the publication which is actually epiphenomenal.

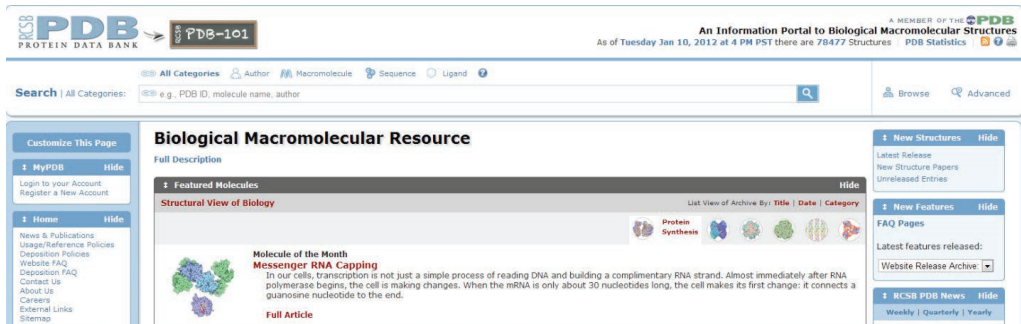


Figure 1.14. Protein Data Bank: <https://www.rcsb.org/pdb/home/home.do>

But first, let us consider the role of the database today. To do this, I want you to consider first, the Protein Data Bank (PDB). To publish an article identifying a protein’s structure, you must first log the structure in the data bank. Often, entire scientific articles are written about a new structure just to point to the corresponding entry in the data bank, making them purely epiphenomenal to the work of knowledge production and knowledge expression. To facilitate this relatively novel type of knowledge work, the PDB employs five professional annotators to coax the scientific papers and the scientific findings into their desired form. Curation and management of very large datasets like the PDB is a new kind of role for libraries.

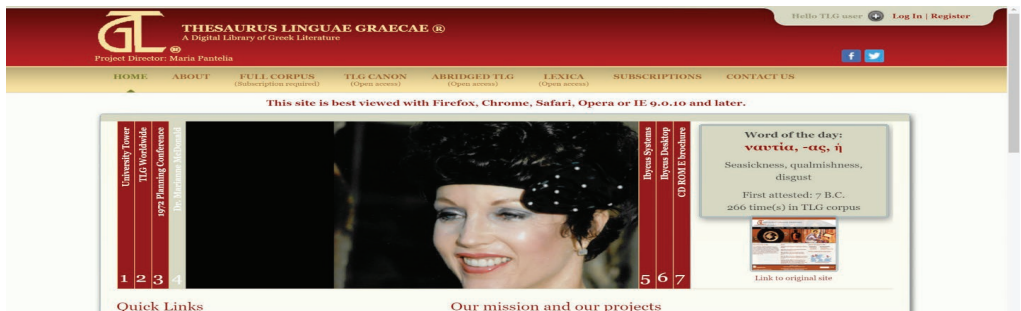


Figure 1.15. *Thesaurus Linguae Graecae*. <http://stephanus.tlg.uci.edu/>

The *Thesaurus Linguae Graecae*, which contains the canon of classical Greek literature and was originally on CD, is now on line. When considering databases like the *Thesaurus Linguae Graecae* and the PDB, it is imperative to consider whether they are actually producing new forms of knowledge, new ways of knowing, new ontologies, or are simply reproducing the old forms. A classics scholar I talked to in the 1990s said they can now complete a search that used to take twenty years at the push of a button. The problem is, they're all asking the same questions they were back then.

So then, what are the new kinds of questions and their corresponding ways of thinking that we can begin to explore? For example, Peter de Bolla, in his book *The Architecture of Concepts*, innovatively analyzes the Ecco database—an online, English database of eighteenth-century literature.¹⁴ As he analyzes the database, he explores a conversation that never happened in the sense that there was a ‘discourse’ but it did not take place in a simple to-and-fro dialogue; you see, when we do traditional hermeneutic analysis, we track conversations, but when conversations didn’t happen and culture is constantly shifting—well, how do you analyze that? Frederic Jameson eloquently addresses this problem when he posits that—in order to understand Poe and his work—one must both examine Poe’s methods of production and his cultural, historical, and scholarly context.

Like Jameson, de Bolla uses a technique called “distant reading,” the inverse of close reading, to comb through his huge database and uncover changes in the discourse. While this is a very Foucauldian sense of discourse, one centered around ideas of rights, de Bolla did uncover this discourse in ways that would have been unimaginable in previous generations of knowledge production. Leslie Kurke navigates these new methodologies in her book *Coins, Bodies, Games, and Gold* as well by deploying structural semiotics to reveal a discourse about money despite the absence of a common discussion of it for the first two hundred years of its invention.¹⁵

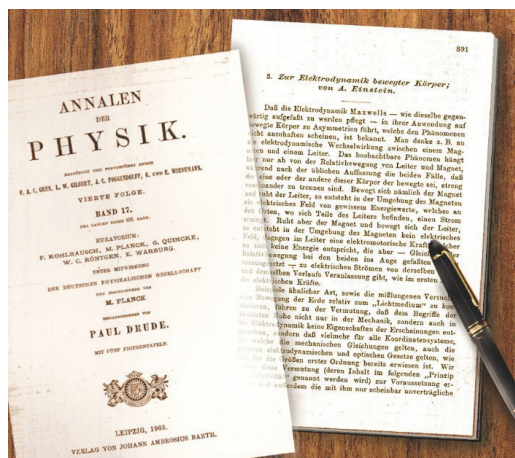


Figure 1.16. *Annalen der Physik*, 1905.

In this new paradigm, the singular author is dead. This is evidenced by the fact that the announcement of the discovery of the Higgs boson particle had more authors than words in the text itself.

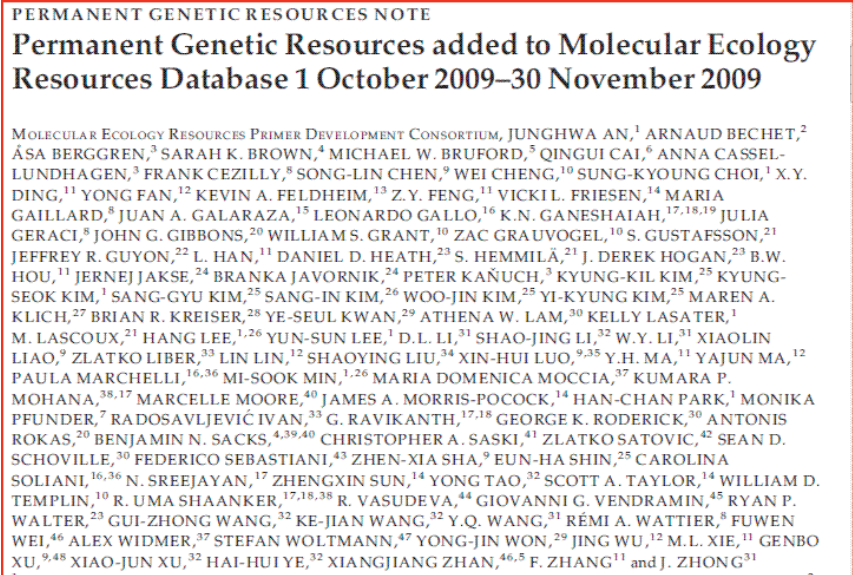


Figure 1.17. Authors cited for Database. *Mol Ecol Resour.* 2010 Mar;10(2):404-8. doi: 10.1111/j.1755-0998.2009.02827.x. Epub 2010 Jan 20.

Here, I'd like to review some new forms of knowledge expression. The first form is a science studies scholars' delight, the *Journal of Visual Experiments*. In the journal, the normal text of an article is situated alongside a video of the experiment as it's being performed. By presenting the experiments this way, readers are provided with invaluable context. As Harry Collins said, you can never replicate an experiment from an article. You've got a much better shot if you're saving media from the experiment as well.¹⁶

The magnificent work, *Blue Velvet*, deals with New Orleans after Hurricane Katrina.¹⁷ In it, the artist, database designer and author created a beautiful form while integrating the database into the expression. As words drop from the sky, the infrastructure is revealed, playing into the knowledge below, allowing you to explore the data that is being used to make the claim.

Another pertinent example is *Logicomix*—a graphic novel centered around the life of Bertrand Russell, which calls up discussions of Georg Cantor and Alfred North Whitehead *inter alia*; essentially, it's about people who went crazy while studying the infinite in one way or another.¹⁸



Figure 1.18. From Doxiadēs, Apostolos K., Christos H. Papadimitriou, Alekos Papadatos, and Annie Di Donna. 2009. *Logicomix*. New York: Bloomsbury.

The brilliant thing about the graphic novel is that it conveys actual information about mathematics and the nature of truth, but it's doing so contextually. So, while a reader gleans peripheral but very informative information about Cantor and Russell, he or she also absorbs the fundamental ideals of Cantor, and so on. Thus *Logicomix* is an exemplary, contemporary expressive form suited to the vogue of philosophical biographies that traditionally give the social as well as the intellectual context of its subject(s).

In *Aesopic Conversations*, Leslie Kurke talks about the shift from philosophy being about that which was performed, to that which was written down.¹⁹ Today, we're reversing that shift—in many ways, knowledge transfer and knowledge expression are now performative. We're moving away from that which was written down to that which is being performed. The image below, which is quite famous, is from Hans Rosling's *Gapminder*.²⁰ His work is highly performative, as evidenced by his TED Talks—in fact, he even swallows a sword in one of his lectures.



Figure 1.19. Hans Rosling at *Gapminder*. <https://www.gapminder.org/>

But performance is not only being used for knowledge transfer, it's being used for information storage and categorization as well. This is most clear in the case of databases. A wonderful example of this comes from Ruth West, an artist who developed a 3D interactive interface for a massive database generated by Craig Ventner's Global Ocean Survey to move your way through the database via gesture, exploring at will.²¹ As you move, the interface generates music corresponding to your location in the database and an artificial language based on the Platonic solids.

And there's also an artificial language, which doesn't quite make sense but is interesting, based on the Platonic solids. You are interacting with the database; you're producing new knowledge with the database. You're producing it with your knowledge—Microbiome Project, which aims to identify and categorize all the little critters in the sea, including free-floating bacteria and viruses. When interacting with the interface, you are with your body, you're experiencing it with your body. It's a fundamentally different way of knowing and thinking about knowing.

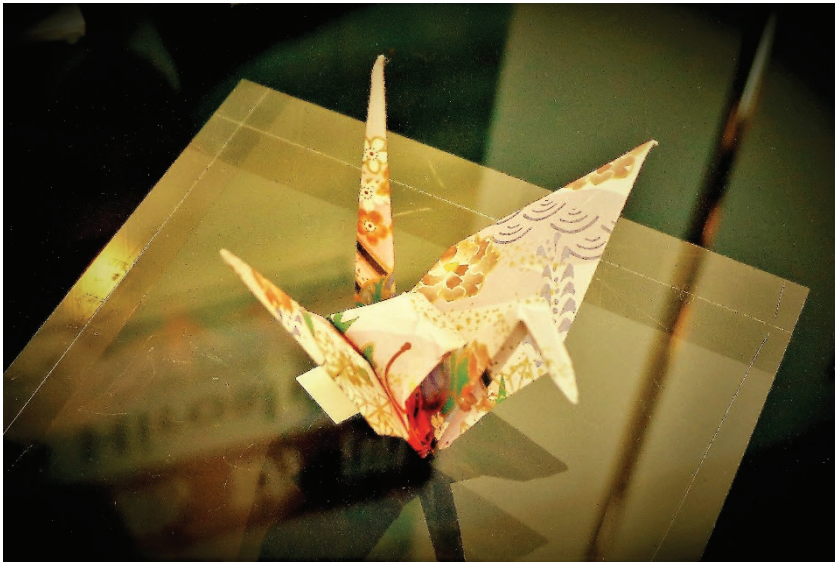


Figure 1.20. Origami Crane. https://upload.wikimedia.org/wikipedia/commons/a/aa/Barack_Obama_folded_paper_crane._Hiroshima_Peace_Memorial_Museum.jpg

Claude Lévi-Strauss used his skills in origami to inform his process writing his famous mythologies. This is particularly intriguing because Lévi-Strauss was thinking in terms of a topological structure, and a complex one at that, when considering his research question. Unfortunately, when it's expressed in book form, the possibility of fully understanding the structure of his thinking is almost entirely lost. However, if we remediate that textually-rendered loss as a topological form using the power of visual imagery, then it is far easier to unearth Lévi-Strauss's ways of thinking and modes of expression—and thus, far easier to more accurately understand his work.

We think about a lot of what's happened over the past few centuries in terms of the development of information infrastructures. What we need to think about today is knowledge infrastructures. Knowledge infrastructures are defined in terms of modes of knowledge production. Amazing work is being conducted in data and databases across all academic fields, but it often goes unrecognized, unrewarded; there is no career structure for it. Working in interdisciplinary ways—a researcher collaborating with an artist, a graphic artist and a database designer, for example—should be accepted as the new working unit for knowledge, rather than the lone, genius scholar.

In closing, I show Scott Mutter's surreal image of Michigan Avenue in Chicago. It serves as a reminder that databases subtend all aspects of our lives. They subtend our

knowledge, telling us what kind of entities there are in the world, how to sort them, how to analyze them, and how to play with them. The library, the prime locus of the database, won't go away. It may never become infinite, but it will never disappear.

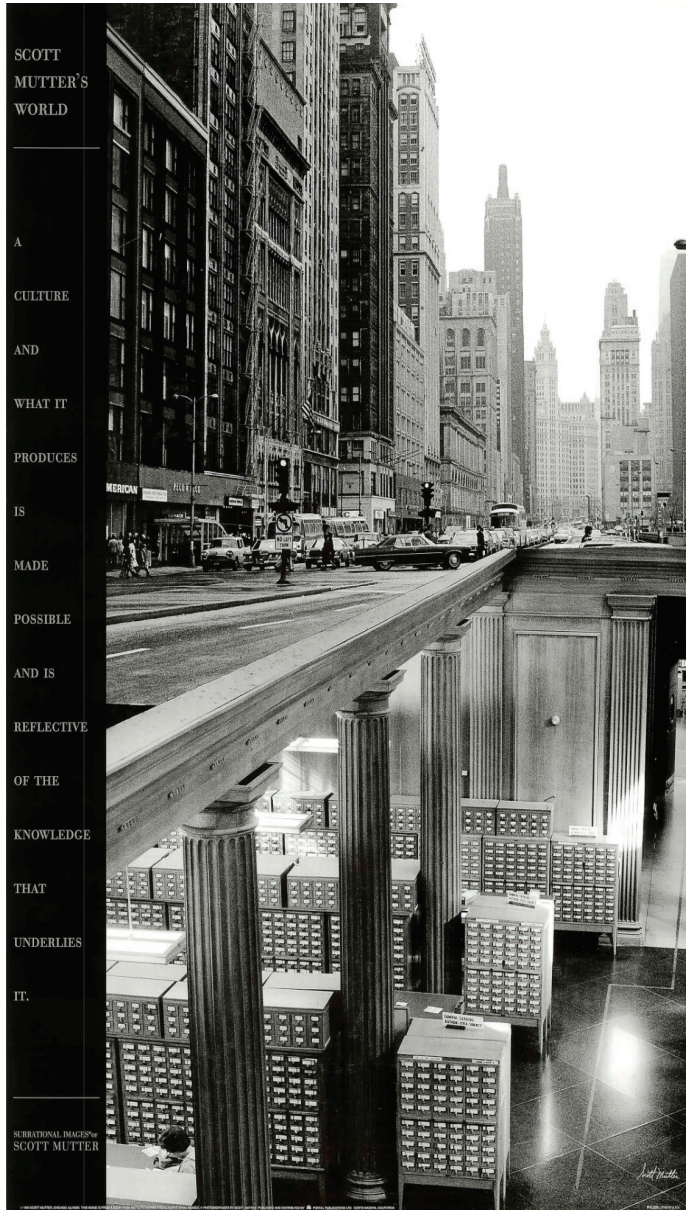


Figure 1.21. Scott Mutter, “Untitled (Library)” c.1980. <https://www.pinterest.com/pin/542754192563604691> (accessed 3/25/2018).

DEBATE

Gregory Crane

I can't resist talking about scale. We classicists regularly hear, "You have only so much material to study—we have real data and you don't." But reading is fractal in one sense: there can be both intensive reading and extensive reading, both of which can be endless. One of the great crises that I face in my little field is that it is no longer possible to cover even the undergraduate curriculum. Harvard University gave up altogether on its undergraduate reading list in Greek and Latin. That reading list contained roughly 150,000 words and you could not find, at the world's self-considered greatest university, a sufficient population of undergraduates with the training to go through and cover this curriculum. So they got rid of it. And one can see there's already a crisis of big data. What does big data mean? There are at least two scales: one is big data where statistical rules come into play and things start to emerge from patterns that you can detect; the other scale is just a quantity of unprocessed information you can't even get into your head. There are different scales of thinking: thinking in terms of buildings, versus *bildung*, so to speak. So is the purpose to generate knowledge or is the purpose to change the way people think? And what are our goals in looking at these new knowledge structures, and designing them? Do they produce "useful" or "monetizable" knowledge (being that the two are or more or less equivalent in the United States)? Or is our goal to change the internal workings of the human mind in some fashion?

Geoffrey Bowker

I think ultimately for me it's about changing the nature of the human mind. There's a wonderful piece by the pragmatist philosopher Arthur Bentley, written in 1941, called "The Human Skin: Philosophy's Last Line of Defense."²² He argued that if we assume that knowledge and our ways of thinking are just held in the body, then we've already given the game away. Our information infrastructures have gone through fundamental changes over the past 30 years. Of course they're going to change the nature of the mind. Derrida actually makes this point all too briefly in *Archive Fever*, where he says that the subject of psychoanalysis is different now because we have access to different kinds of memory that we didn't in the past. Fleeting memories were fleeting memories and went away. We now have modes of storage and projects such as Gordon Bell's MyLifeBits, where he's storing absolutely everything about his life; or Memoto, which is a Kickstarter project in the form of

a wearable camera automatically taking high-resolution images at regular intervals. You wear it your whole life and you've got this stack of images at the end of it.

What I'm interested in is what knowledge is for. We are absolutely trapped in America by the idea of useful knowledge—this is not new in the history of developed countries. Terry Shin makes the same argument about the difference between Prussian and French education in the mid-19th century; the Prussians won out because they were interested in practical knowledge. Ultimately, I think it is swings and roundabouts: every useful mode of knowledge also has its mirror, its double in the idea of pure knowledge, knowledge for knowledge's sake. That tension is still there today. As Foucault says, knowledge is power. Knowledge is *about* power. It's about the positive power to be able to do things. The knowledge that we're producing right now is very good at reproducing conformity and uniformity. We know how to produce things which are the same, which resonates with the Human Genome Project. We know that that's useful and generative, in the sense that it makes some people extremely wealthy and some people increasingly unwealthy. But there are other forms of knowledge, other forms of thinking about the world. Changing the ways that we think will be incredibly useful in a political sense, though certainly not useful in the National Science Foundation's understanding of the word.

Ann-Sophie Lehmann

I want to ask you to reflect on the metaphors, and on the rhetoric you tapped into centering around a “revolution,” a “change,” a new way of interacting, one connected to remediation and performance. At the end, for instance, you gave a number of examples of how we can interact with data differently. There was Hans Rosling, who switches around data on a large screen, demonstrating how the filming of experiments is a very important new way of showing what you usually cannot show in texts. These practices can be very important and exciting, but they hide a lot because they often thrive on visual spectacle. Rosling for instance gets mentioned a lot in data interaction; yet filming your experiment of course involves staging the experiment in a different way. There is also a whole new element of power and money involved, as you said. If I want to do research now, what I want is a data analyst as well as a really cool animation artist. I need money to get that. So in a sense I don't think that image of the old-fashioned individual genius writing in solitude really ought to go away. What are your ideas about how these new ways of representation and performance might actually hide certain forms of knowledge, and how do we keep those visible as well?

Geoffrey Bowker

Two responses. You started off with my talk of revolution; I probably shouldn't have used the word. What I was trying to say is that when people talk about things like the information revolution they tend to tie it to technologies—to say it's all about the computer, for instance. The origin of computers, as JoAnne Yates discusses so beautifully, is the insurance industry in the nineteenth century. The insurance and the railway industries were the two largest industries in the mid—to late-nineteenth century. The former put into place a new form of office organization because they needed to be able to sell insurance to the working class, since they'd already tapped out the middle class. So they reorganized their information processing structures in such a way that they were able to produce cheaper, more precise actuarial tables which allowed them to target their new customer base. Then that form of knowledge organization got transferred into machines such as the Hollerith punch card. That is one of the possible origins of computing. So when I'm talking about change, it's not revolution in the sense of something coming "from outside." I'm trying to recognize the fundamental shift while it's occurring. And it's a slow shift. I argue that it started in the late eighteenth century, and I would say we're still in the middle of it, and we won't know what it really looks like for about another hundred years.

Your second point is: what is hidden in this knowledge? Cory Knobel, a colleague of mine, has this wonderful phrase "ontic occlusion." An ontic occlusion is the idea that every time you shine light on something, you also create shade. There are things which get hidden, which get pushed away. Scientific experiments are staged, in much the same way that Bateson and Mead's ethnographic films were staged.

How do we not lose our perception of the occlusions in our knowledge infrastructure? It's about practices of reading and of awareness. We really need to open up what it means to read, what the nature of reading really is. There is a lot of work going on in this area now, but we are really, fundamentally dealing with new kinds of knowledge products, which means that we need new modes of reading. What we've been very good about doing over the last twenty years is producing new expressive modes. But we've not been very good at producing the new readers. We are left with a sort of Facebook situation where you get an infinite number of posts from all of your friends all of the time. How do you cope with that? How do you deal with it? Everyone is interested in expressing themselves; they're not interested in learning how to read others' expressions. I think it's those new reading practices we have yet to articulate which will enable us to move forward.

John Tresch

I am bit uncertain what you were saying about the data-base and its historical specificity: it seems to be both a return and something quite new. How does the novelty of some aspects of these practices relate to the fact that they all seem to be grounded, as you pointed out, on an ontology of information where the basic unit is the seed, element, or bit? How do we deal with the fact that we're putting these seeds in a vault that no one will reach, or expressing ourselves in a new kind of language of unreachable Platonic solids? The new performative practices you describe seem to grow as a kind of epiphenomenon upon a more fundamental development that's been occurring over centuries, where knowledge appears as this Lego-brick logic—where it's all grounded in an idea of individual bits of abstract information that no matter how they're performed ultimately don't have anything to do with expression or the wider context or the embodied forms in which people actually produce or consume knowledge.

Matthew Battles

It seems to me like many of these expressive forms are interacting with each other and with our ideas of knowledge production in similar ways. Palimpsestically, that notion of performance opening up new avenues to the experience of knowledge is very evocative and I find it very persuasive. In a way, I too find myself in these congeries of collaborations among people with very different practices, very different skill sets, and the very different epistemic virtues that come along with them. And yet I think we continue to expect knowledge to eventuate in the same kinds of ways—that, in a sense, truth, beauty, and the good will appear out of our work. So I'm wondering how we understand the revolution or the transformation, whether it's punctuated and fast, or whether it's very slow and only discovered retrospectively. What's the impetus behind that transformation? Is it one of seduction by new forms, or is there a political dimension to it as well—is there a dimension in which we need to think about who that performer is in the economics of knowledge, while remaining attentive to the fact that their performance is a site that's very much like the book in Benjamin's economy, mediating between two different databases? Does the fundamental politics of knowledge production change as a result of these new forms, or does that change only come with reflection on the forms? And if that's necessary, how do we create readers adequate to the forms?

Glenn Most

This is not an answer to those questions, but a reflection on what you were showing us with regard to the concepts of finitude and infinity. The basic problem of the databases in the cultures that I study has always been the finitude and the expense of the bearers of data. Parchment is extremely expensive. Papyrus is expensive, too. And so we had to make choices—the history of my discipline in the digital age is one of moments of expanding the amount of data, and then moments of cutting back the amount of data dramatically. If there is something really different in the current situation, it's the potential for infinite data storage, where you can photograph everything, have as much data as you want, even have much more than you could ever want. Whether it's really infinite or just extremely large is not pertinent. The point is that in either case, there's one factor which is still finite, and that's the time of our lives. How much time we have is short and it seems much shorter when there's an infinite amount of data coming in on us. So it's not only a question of reading, but also selecting and knowing how to keep things hidden. You need to keep it in order to have enough attention for the things that you really want to know in your short life.

Aihwa Ong

I am very sympathetic to what Geoffrey is trying to do here because I just finished a manuscript on scientific knowledge formation infrastructure in Asian genomics.²³ I like the idea that there are new forms and new units being produced. You recognize that these expressions of power, of knowledge-power are constitutive of what it means to be human. So the question then arises about biopolitics: the biopolitical effects of these kinds of knowledge on particular kinds of subjects. It goes beyond fiddling with your mind and making yourself smarter; it's not merely a matter of reading but of reconceptualization and application, because the new knowledge infrastructures represent a rethinking of relationships among disparate things. The last point I want to make is to track a move from homogeneity to multiplicity and variation. If in fact we are in a whole new terrain, it is because we are moving from a very stabilized ontology to an extremely unstable, dynamic, contested situation of competing information infrastructures.

Filippomaria Pontani

You mentioned the TLG example, which is the only one I am really familiar with, the *Thesaurus Linguae Graecae*. This huge database has given lots of people throughout the world the idea that they can master the Greek language without having the linguistic competence that should lie behind it. So when it comes to the performative aspects of knowledge you were showing at the end of your paper, like dramatization and show, my question is, what is hidden behind that? Doesn't this correspond precisely to the ability to recreate those forms of knowledge which still lie in the hands of very few people, and of people who have the old-fashioned technique of, say, in-depth linguistic expertise, or an old-fashioned education? Aren't we facing a political move towards "giving an illusion" instead of "giving knowledge," in the sense that many people are offered the illusion that they can know "everything," even in domains you are not fully familiar with? I'm sorry to be provocative and conservative, if you want, but I want to put this into the discussion.

Matthew Battles

I think there's an interesting line here from Aihwa's question about the biopolitical to this question of what's hidden and who participates in systems of knowledge production. I'd like to throw out another example, which may be familiar to some of you, the Ancient Lives project headed by a UK-based non-profit called Zooniverse, which does citizen science. Zooniverse began doing citizen science astronomy projects. But Ancient Lives takes the *Oxyrhynchus papyri*, a large trove of papyri found in a town in the Nile Valley, and makes it available. These fragments of papyrus have now been transcribed, translated, and published for more than a century now, in a long series of volumes. But the fragmentary remains of that corpus now have been digitized and put online, so anybody can view these fragments and transcribe them. The interface gives you this wonderful little panel of Greek characters, so you can drop a Greek character from the panel onto a Greek character in the image of the fragment, and transcribe that way. The system compiles those transcriptions and out of that eventuates an allegedly useful transcription. Now, what I wonder is, what is, what is the politics and biopolitics of a system like this? Is this hiding a lot of the knowledge production and creating a kind of simulacrum of participation? Or is there a new avenue of participation here, an opportunity to interact with a body of knowledge that would otherwise be extremely esoteric, locked up in those slip cases and monographs? Or does it have to do with how we interact with the system? Does the biopolitics reside in

the sensitivity that we have to the subject matter and the readers we create who participate in it?

Ann-Sophie Lehmann

There is a lot of what my colleague Mirko Schäfer at Utrecht called “implicit participation” going on. For instance, I’m sure you’re all familiar with a ‘captcha,’ the little number or words that you have to translate in order to download a PDF document or log into some digital environment. You think this would just be a check, but actually these captchas are increasingly being used to feed these kinds of databases in a very pronounced way. You unknowingly participate in knowledge creation, essentially performing translation for Google books; people should know this, you should have a choice here, you need to be educated about that. Same with a simple Google search these days, which, if you search for an important person, somebody who is well-known, an author, you now get a preformatted summary, a recent picture, his most bought books and a video of a lecture at a conference. That saves me time, but does it really? I no longer stumble upon all those things that cost me a lot of time to find but gave me more intellectual advancement. I’m not saying semantic search is bad, because I think it’s wonderful that a lot of algorithmic energy is going into saving us time at finding the amount of information what we need to know quicker. But we just need to know how it works.

John Tresch

I hear a kind of evolutionary expectation at the horizon of your talk. It makes me think of the Bergsonian paleoanthropologist André Leroi-Gourhan, and his claim that *Homo sapiens* is not defined by an expanded brain, but rather by the big toe: once we got our big toe we could stand up and free our hands and develop all the technological apparatuses that then fed back to the brain. That seemed to be part of what you were saying—that knowledge is as much about our toes and hands as it is about our brains. But Filippomaria’s point is crucial to develop that, which is that knowledge as it is presented on screens gives us this illusion that everything is knowable. Maybe not everything, but more than we can possibly digest. But the history of educational theory, if you look at Comenius, is very much about transforming learners, not filling the brain with ideas. It’s about *askesis* or organising *askesis* on a grand scale, and that has continued to be the case. It is a well-defined process that takes a great deal of time.

So, echoing what’s already been said, how do we think not just about ways of

delivering knowledge, but ways of thinking of processes of *bildung* and *askesis*, which is what it takes to learn a language, or to learn a discipline, or to learn really anything? It takes a long time and it changes the body as much as the mind.

Simon Schaffer

Don't forget that John's earlier question was a worry about the fact that the systems which Geoffrey was showing seem, rather strangely, to maintain a very traditional ontology of the bit, the core element, the seed, or the unit. Then there have been questions about epistemic virtues, about certain kinds of etiquette and limitations that seem to come with database technologies, knowledge technologies. In other words, yes, it's fun to play but actually we're getting very worried about *ars longa, vita brevis*—because the *vita* gets a little less *brevis* thanks to the acceleration of the *ars* of the *technae*. Then there's the scholars' worry, certainly since Pericles in Athens, which is that scholars just look really old and slow.

Geoffrey Bowker

I am not going to answer these questions serially; I'm just going to make some observations that range across them.

I'll start, as Simon reminded me, with what I noted down as John's intervention that it's all just another brick in the wall. Yes. There is conservatism there. There is no question about that. There is also novelty. I think it's absolutely beautiful that you can trace out filiations which would have taken you forever to describe in a straight linear form in a book: you can now represent them in forms that enable you to create new kinds of argument.

Now onto the creation of new kinds of arguments. Let's go back to Paul David's wonderful paper about the productivity paradox. When personal computers went into the workplace in the 1960s, productivity went down for about twenty years. And then it started to pick up again after a twenty-year break. Exactly the same happened when electrical generators were put into factories, to replace the ancient old centralized steam generators. What they were trying to do, and what we are trying to do in many ways, is treat the computer like a souped-up typewriter. But it's a very bad typewriter—it takes a long time to think about what the new forms are. We are living in just this kind of transitional time.

You can be twenty-two years old and have grown up in a world with the Web; that could be all that you know. But it wasn't natural to those of us here, who are older than twenty-two. We grew up reading, we grew up with texts. We grew up, in a word,

with one form of knowledge. It's a generational thing. Crudely put, let's wait till we die out and let's see what interesting things happen at the other end of the equation. Next point. Talking about participation and citizen science, Jonathan Zittrain has written beautifully about the distribution of cognitive labor. Take something like Amazon Turk, which is a form of bit-work you can do anywhere in the world with an internet connection. Its slogan is "artificial artificial intelligence." Artificial artificial intelligence was about stuff that computers can't quite do well yet, such as image recognition, image metadata fields, and things like that. We can actually get folks to do that in distributive ways: they become part of the computer system.

The initial citizen science projects such as Galaxy Zoo had a similar distribution of cognitive labor. The public basically got to do scout work for scientists who didn't have time to do it themselves. You get slightly better with something like Foldit, which was about 3-dimensional folding of proteins. That's an interesting one, because playing the game, you did not learn the science at all, but you've got a skill set there where kids can think just as well in 3-dimensional shapes as trained chemists and molecular biologists. So they're actually on a par with the scientists, but they don't get the knowledge. All they get is this specific skill.

I think one of the great possibilities that we have today is the breakdown of the walls of academia, but really that is a programmatic statement about how we ensure that the division of cognitive labour is reasonable. There are vast scads of unemployed PhDs, students with great training who come out with BA's, BSC's, or what have you, who would love to be part of the knowledge creation process, and they have the skills and they have the ability. We don't need things like captcha, which tricks people into doing work, in order to do that. What we do need to do is really think about we spread the knowledge production in process in fair and legitimate ways.

Next point: seduction and the performance. I really like the points you were making, Aihwa. You reminded me of Desrosieres and Thévenot's wonderful work on socioprofessional categories. They show how the socioprofessional categories put into place in Germany, France, and the United Kingdom had a huge performative value. In English it's the white collar worker, in German it's the *Beamte*, and in French it's the *cadre*. Each of those terms initially meant more or less the same thing. But there were slight differences in the definitional forms. Those differences in definitional forms then started to take on institutional weight; they became brick-and-mortar, if you like. They became integral to the way in which we organize workers, the way in which we think about processes of labor, the way in which we plan our economy. So that which was originally a descriptive device became a performative device which changes who and what we are. And this is what Aihwa was describing when she talked about biopolitics. It's precisely that move—it's the performative aspect of the creation of new communities.

I agree with the point about how we're moving from homogeneity to multiplicity, but there have to be real caveats around that. One of the problems of the TLG when it came out, as I understand it, and I'm totally happy to be corrected on this, is that they made definitive choices about the interpretations of some of the texts. You didn't have a concordance or multiple possible readings being presented to you. You had one reading of what was on these old manuscripts and papyri being presented to you. So in the service of making it available, interesting, and useful, there was also a reductive function that goes on at the same time. I think that while looking for heterogenous and multiple forms, we should also look at the continuing move to reduce, to simplify, to make everything the same.

Several of you brought up the political aspect of my talk. I've got a project right now where we've created a council called the Big Data Council, and where we're trying to advise the National Science Foundation in the States about ethical, moral, social and cultural issues in the use of big data. There's one set of easy pickings, which is to look at the quantified self movement, things like *Twenty-Three and Me*, which generate medical information which might be used by other people to your detriment. But I think the deeper question there, and it's a reading question, is a question about the algorithms themselves. I love your phrase "algorithmic energy," but what about the algorithms such as Pareto optimization? What is it about that tool in and of itself which holds value? And how does value which is created by one algorithm in one setting move when you pull the algorithm across and you don't realize what you're hiding and keeping available in the act of porting—you just think, I've got a great new tool here, you know, "I've got a brand new pair of roller skates, you've got a brand new key."

Finally, we have a sense of the plenum of knowledge. "Everything is out there, everything is available." This is not really the case. I go back to the instauration point. There was a beautiful article in the *Onion*, a satirical paper, with the headline "Google Destroys All Information Which It Cannot Store" and they talked about things like "Google Purge" where they go out and burn all the books. That was written sarcastically, but it's got a huge truth value to it. People will not go to books, they will not go to other sources when it's available to them on the web at the push of a fingertip. Fortunately there are enough people in the world scanning academic books that we write that we can get all the works around the table free on PDF. But generically, if it's not on the Web, because the Web seems so full, it doesn't exist, and we don't recognize that which we're not representing, that which we're not talking about.

Ruth Padel

Two words I haven't heard yet are imagination and originality. Different people are different. Looking at your cartoon of the people in the cave looking at the picture of the reindeer instead of looking at the stars: some of those children may think new things, feel new things when they look at the patterns of the reindeer that may then, when they happen to go outside, make them perceive things differently about the stars. You can't quantify that. It's the danger of conformity and the danger of believing that everybody knows the same things. Maybe we are creatures who filter the ways we perceive. I was listening on the radio to a story about three laboratories that were trying to reproduce the same experiment with mice, in which apparently all the data was fine, but none of them could reproduce it. They made sure they did everything the same with the mice—they fed them the same, they picked them up by the same way by their tails or by glove or something like that, they kept them in the same conditions, and they all not only failed to reproduce the original thing, but they also generated different data. The professional on the radio said, well, maybe it's just a mystery. I think there's a possibility that we think we no longer need to bear not knowing, but maybe we need a place for mystery, too.

Murtha Baca

I'll just touch on a couple things that I think we can maybe discuss in the next few days. Two of the big concepts are knowledge classification systems versus big data. Now all we hear about is big data, but in part the knowledge classification systems are a way of trying to get at the big data. I also want to really express my solidarity with Filippomaria, about the old-fashioned ways of learning language. I think this is a big crisis; language is one of my main areas of expertise, so my psychiatrist doesn't allow me to talk about Google Translate, for example. Just to give a couple of quick examples about the importance of language and how you approach big data, especially in the humanities. At the Getty we're working with big data. One set in particular is the Getty Provenance Index, which is millions of records from archival inventories and sales catalogues. But they're in all different languages—so, say, in a 16th or 17th century Italian inventory, landscape is called *paese*, not *paesaggio*. If the computer doesn't know that, it's going to miss all the landscapes because it's looking for the word *paesaggio*. A very simple example. Or they'll use circumlocutions for the names of artists, like, D'Arpino l'Appelle, the Appelles of Arpino. That's Giuseppe Cesari. The computer may not know that, so I love the insistence on having knowledgeable people, not John Q Public, participating in the

knowledge creation process. If you have graduate students who can read Italian or these other languages, it can help you codify the information in these big data sets. Another point concerns the viewpoint of the *Thesaurus Linguae Graecae*. They had to make a decision as to what this or that text means. But some of the work that we're doing now is to use or develop technology to capture multiple viewpoints. So I can say, "I think this was by this painter," and someone else can say, "no, actually I think it's by this other painter," and both can be in the database. And of course translation is an act of interpretation. If I translate something one way, and you translate it another way, the knowledge produced is different. I hope these are some themes that we can come back to.

Gregory Crane

I was struck by two comments. First, thank you for pointing out that the classicists basically replicate traditional actions when they're word searching. We were benefitted by being the first humanists, Latin was there first. But I would question saying, "well now we can analyze everything in the seventeenth century." Can we analyze things in this huge scale or things we can't see? That's really a big deal. So there's this pushback between crowd sourcing, which is what the Ancient Lives project is, and citizen science. Well-trained people can help. When I talk to my colleagues about citizen science, the first reaction is that they're too dumb and incompetent to do anything useful. "Students? They can't do this work." Restructuring intellectual culture to give people voices, that is something that is very hard to do and there is tremendous resistance to that. That, I think, is the threatening thing. That's the big shift from my perspective.

Stéphane Van Damme

I would like you to come back to your collaboration with digital artists. What is their role in this knowledge production process? I am quite convinced that we have to work with digital artists. But I think the most important thing I saw in your presentation that we can come back to is the old poetics of knowledge, where imagination was at the core of the juristic process of knowledge production. So I would like you to come back to this issue about the epistemic community—how do you see artists' role and place in this?

Geoffrey Bowker

I love this point about the cave, and of seeing the world differently through staring precisely at that which is drawing you away from reality—whatever reality is. I'm not going to be able to develop it very well at the moment, but I just wanted to highlight it as something really interesting.

Generically, let's talk about ontology for a bit. Antonia Walford just wrote a superb thesis about databases. She was dealing with tropical data from the canopies in the Amazon rainforest. What she talks about is the recreation of nature inside the computer—she's got marvelous language for describing that. The nature that scientists interact with is not the nature that's "out there"; it's the nature that's in here, in your computer. Understanding databases as organizing devices in this way, with all their performative significance, is really important.

Of course, when we end up with a single view it can be harmful. Let me describe one project I worked on, Geon. This was an attempt to take all the knowledge in all of the disciplines making up the geological sciences (about thirty or forty of them) and put them all into a single interoperable form so we'd be able to push out a query and fine-tune things that, say, geologists can't deal very well easily, such as the precise timing of some of our major extinction crises, apart from the current one. The idea was that if we can pull in all this knowledge from all these different fields, then we'll be able to make progress in that kind of chronological work. The thing they did was to pull together all the scientists involved, and they asked them what their ontology was. This was a fairly stupid question to start with because the scientists had no idea what they meant by ontology. Then the computer scientists who had a Mertonian vision of science absolutely believed that there was only one true, correct, and single scientific ontology, whereas the work of the scientists in many, many sciences is to actually create new ontologies, to change the entities, the people, the world. And so they were looking for a kind of stability. They were fixated on a kind of stability that was theoretically impossible.

These problems actually do bleed into the questions related to different epistemic communities and the role of digital artists. Database design is the computer scientists' responsibility—they need to be an integral part of our epistemic community. If they are not, if they do not share our critical reading or our critical practices, they're going to be producing crap software, which is going to do nothing for us whatsoever. And by the same token, if we don't understand what's going on inside the computer and the database, we're going to be producing crap theory. We need that new kind of structure where we're working together, across disciplines. But, in a sense we always already do that. I keep going back to Gerald Holton's, *The-*

*matic Origins of Scientific Thought.*²⁴ Things do get ported across disciplines. Ideas, thematics, whatever—they all do get pulled across. When computer scientists talk about networks today, they make the same kinds of points that social network analysts have made. There is a shared epistemic community in many ways. We just don't recognize it nor train for it. We don't train our students to recognize filiation between disciplines, nor to recognize filiation between different ways of knowing, because we tell them they are here to learn a speciality, and we tell them that "our speciality is different." Changing that would be marvelous.

One final point. Mike Twidale has the great concept of the altruistic database.²⁵ With the altruistic database you put up dirty data deliberately, and rely on the people who actually use the database to change it. That involves a different way of thinking. The current claim for the encyclopedic effort to classify all tropical flora is that they are going to be finished in the year 2376, if they continue at their current rate. This is somewhat slow. But the botanists are particularly bad because they're associated with the first incunabula—they love books, they love perfect images, they love certainty. They are unwilling to publish partial, possibly incorrect data. So what they end up doing with the culture of perfection, which grew out of a particular printing technology and the expense of printing very, very high quality color images like the canonical scarab beetle by Durer in scientific illustrations. They are absolutely gorgeous illustrations, but you could only make them once in a lifetime. That's what they used to think about as a community—these are once-in-a-lifetime productions. They need to be able to change their practices in order to take advantage of new affordances.

Simon Schaffer

It's interesting for me as a historian of science to think about the roots of the language that's being used to characterize these new data forms. The word computer, for example, is probably worth remembering, because it first refers to humans and, certainly in Anglo-American culture, only stopped referring to humans in the 1910's. So there is a sense in which one is going back rather deliberately to the etymology of the term.

The same is true *a fortiori* of the word "reduction"; it's not a coincidence that my science, astronomy, produced both the computer as a human, and "reduction," as reduction is the one thing astronomers have to do. It's only from the 1820's, and not before, that you can be an astronomer even if you're myopic. Because from then on, you crowdsource all the observation—I'm sorry to say this in Venice, in the city of Galileo's telescope—you crowdsource the observation, and the cleverness lay in working out the algorithm for managing the data.

So we're not inventing the wheel here. But it does seem to me exceptionally interesting that in this very important set of contemporary conversations that one is, from an historical point of view, reengaging with a role that information management traditionally played—but, as Geof absolutely reminds us, was systematically effaced by the cult of the genius. Not that we're all going to be myopic astronomers—but we might be something like that.

NOTES

1. Henri Poincaré, *La Science et l'hypothèse*, Paris: La Bohème, 1992 (1902).
2. <http://www.humanemergence.org/humanMemome.html>
3. Derrida, Jacques, and Eric Prenowitz, "Archive Fever: A Freudian Impression." *Diacritics*, 25 (2) 1995: 9-63.
4. Manovich, Lev. "Database as Symbolic Form." *Convergence*, 5 (2) 1999: 80-99.
5. Roos, A. M. *Web of Nature*. Leiden: Brill, 2011, p. 9.
6. <https://www.youtube.com/watch?v=nJmGrNdJ5Gw> (accessed 3/25/2018). Cf Lima, Manuel. 2014. *The Book of Trees: Visualizing Branches of Knowledge*. Cambridge, MA: Harvard University Press.
7. International Barcode of Life. <http://ibol.org/>.
8. Witzel, E.J. Michael. *The Origins of the World's Mythologies*. Oxford: Oxford University Press, 2012.
9. Anderson, Chris. "The End of Theory" *Wired*, June 23, 2008, 16: 7. http://www.wired.com/science/discoveries/magazine/16-07/pb_theory.
10. Latour, Bruno, Pablo Jensen, Tommaso Venturini, Sébastien Grauwin, and Dominique Boullier. "The Whole is Always Smaller Than Its Parts"—A Digital Test of Gabriel Tarde's Monads." *The British Journal of Sociology*, 63, no. 4 (2012): 590-615.
11. Czizsar, Alex. *The Scientific Journal: Authorship and the Politics of Knowledge in the Nineteenth Century*. Chicago: University of Chicago Press, 2018.
12. Lisa Gitelman, "Raw Data" *Is an Oxymoron*. Cambridge, MA: MIT Press, 2013.
13. in Gitelman, p. 111.
14. De Bolla, Peter. *The Architecture of Concepts: The Historical Formation of Human Rights*. Oxford University Press, 2013.
15. Kurke, Leslie. *Coins, Bodies, Games, and Gold: The Politics of Meaning in Archaic Greece*. Princeton: Princeton University Press, 1999.
16. Harry Collins, "The Seven Sexes: A Study in the Sociology of a Phenomenon or the Replication of Experiment in Physics." *Sociology* 9(2) 1975: 205-224.
17. <http://vectors.usc.edu/projects/index.php?project=82>
18. Doxiadis, Apostolos, and Christos Papadimitriou. *LOGICOMIX: An Epic Search for Truth*. Bloomsbury Publishing USA, 2015.

19. Kurke, Leslie. *Aesopic Conversations: Popular Tradition, Cultural Dialogue, and the Invention of Greek Prose*. Princeton: Princeton University Press, 2010.
20. Rosling, Hans. "Gapminder." GapMinder Foundation. <http://www.gapminder.org> 91 (2009).
21. <https://www.youtube.com/watch?v=U4A1vY2iXWM>
22. AF Bentley; "The Human Skin: Philosophy's Last Line of Defense." In S. Ratner (Ed.), *Inquiry into Inquiries*, Beacon Press, Boston, MA (1954), pp. 195–211.
23. Ong, Aihwa. *Fungible Life: Experiment in the Asian City of Life*. Durham: Duke University Press, 2016.
24. Holton, Gerald James. *Thematic Origins of Scientific Thought: Kepler to Einstein*. Cambridge, MA: Harvard University Press, 1988.
25. Organisciak, Peter, and Michael B. Twidale. "Design Facets of Crowdsourcing." *iConference 2015 Proceedings* (2015), <http://hdl.handle.net/2142/73640>.

Philology as a Social Practice

Glenn Most



Figure 2.1. A pair of figures in celadon, displaying proof-reading in ancient China Second year of the Yongning reign, Western Jin Dynasty. Unearthed from Tomb No. 9 at Jinpenling, Changsha City in 1958. Hunan Provincial Museum Copyright © 2006-2010.

The figure above depicts an ancient scriptural activity rather unorthodoxly. Made of celadon (a type of Chinese stoneware produced with a green glaze), the piece stands only seventeen centimeters high. It is a funerary figurine, unearthed in 1958 from a tomb at Changsha, Hunan Province. The tomb itself dates to the second year of the Yongning reign, during the Western Jin Dynasty—placing the object around year 302 of the Western Christian era. It is currently preserved in the Hunan Provincial Museum in the city of Changsha.

The statuary depicts two clerks collating and checking the accuracy of manuscripts. Today, we think of the collation of texts as a solitary activity, undertaken in silence and performed by the eye; it conjures images of a modern scholar sitting in a library with a printed text and a manuscript in front of him, or a pre-modern scholar with two manuscripts on his desk, looking alternately at the one, and then at the other, blocking out all distractions so that he can focus on the text in front of him—so that he can compare them both, letter for letter, word for word.

This funerary sculpture, in contrast, shows not one person involved, but two—engaged in an intense joint activity that is as much interpersonal as it is intertextual. They kneel or squat facing one another across a small, wooden table on which a pen, an ink stone, and books made of bamboo have been placed. The table separates them—but, at the same time, links them—as a physical object, and as the embodiment of the ancient tradition in which they have their place. The figure on the left holds a book in his right hand and is ready to write something onto it with the pen in his left. The figure on the right holds a pile of books. He stares fixedly at the face of the figure across from him, almost directly at his right ear. The figure is saying something of great importance to the other man, and he wants to be quite certain that his oral communication reaches its goal unimpeded. The man on the left seems to stare out into the empty space beyond the other man so that no sensory inputs will distract him from their urgent communication. Their leaning towards each other is as an expression of the intensity of their collaboration. The two blocks out of which the figures are sculpted are connected by an intimate complementarity in a kind of elegant interscriptural tango. Here, as in any good tango, the partners are asymmetrical. The man on the right is placed a little bit lower, leaning slightly more towards his colleague in a gesture of deference and respect, for their complementary collaboration is articulated unmistakably as a hierarchy. The figure on the right has to do only one job. He must read his text out loud as precisely and clearly as possible. The figure on the left, conversely, has a number of jobs: he must listen to his colleague, compare what he hears to what he sees on the page, and if necessary, he must intervene into the text to correct and amend it.

These two clerks are engaged in correcting manuscripts, but they are doing so in a collaborative oral and aural way. We might have expected the sculptor to show the

men actually looking at the manuscripts, but instead he chose to depict one man looking at the other, the other man looking into space. A moment's reflection is enough to explain his choice. If he had depicted both clerks looking down at their respective manuscripts, he would have limited interpretation of the statue to that of two independent scholars, each one reading his own manuscript next to but not in collaboration with, the other. Alternately, he could have shown one man looking down at a manuscript while the other looked on, but this would have conveyed a one-way act of dictation in which one man spoke to the other, who was simply copying down what he heard. Instead, the sculptor has shown us both men engaged primarily with one another, and only secondarily with the texts that are their true *raison d'être*. What is more, he has focused all of our attention on the left scholar's right ear, into which his colleague pours his words, and towards which both he and we direct our attention. At the outset of their collaboration stand various written exemplars of the same text that differ in various points. At the end, these written exemplars still stand, although corrected and homogenized. The collaboration itself is not visual, but oral—not written, but spoken. A scriptural tradition involving canonical texts (for what other kinds of texts would these clerks be paid to control?) is depicted here as an act of oral transmission and constant, reciprocal inspection. It almost seems as if the man on the right expresses not only deference to his superior, but also a certain degree of anxiety—as though the only guarantee for the accuracy and transparency of the textual transmission, of all the values and institutions that depended upon its success, is their unremitting attention to their ancient, tedious, and indispensable labor. After all, the man on the right is younger. Perhaps—and only if he does his job very well—he might someday become a corrector. So, not only is the world, the nation, and the future of mankind at stake, but so is his own career.

In fact, the practice of collation was oral and aural for many centuries, and not only in Confucian China, but also in the West. Evidently, the vision of collation I began with as a straw man rests on very limited experience. It reflects practices that came into being in the modern scholarly library, with its rules enforcing silence and scholarly separation. Unfortunately, it gives a false sense of the way textual work has been carried out in the past in many cultural traditions, including the Greco-Roman one.

The similarities between manuscript collation practices in various cultures, widely separated from one another in space and time, is the result of a widespread tension between two central themes: the nature of copying manuscripts by hand, and the privilege given by some traditions to certain canonical texts. To understand why this is so important, we must consider some basic facts about a process that, for millennia, has been central to human culture: the transmission of written texts. Because it lasts in time beyond the moment of expression in a physical form independent of its

speakers' and listeners' memories, a written record has an advantage over an oral utterance. Although an oral utterance can be repeated and propagated, it changes constantly as it spreads. Writing, too, has its limitations: it is restricted to a single spatial location, and must be entrusted to an ultimately perishable medium to preserve it.

Before the age of photographs, photocopies, and scanners, which copy texts by purely mechanical processes, simply on the basis of the contrast between lighter areas and darker ones, the only way to produce new copies was to transcribe them by hand from old ones, element for element, most often semantic unit for semantic unit. If greater transmission accuracy was required, the process could be done visually, by a scribe copying the text he saw before his eyes onto a new medium. A disadvantage of this method was that it could only produce a small number of copies simultaneously. If a large number of copies was desired, an acoustic procedure could be employed, whereby the exemplar was read out before a group of scribes who listened and copied it down, each onto his own medium. However, due to homonyms, distraction, noise, and other forms of interference, this method led to greater inaccuracies in the copies. Given that the procedure was performed neither by machines nor by gods, but by humans, and that humans err, transmission always entailed error, and multiplication of copies usually entailed proliferation of errors.

Having one source greatly simplified the copier's task. He could attempt to transcribe as faithfully as he or his advisors wished, intervening into the text as he saw fit, so as to correct obvious errors or to improve the text. But what was he to do when he had two source texts available? Given the proliferation of errors, these were bound to differ from one another, at least occasionally, if they were of any considerable length. On what basis was he to choose one reading to put into the target text? However rarely such a situation occurred—and presumably it did not occur frequently except in large scriptoria, monasteries, and libraries for many centuries—it happened regularly enough that a set of criteria for choice developed. Whichever reading seemed grammatically, semantically, or logically superior could be selected, case by case, or both readings could be incorporated into the target text without an expression of greater authorization for one of them. The next step, methodologically, was to give general preference to a single source text whenever possible. This simplified the copyist's task. At this point, however, the question arises: how would the copyist choose the preferable source out of the many available? Over the centuries, various contradictory criteria were developed, each with a unique justification: the oldest manuscript; the most legible manuscript; the one that appeared to have the most good readings; the one that had the fewest corrections; the one that had the most corrections; the one that derived from an authoritative provenance; the one that was closest to hand, and so forth.

The other fact is that those cultural traditions that have assigned a great impor-

tance to a small body of canonical texts—religious, philosophical, literary, legal, and observational, among others—have historically faced a perplexing set of problems. The central role that these texts have played in all institutions necessitated that these texts be reproduced over and over again, not only because any bearer of the text was liable to damage them over time, but also because empires expanded, institutions proliferated, and users multiplied. But until the nineteenth century, the only way to reproduce texts was by copying them by hand. Even printing didn't change the dominance of hand-copying. And copying by hand, however carefully and conscientiously it was done, inevitably introduced new readings into the new exemplar, which became exponentially more numerous with every further act of copying. So the cultures involved—Mesopotamian, Egyptian, Hebrew, Greek, Latin, Arabic, Vedic, Chinese, Tibetan, Japanese, and some others—had to confront a fundamental and potentially unsettling paradox. The texts that were seminal for their most important activities were available to them only in copies that diverged from one another, and the older the originals were, and the more often they had been copied, the more likely discrepancies were to appear.

The history of this dilemma and of the methodology of attempts to deal with it have been studied for centuries in the Greco-Roman tradition. To a lesser extent—and, by and large, more recently—this phenomenon has been studied in some other cultures as well. Surprisingly, however, very little attention has been paid to investigating its history comparatively among different cultures. Comparison reveals that almost all cultures of which we have records have developed some of the same techniques and institutions for ameliorating this difficulty, or for dealing with its potentially dangerous consequences. Invariably, these cultures established royal libraries and created standards for generating official copies of important texts. So too did they establish scribal schools with rigorous professional procedures for training and testing scribes. The restriction of literacy to a small caste of highly-trained professionals and their masters, entrusted with access to the canonical texts, was one method of limiting textual variants in Mesopotamia, Egypt, and elsewhere. The myriad of astonishing errors that festoon Greek and Roman papyri, graffiti, curse tablets, amulets, magical texts, and other forms of popular culture is evidence of what happened when a more widespread, and less highly professionalized, portion of the populace achieved literacy. So, it follows that philological techniques for dealing with textual variance are widespread. Astonishingly, methods of copying manuscripts (orally and visually, one-by-one or in groups), practices of collating manuscripts (usually orally and in pairs), and modes of emendation of manuscripts (erasure, interlinear correction, and marginal annotation) have tended to be invariant throughout the world and over centuries, at least until recently.

And yet cultures do differ from one another in their attitude and approach to

the problems posed by manuscript variants. The Vedic tradition puts a unique premium upon the ability to fully memorize extraordinarily extensive classical texts in Sanskrit, thereby, in effect, reducing the likelihood of textual variation arising and proliferating as a result of hand-copying written exemplars. By contrast, the Chinese purportedly display a high degree of *sang-froid* about the differences between copies of classical texts, which they are said to regard, not as errors or as variants, but as versions. Yet, archaeological and anecdotal evidence suggests that collation of manuscripts did indeed take place in China, and so I believe textural variance must have caused more misgivings than my Chinese informants conjecture.

In any case, the ancient Greeks seem to have felt the greatest anxiety about divergent copies of texts, and so developed methods for dealing with these earliest and most systematically. Over and over again, throughout antiquity, Greek political leaders amassed extensive collections of important texts. Perhaps already in the late sixth century, the Athenian tyrant Peisistratus collected the epics of Homer; certainly in the later fourth century, Lycurgus collected the texts of the three great Athenian tragedians; and certainly, too, starting in the early third century, Ptolemaic Hellenistic Alexandria collected all the preceding works of Greek literature considered valuable.

Ptolemaic institutions like the library and the museum (the temple of the Muses), and their constituents (i.e., the library catalogue, the head librarian, the critical edition, the commentary, and the monograph) went on to become models for late Greek culture and ancient Rome, and even for post-classical Europe through the mediation of Latin. Within this millennial Western tradition, there seems to have been little decisive change in methods and techniques until the nineteenth century. Even printing, which has attracted so much attention, did not transform the activity of philologists as profoundly as some have supposed. Only in the 19th century was the situation in Europe altered decisively by a series of innovations; namely, the ease of travel and communications, the pacification and reclamation of parts of Italy and the eastern Mediterranean, the expansion of the scholarly community, the reorganization of the university and scientific research, and the establishment of the “big science” model for the organization of large-scale industrialized research into antiquity. One register of this transformation was the invention of the historical critical edition, which has been an identifying marker for Western textual philology since the later part of the 19th century. Today, historical critical editions of non-Western texts are done either by Western scholars themselves, sometimes not uncontroversially—witness the current Berlin edition of the *Qur’an*—or by non-Western scholars who are consciously imitating Western techniques and in many cases were themselves trained in Western institutions. Another register is Lachmann’s Method, a mechanical procedure for determining the affiliation of

manuscripts in a closed, systematic tradition, developed in the nineteenth century.

The Alexandrian philologists created the model of traditional, pre-critical editions that dominated Western culture until the end of the eighteenth century. To edit an author, you took one manuscript and used that as a guide. Whenever anything struck you as odd or mistaken, you changed it, either by comparing it with other manuscripts that you had access to (*ope codicum*), or on the basis of your own erudition, intelligence, and native wit (*ope ingenii*). Where the manuscript readings did not bother you, you left them as they were. Essentially, it was the methodology of, as they say in America, “if it ain’t broke, don’t fix it.” This pre-critical editorial method may sound good, but it never was. The problem was not only that it inevitably produced many false positives—that is, passages where some editor thought the transmitted text was mistaken and emended it when it was perfectly all right—but also that this method inevitably produced many more false negatives: passages where no one was bothered, but the text was unsound. Why should we suppose that manuscripts produce nonsense whenever they are mistaken, and are correct whenever they agree in a plausible reading? As A.E. Housman wrote, such an outcome could only be produced not by chance, but by divine intervention. And when we look at the state of our world, we can suggest without impiety that divine intervention could have been better employed elsewhere.

Nonetheless, the Alexandrian method was exclusively used to edit texts throughout antiquity and the Middle Ages. The first attempt to provide a thoroughly mechanical and systematic procedure for rationalizing and standardizing the choice between manuscripts, and hence between readings, wasn’t developed until the nineteenth century. Since the beginning of the twentieth century, it has been known as Lachmann’s Method because of its association with Karl Lachmann, a German classicist who produced celebrated editions of texts in Latin, Greek, and Medieval and modern German. Lachmann’s method is genealogical and mechanical in nature, and it aims at providing a standardized, rational procedure for editing texts on the basis of multiple manuscripts, without requiring that the editor use personal judgment in order to choose among various readings. To do so, the Lachmann Method helps to determine the filiation of manuscripts, that is, to ascertain which ones have been copied from which other ones. Its logic is as follows: given that every act of transcription is likely to introduce new errors, a manuscript B, if it has been copied mechanically from a manuscript A, will have all the errors that A had. If it does not have all of them, then it has probably corrected some of them in the transcription, and hence is likely not to have been copied mechanically after all. And it is also likely to have at least one new error of its own. If this can be shown to be the case, then B can be discarded for the purposes of the constitution of the text it shares with A, since B, compared with A, brings no new information that is not

erroneous. Lachmann's method is mechanical both in the sense that it must presuppose the unthinking transcription of manuscripts if it is to be applied to them, and in the sense that the determination of relations of filiation is achieved on the basis of simple rules and calculations of probability. Ideally, the selection of manuscripts and readings based upon this method will be rational, and will depend not upon the tastes of the individual scholar, but upon objective evidence that can be mathematized and evaluated. Hence, it is possible to standardize these selections; on principle, any scholar, young or old, inexperienced or expert, should come up with exactly the same results if he or she is given the same information. We may interpret Lachmann's method as a defensive reaction to the proliferation of possible source texts, intended to reduce them to a more manageable number. Indeed, it is an important element in the professionalization of classics during the nineteenth century, since it established rules that all who wish to be recognized as full members of the discipline could be expected to follow so as to produce uniform, and hence generally acceptable, results. It also bears a striking resemblance in methodology to other attempts in the very same period to reduce the complexity of sources of error by developing mechanical procedures.

Everything above is a history of the humanities. And yet, it's not the kind of history that you will find in humanities departments because there are not departments of humanities, there are departments of classics, of English, and so forth. Each of them tells its own history, in its own way. My hope is that this kind of history of the humanities will be recognized as a part of the history of science. There is a tendency in some languages to have a very restrictive notion of what science is, but this kind of focus upon methodologies and procedures seems to me to be perfectly easily imaginable within the history of science. So what kind of history of science do we want to do? It must be comparative, but how? Well, until fairly recently, common opinion was that Western science was the universally ideal science. It was thought that one should measure everything else in terms of Western science, and anything outside of it was viewed as a defective precursor. My own vision of comparative history of science is much more modest, and much less problematic.



Figure 2.2. Silk Painting

The figure above is a well-known painting that hangs in the Museum of Fine Arts in Boston. It's traditionally attributed to Yan Liben in the 7th century, but it probably dates back to the 11th century. It shows Northern Qi scholars collating classic texts. It shows four scholars on the right, who are surrounded by their assistants, some male and some female. The scholars all have beards and are all sitting down. Some of them are looking at texts. Their assistants, of course, are all standing. The scholars look at each other. They look at their books. They're surrounded by food. Two of the scholars, the ones in the foreground, seem to be arguing with one another and are about to come to blows. Two scholars have just arrived on horseback. It's a scene of people coming together and working together. I like to think of us in this scholarly moment as being on those horses. We do not, some of us, share a common language with them, but we do share a set of procedures and scholarly practices. If we had interpreters, I think we would understand one another very well.

DEBATE

Filippomaria Pontani

Thank you, Glenn, for this fascinating overview of different methodologies in philology. I think this chimes in pretty well with what Geoffrey was saying.

Geoffrey Bowker

There was a comment that you made about the *sang-froid* of the Chinese copyists who say, "It's all about different versions, it's not all about a single central text." That ties in very closely with lots of stuff in the digital world right now, where we're talking about fixed versus fluid texts and how the digital document is always changing; it's all about the versions, it's not about the original. I was wondering if you'd tell us a little bit more about the Chinese tradition: how do you see it resonating with this move across some of the scholarly world right now of saying that a text is something that always changes, always develops over time.

Glenn Most

I'm learning Chinese, though at my age, something like that doesn't come very

quickly, so at this point I'm still dependent on what people tell me. And what I report is what a number of Chinese scholars have told me, which is that they know about manuscript variance, but they don't regard it as a problem. I find that odd, but that's what they say. The statue that I showed at the beginning and the painting that I showed at the end are evidence that there was collation, and you don't go to the trouble of collating if you don't think there's a point to it. On the other hand, it seems to be a feature of Chinese culture—and forgive me, Dagmar, for being so crude and simplified, and probably wrong about it—that there's a sense of authenticity that is not necessarily attached to the continuing material embodiment of the object. That is to say that a shrine can be rebuilt over and over again, and it's still the same shrine, even if the material has changed. I want to understand more about that, and I hope that I will live long enough to learn enough Chinese to do so on my own. How that relates to the very interesting question you raised about the current situation with digitization and the Internet, where there are all kinds of textual variants and people put into question the very notion of the “correct version,” seems to me an extremely important question, which I look forward to understanding better in the coming years.

Simon Schaffer

I just want to understand a little more about what the relationship is between difference and error. Of the Chinese tradition I know absolutely nothing; in fact, less than that, because all I have are prejudices. Of the Western tradition I know maybe a little more, and one might want to say two things about this: one is that there are knowledge enterprises in Western Europe which are in love with difference, and they are the experimental sciences above all.

When an experimenter, at least since the 1650's, executes an experiment and she follows a recipe written down by someone else, if the result differs from the original, it might be because the recipe has not been followed properly, which would mean the experimenter had failed. Because of the assumption that the original is the truth, it might be because the original is the error—which would be seen as progress, a discovery. In my field that's called the experimenter's regress. Because there is no way *a priori* of telling which of those two situations applies. There is, in fact, only one way of controlling variants under those circumstances, which is what scientists call calibration, in which both the original and the replicator have already agreed on what counts as a reasonably good working set of equipment. My thermometer is calibrated, my balance is calibrated. And what does that do? What that does is to control interpretative freedom massively. So that's a particular Western

tradition which is in love with difference, a tradition in which you only get a job if you produce difference.

Now, in the digital world, we have an enormous problem in the natural sciences, which is that it's fantastically difficult to publish confirmations. And that's (in terms of health and medicine, for example) a disaster. Ebola's fate relies on that problem, as confirmations of other people's results are not going to be published because such results are insufficiently well-rewarded. So that's one tradition. And then there is the second tradition, which you absolutely brilliantly pointed to, in comparison with Lachmann, which worked exactly the other way around. In which it is assumed *a priori* that one is after agreement, and one is massively rewarded for agreement. One wants to avoid difference at all costs. And in my field, the name of that approach is Gauss.

So within a kind of history of science, comparative both within the Western tradition and out with it, there is this extraordinary angst about whether one is best rewarded for finding difference that is not error, and error that is not difference. There is certainly more to say about the tension between a certain humanist attitude to difference which one wants to efface as far as possible in order to preserve a sacred original, and a certain experimental attitude to difference which one wants to cultivate as far as possible, which is again done for sacred reasons. The people who invented experimental philosophy were obsessed by difference because they believed in a God who produces difference. On the other hand, the humanists who cultivated similitude were obsessed by similitude because they believe in a God who set everything exactly once. That tension is, it seems to me, irreconcilable. Ultimately it's part of the problematic of the history of science, but it's also part of the problematic of the library, because the library is an institution that tries to manage similarity and difference in the most extraordinary way. How is that tension going to be explored?

Filippomaria Pontani

To pick up on this point one of the interesting aspects of Glenn's talk is how it traces this problematic to Alexandria. The Library of Alexandria has been often invoked in the past few years as the ancestor of intertextuality, and then as an ancestor of the Internet. Its ambition of comprehensiveness is certainly comparable to what we have in the digital world, but what I regard as a lasting heritage of Alexandrian scholarship is what they wanted to make of this comprehensiveness and the methodology they used to approach it. The path that most Alexandrian philologists followed is a pattern of similarity, as we were saying: how to get to a fixed text and

to fixed rules. There too, for example, lies the very origin of *grammar* as a tool for linguistic calibration. I think we are in much the same situation today—we are faced with the wide world of knowledge, which we are not able to comprehend on our shelves any longer because it's too big. And we (or some of us, at least) are looking for a criterion to find a way through this *rudis indigestaque moles*.¹ And so I see some epistemological similarities, from this point of view, between now and then.

Glenn Most

Filippomaria will remember as well as I do an episode a couple years ago that took place in Berlin at the Max Planck Institute, where Anthony Grafton and I had organized a workshop on comparing philological procedures in different countries and traditions. One of the great moments in our discussions was when an American professor of Latin was explaining some peculiar and fascinating episode in the transmission of Suetonius in the Middle Ages. He was talking about how certain errors had come about, and how somebody had managed to correct them. One of the members of the group was a Chinese scholar, who said, "I thought this a wonderful paper but I don't understand... Why are you calling these errors? They are differences, are they not?" Suddenly we all realized that this was why we were all together in the same room. I think that the ultimate answer to Simon's question about the difference between the book of nature and the book of books: on the one hand, a scientific enterprise that is directed towards experiments—experiments that have to produce difference—and on the other hand, canonical texts, in which difference is worrisome to different degrees. I don't want to end up saying that there are two cultures, but there are differences between the kinds of practices in some natural sciences and in some humanities, and also lots and lots of similarities.

Simon Schaffer

It's about training—and that's what we were talking about this morning. We were worried about the acquisition of expertise. What is so striking for an historian of experimental science is that experimenters in the Western tradition are trained well if they produce the same, but they will produce the different in their eventual job. I wonder if that chiasmus applies in the case of philology. Is it that one is trained to produce difference, one's own edition, and then when one is a professional, one's quality is recognized because one creates or contributes to the "same"?

Glenn Most

I do, but I think that humanists are trained to seek similarity and to produce similarity much more than difference. Think of the role of memorization, or the role of getting the translation exactly right. The professor checks for differences; the student is supposed to produce similarity.

Dagmar Schäfer

Thank you very much for this wonderful foray into lots of issues related obviously to China. First I have a question and then some remarks. Did you say that critical editions of texts come out of the European tradition and is only reiterated by other traditions?

Glenn Most

The historical critical edition, *Historisch-kritische Ausgabe*, is a specifically Western innovation. And that's a special form of critical edition.

Dagmar Schäfer

I would like to have a definition of that; I probably have a different opinion. But in any case I find it very fascinating how you can look at a library as something that we all want to be in agreement about, but probably are not. So related to Simon's remarks about what do you actually look for when you do philology, I would say that within the 2,500 or so years that the Chinese have been doing something like philology, the approach is slightly different from that of those in the West because the idea of what actually constitutes a library, or what texts actually can do, may be totally different. Let's go back to the first image that you looked at, which was so nicely interpreted. There are various interpretations of it, and I basically agree with yours. But it could also be related to a perspective that sees the value of a text as something that varies. I think it really relates to our problem in digital humanities—namely, what are texts? They are not necessarily “wisdom” or “knowledge”; they may just be empirical data. But it's when you talk about texts that you gain knowledge: the knowledge is not in the books, the knowledge is in the conversation of the people talking about them—I really want to emphasize that.

The other thing is that within this question about which texts came before oth-

ers is the question of what, then, the library is. People were convinced at the time of the Alexandrian library that the world was all about change and dynamics. Nothing ever remains as it is, including texts, so the only thing you can actually do is find the pillars of the stability within that flux. So what the library does, and what the scribe does, is find these pillars and adjust them to the world's dynamics so that you still can maintain the stability of some kind of system. It is not about gathering data in the Alexandrian library; it's about very careful selection. You would not find every book in that library or any other library in the world—you would find a fine selection of texts. And the other point Simon has raised already: what do you really do, then, with texts? Do you find similarity or do you find differences? To take a Chinese example, the *Tao* cannot be transmitted, but only approximated—you cannot find the “truth,” in texts in this sense.

Glenn Most

As far as the *Historisch-kritische Ausgabe* goes, that is a specific form of the critical edition which developed in Germany over the course of the nineteenth century, and which claimed to give the authentic form of a historical document by giving its earliest form. So for example, the alternative to the historical critical edition would be, for Goethe, the *Ausgabe letzter Hand*, the one which shows what he at the end of his life thought was the right version. That's just terminological. I wasn't in the least suggesting that there's no kind of critical edition outside of the Greek tradition.

Dagmar Schäfer

Right. I asked about this because you certainly could say that any Chinese commentary on any classical canonical text is a critical edition, because that's what they try to do—they trace it back and list all the differences that appear. And that goes to another serious question: What is the use of an author? The author is only important to us according to variable ideas of value, creativity, originality, or whatever. For most of the history of China, the author hasn't been important. You can see that in the fact that in book catalogues you usually find the title first, and then you might find the author. And even then it's more or less an organizing principle. When you know about the author, you know where the text comes from, but you make no judgment about the value of the origin, the original, or the copy. The copy can in fact be much better than the original.

Filippomaria Pontani

Some of laughed just now because there is this sinister coincidence between how you said “there is no need for an author” and the “death of the author,” which is a very problematic issue all philologists in the Western world have had to come to grips with, and which has created all sorts of problems in the new definition of philology over the last thirty years. Even in the West there is this problem, and it partially overlaps with what you’re saying.

Gregory Crane

Does the memorization of Vedic texts improve accuracy because of the complex form of the Vedic scriptures? Normally when you memorize a text you don’t remember it precisely; cognitively, that’s the way it works. So why does it improve?

Glenn Most

I think that the point that I wanted to make was that requiring the Brahmins to memorize enormous amounts of textual material exactly meant that, as a consequence, there would be simply less textual deviation in any texts that were produced in writing.

Gregory Crane

But normally when you memorize, you don’t memorize perfectly—you will substitute semantically equivalent words in the memory. No?

Filippomaria Pontani

That’s the same objection I was raising in Berlin to the specialists of Indian literature. I’m familiar with oral theory as you are, but they say the opposite—that memorization is more exact than transcription—and Glenn perhaps is saying the opposite.

Dagmar Schäfer

I’d say it is a modern bias. You are trained to believe that the text is superior, so

that's why you believe so. But if you believe that wisdom lies in the ability to decipher, interpret, and reorganize data, then the wisdom cannot be in the text. It's in the conversation.

Gregory Crane

I'm not particularly stressed about the small things. I am more of the *sang-froid* school, I think. But when Albert Lord went to Yugoslavia and asked people to repeat things word for word, they would say they were doing just that—but it wasn't word for word, though even when it was recorded, they thought it was. But I don't want to belabor that. I just think the really interesting question is what constitutes an accurate text? I remember when I was starting out with digital transcription I was terrified of having any errors. But do you know how one does modern, digital transcription of the best quality? You have two different people transcribing independently then collate their versions and check where they differ. You can guarantee 99.995% accuracy if you have three versions. Usually with two versions, the only errors we have are typographic if it's a clearly printed text (though manuscripts are different). So what constitutes accuracy? I remember being horrified of the notion we would work with OCR-generated text, errors and all. I remember saying, "No, you have to do it all perfectly." But that doesn't scale. JSTOR, for example, which I think is the best of all academic channels, is based on scalable technology. In Greek and Latin, we have problems of knowing what the source is. The same is true today with a public edition—you don't know what the source is, and people may have hidden or changed the source. Once you know they took something that is copyrighted and will have changed things, you don't know what they changed. The standard now is that you have both a transcription and a page image available, which helps to identify errors. But the question remains: what are our different conceptions of accuracy? Certainly my conception of it has evolved over time. We have different views of what constitutes accuracy even at this table.

Ruth Padel

Yes, I wanted to talk about *traditio*, because Glenn has that extraordinarily beautiful image of the handing down of tradition. What sorts of relationships are in that handing down? There are two people, but then there is a third thing, which is the text. Then there is a silent other thing, which is the consumer, the onlooker, the audience—which is also the universe of the library. Because of what's being handed on in these texts, the custodian can open the cabinet and give the text to

a student, and the student becomes a sort of consumer of the world of the library. I was also thinking about transmission, and what else is being transmitted in this handing down. What else is transmitted? Disease is transmitted as well as text and other things. There are all sorts of invisible things that are being given to us, the onlookers and students. It's an extraordinary image, coming from the East, which is also incredibly evocative for us in the West.

Matthew Battles

I think there's a wonderful line that is being traced here, and I'd like to follow it back to the material, mechanical, and architectural constitution of a library. What exactly is the nature of the thing being transmitted in an image like this? Think of Dagmar's evocative formulation: is a text wisdom, knowledge, or is it empirical data?

I'm continually fascinated by the ways in which my digital humanities colleagues talk about the contents of their notebooks, the contents of libraries, and the meta-data that are created by many of these things conceived as data now. I think they are bringing interesting things to the surface about the ways in which this term, data, is being mobilized. This brings me back to Simon's discussion of the practice of experimentation versus philological practices, the differential between the production of similitude and the production of difference, and what role the library plays in all of this. Particularly given that the nature of the stuff that was knowledge or wisdom and that has become data is actually changing all the time, phenomenologically. You open a file, it changes. You share that file with somebody else, it changes. While some of that seems paratextual or epiphenomenal, some find that fragments of the truth are found in the material.

Following this trail back, I'm wondering how we begin to sort out how people are talking about this stuff that is now called data and where the error, the difference, the similarity, and the invention emerges. Is there something that's held consistent in that millennia-long trail, or is something new eventuating now? I wonder about that question particularly in the context of the library, which seems in some ways like a kind of air pump for the stuff that's passing between those two fellows in the Chinese sculpture, or is being produced by them. The question of how we calibrate these machines, these bibliotechnica, has changed throughout time.

Glenn Most

Let me try to pull together some strands from these questions. What is accuracy? Accuracy depends upon the purposes to which you are subordinating what you are

doing. For certain purposes a higher degree of accuracy is necessary than for others. For many purposes one can be very inaccurate and it just doesn't matter. What is involved there is, once again, the finitude of time. Because to be more accurate you have to spend more time, that means it can be expensive to be very accurate. In certain cases that's all that matters. I think that with holy scriptures, as well as with canonical, legal, scientific, and literary texts, people can feel that it is worth that investment of time to get that degree of accuracy.

This gets me to Ruth's question: what is being transmitted here? You're absolutely right—aside from whatever diseases are being transmitted, it's not just knowledge in the texts, it is also a kind of ethos. It's a kind of collegiality, self-discipline, knowing your place, following rules, being precise. It is an extremely complex ethical *habitus*. And there is something absolutely didactic in this situation, even though it's not a schoolchild but an older and younger colleague, one slightly superior to the other. It's enough of a difference that the hierarchization transmits a whole set of values, which I didn't talk about, but which I should have. As our generation fades away, there will fade away the people who knew of a world before the Internet, a generation who knew the world before the computer (or at least the personal computer). My children can't imagine a world without that, and I'm very curious to see what they will produce.

Geoffrey Bowker

A couple of points. First, I wanted to get back to Simon's intervention and the temporality it suggests. On one hand, the word of God is said only once, so what we want is similarity. On the other, he says that experimental science is about difference. But in fact experimental science just puts similarity at the other end of the question. God has not yet spoken. So once we've achieved the word of God, we are fine—ideally, we will just be replicating experiments to the same result in the future. That's one point. The second point is that I was just reading a collection of Chinese short stories from the seventh or eighth century, and my understanding of the tradition—and many of you might know this better than I do—is that in an anthology, the ordering of the stories was seen as a philosophical argument. So you could have two collections with two different orderings of the stories, and your interpretation of the spiritual message of the text would be totally different. The actual work of the editor in ordering is an integral part of the work itself. By the same token, with the traditional Chinese short story, the marginalia are also part of the story. It's the commentaries which actually make the story come to life, much as the Talmud makes the Bible come to life. So the question is, where do you put the

work? Is the work actually in the *Ding an sich* or is it in the *Ding an sich* together with its ordering, its collocation, and its explication?

Glenn Most

Dagmar, please correct me if I'm mistaken about this, but until very, very recently, there was no manuscript of the Shi Jing, the book of odes, which had just the poems; they all had the commentary. They all also followed the same order. It's a completely different situation from Greece, let's say, where you have manuscripts with the text and you have manuscripts with commentary. You can have manuscripts with both of them, but the transmission of Chinese poems was already, from as far as our documentation can go, shaped by the choice, sequence, and commentaries of the poems, which determined what they were supposed to mean. That's something which is not restricted to the Shi Jing, but also to mathematical texts: they are transmitted together with the commentary that explains what they mean. And perhaps this was the case in other fields as well.

Ann-Sophie Lehmann

Geoffrey mentioned, and Matthew too, more contemporary practices of how texts are exchanged and performed quickly on the internet, as well asking how we can research them ethnographically. But underlying this textured matrix is a very fixed language, that of code, which cannot change at all. Think of a link, which we rely on so naturally; if that changes, all it led to is gone, it's somewhere else. So there is a very fixed international language that we don't often talk about because we (or at least I) do not know a lot about it. Would we not need, pretty soon, a philology of code in order to understand how code changes, how annotations are made on digital documents, and how that is done in completely different areas than we usually have access to?

Matthew Battles

I just want to throw out as an example that the 8-bit word in computer science itself is to a large extent an artifact of telegraphy and of the encoding of the alphanumeric character set ASCII. ASCII is a product of telegraphy. To create that character set of one hundred twenty-eight characters, the creator and international group of technicians and scholars who created that standard determined mathematically that they needed a seven-character word with one more character for

error correction. It's always a zero or a one, and the machine can add up the number of zeroes and ones in the line and know whether that line should be even or odd. If it's even and it's supposed to be odd, it rejects that line. This was a thing that could be done mechanically by telegraphy machines. So there is a kind of philological opportunity there that's written into the technological genealogy of the constitution of digital text, buried many layers below other kinds of electronic textuality.

Filippomaria Pontani

Are they accessible to us at this point? Are these layers accessible to us all (not just to specialists and technicians, I mean)?

Gregory Crane

Don't get me started on the 8-bit character...

Matthew Battles

To be sure, I'm not saying that it's the be-all, end-all. It's very provisional, but at the same time, the 8-bit is the dominant form.

John Tresch

I'd like to raise three points. Glenn said that he hopes this kind of questioning can be part of the history of science, and from my point of view, it absolutely is. Making too much out of the difference between textual practices and practices of observation, proof, and experiment is risky, as there is a very deep continuity in terms of the infrastructure of observation, and of textual interpretation, even past the divide of 1650. The ways in which people have to strain for fidelity is central to the experimental project, such that observations themselves have to have these kinds of checking and double-checking of similarities in order to arrive at the crucial moment of difference. And many of those methods of maintaining the fidelity of notations come precisely from the hermeneutic and scriptural traditions that you are reconstructing. So, again, following what you said, these aren't histories of disciplines, they're histories of practices. And therefore we can follow the practices as they cross this often exaggerated divide between humanities and natural sciences. The practices concerned with maintaining the fidelity of statements and texts really

do travel. So I welcome Glenn's approach to philology as a contribution to the history of experimental science as much as the sciences in general.

On a second point, thinking about how difference and similarity play out in art history is also worth putting on the table. The idea that in the humanistic disciplines what we do is work to preserve and maintain the great text that was once spoken, and to keep restating it through our commentary— that's true up to a point. But then again when you look at what we do as humanists, we do work to preserve a tradition, but everyone also has to add their new grain of sand to the heap. Our productivity is measured by the "difference" we produce within the tradition of commentary. So we might think about modern art from the 18th and 19th century modelled its expectations of novelty on what was going on in the sciences: so that that people from the romantics onward were saying that artists have to be experimental and novel in the way that the natural sciences have demonstrated. And this is also true in criticism: the art historian has to criticize the object, speak about the object, set a value on the object, and preserve the object, and yet also is rewarded for saying something *avant-garde* and brand new that no one has said before. It's preservation plus production.

My third point is totally speculative because my understanding of China is based on copies of copies, interpretations of interpretations. Dagmar has described the epistemic situation of classical philology as a world of maximum difference, where changes occur all the time; therefore the work of scholarship and all sciences, just as in statecraft, is to create the pillars that will stay, to know the way, and to prepare the adjustments that are required to make sure that something remains. This seems to really resonate with what Ann-Sophie and Geof were saying about the present: that we are now in the era of the endlessly proliferating, copies and versions replicating, with variations, in every direction. And we're alright with that—as Greg has said, even the classicists are alright with this proliferation of variants. But the reason we don't flip out when we think of this absence of a final, stable, original text or sense seems to me to be similar to the ancient Chinese situation: we can be relatively comfortable with these differences because there's stability in the kingdom, something permanent in the kingdom. If the rituals are performed correctly, the mandate of heaven ensures that the kingdom will last, and we can tolerate all kinds of surface modifications. I think we have that same kind of reverential, unexamined trust in the internet, in the infrastructure of communication. We trust that those electric signals, those telegraph wires, and those fiber optic cables will remain eternally, or will be properly and eternally maintained, which is what means we can be comfortable with variation across the surface of that infrastructure.

Dagmar Schäfer

Does that mean that it is now not so much about selecting texts, but rather collecting?

John Tresch

Exactly, because they are all going to be there; all of the versions of every document are possible, stored somewhere in the net forever. As long as the kingdom persists, that is—which is as long we trust the technical minders and owners of the infrastructure. Which is possible as long as we don't look too closely.

Matthew Battles

I think you can see how that trust leaks into other domains. I think of Lev Manovich's work with image plot, which is software that he and his colleagues devised to group and sort large sets of digital images. When looking at and comparing them in terms of their color values, things are algorithmically acceptable; it's a response to the criticism that you can never be sure of how to keep the color values steady across large sets of digital images that have been generated in many places. Again, I'm not celebrating. I'm just describing. It provides an answer to the question, "Which is the original or true value?" based in a virtue or an ideal of statistics that there will be a curve that tells us something about the set, regardless of the local variation. This is a virtue or an ideal which has at least a formal similarity to the ways in which truth is being produced in other disciplines. For example in the Large Hadron Collider, and other scientific projects which depend on statistical models which eventuate in moments that get celebrated as Eureka moments. They're treated like the lightbulb turning on, or Franklin getting shocked by his kite, when in fact these are enormous post-hoc social phenomena, responding to computers processing lots of data. Again, this not to say Lev is right or wrong, but to point out that there's a new kind of ideal emergent in digital approaches to the humanities—and to humanity—that I think is interestingly resonant with practices (maybe misbegotten) in the natural sciences.

Murtha Baca

But we have to be academically rigorous about what we are analyzing. What Manovich is analyzing there is not the difference between paintings, between colors

in paintings, but the difference between colors in completely inconsistent digital images. So it has nothing to do with the history of the actual paintings.

It's also interesting what Ann-Sophie said about computer languages. When it comes to computer code and you make a mistake, the code doesn't work. If you get one character wrong in a URL, it doesn't work. How many times have you gone to look for a link that you used to go to and it's not there anymore? That's the persistence problem, and in fact, John, you said something about documents being "stored in the net." Nothing is stored in the net. The Internet is not a storage space. Things can be stored on servers, but the Internet is this place where we access information. But now there are these things called URI's coming out (Universal Resource Identifiers), which are supposed to be persistent, reliable things that are based on a standard like any other kind of standard (e.g., ISO standard) so that we can get to that thing in a reliable way.

But then again there's been a lot of talk about how things change as well: data changes, information changes. One thing that databases are good for is that you can capture the revision history of everything. So in a way there is this layering: we can say, "well, we used to think that it was attributed to Pontormo, but now we changed it and we think it's attributed to Bronzino." You don't erase the old attribution, because it's part of the history of that work of art. The computer does help you keep that revision history.

Simon Schaffer

I'd like to raise a point partly related to that question about where the truth is stored, and also to what Matt was saying about statistics, which I hope comes to be a theme here. At exactly the same period as the rise of statistics, and for reasons that we all know well, was the invention of the stemmatic method whereby you see the first important institutionalization of the difference between accuracy and precision both in Germany and elsewhere, which up till then in most European languages were synonyms. And then they ceased to be synonyms: precision was, with the stemmatic method, taken to be a sign of accuracy, where precision was taken to be the variance around a meme or unit of meaning. You sought to minimize that variance by social discipline of exactly the sort that John was talking about—in other words, practices to preserve fidelity. It was thought, strangely enough, that high degrees of precision (or tiny amounts of variance) were signs of accuracy, i.e. that the meme was the true value. Geoffrey's written about that wonderfully well.

There's one experiment which was done about this which seems to me to be extraordinarily apropos from the philological point of view. This is an experiment

that Charles Babbage ran between 1834 and 1839 in which he was concerned about using a machine to manufacture numerical tables, in which identity and fidelity are absolutely the point. Bizarrely, he called this machine the “difference engine.” He realized that the Achilles heel of the difference engine and its tables were the humans, and that in particular the source of error, i.e. the source of variance in precision, would be transcription. So the experiment he ran was to print the same matrix of logarithm tables using forty-eight different kinds of colored ink on forty-eight different kinds of colored paper, to see which color ink and which color paper combination would give you the highest degree of precision in transcription, that is to say, the most accurate tables. It turns out it is gold on black. The Crawford Library in Edinburgh has these tables. The whole wall of the library has volume after volume after volume of the same page of numbers, including the diagonal of the matrix—in other words, black on black. That exercise had a huge, huge effect on signal theory, right through the rest of the nineteenth century and into the twentieth, in the form of cybernetics.

What I want that anecdote to illustrate is the way in which there was a philological sensibility there, a sense of how to manage the relation between variance and precision on the one hand, accuracy and truth on the other, and this still drives what Ann-Sophie just invited us to start working on, and which is already there in Geoffrey’s presentation: the philology of code. It seems to me that Babbage’s experiment is one of the sources for the philology of code. It would presumably be a very interesting resource for the kind of transmission stories between cultural traditions that Glenn wants us to engage in as historians of science. Which I, like John and Geoffrey, would absolutely support.

Glenn Most

I want to come back to what Ann-Sophie’s comment, and what Simon just baptized as the philology of code. It is indeed a very interesting fact that code has to be absolutely precise, while algorithms allow a certain amount of slippage. These two are interdependent. If the code were not precise then the slippage would be much more problematic. Somewhat comparable to that in my field, but not exactly, is grammar, which would be the code which permits utterances. But it’s different from the kinds of codes that you were mentioning because, first of all, grammar is not an algorithm. It’s not as precise in any language as these codes have to be. Secondly, most of the authors that are interesting to edit are ones who are pushing against grammar as far as they can, and deforming the language in order to say things which have much more effect than something which would follow the rules

closely. So there's something comparable there, but the philology of code would in fact be very different from the philology of linguistic grammars.

Filippomaria Pontani

In *A New Republic of Letters* Jerome McGann also picks up this point about the republic of letters as being founded on philology—although in a largely different sense of philology than the one we've been discussing today.² But this idea of “precision” oscillating between the poles of the computer scientists and our old-fashioned humanistic grammar, as Glenn was saying, leads to an at times disturbing analysis. This is a huge topic, and I'm very happy that Glenn's paper provoked so many points.

NOTES

1. Translation: rude and indigestible.
2. McGann, Jerome. *A New Republic of Letters*. Cambridge: MA. Harvard University Press, 2014.

Coding the Classical Corpus

Gregory Crane

I want to discuss philology in the digital age. But first, I must address the reality that even outside the context of the digital age, “philology” in German, Italian, and French means something different than it does in English. In fact, the American Philological Association voted itself out of existence because they couldn’t explain what philology meant. Today, we are the Society for Classical Studies.

With this in mind, I pose the question: what *is* philology? I always think of Cedric Whitman’s definition, from a quote I heard when I was eighteen years old. In it, Whitman reflects upon the German roots of American classical scholarship. Whitman states that philology is, in Latin, the *cognitio universae antiquitatis, historica et philosophica*, a phrase that I understand to describe: the understanding of the past (*antiquitas*); the past in its fullest measure (*universa*); and both the things out there in the world (*historica*) and those things that transpire in our minds (*philosophica*). So, everything. Everything you can do with language. Everything that is meant to reconstruct and bring back to life the past, as fully as possible. Philology is an extensive, unbounded, restless, and driving discipline. The fact that no one knows what it means is a great opportunity, so much so that I sometimes use slides from *Forbidden Planet*, the 1950s science fiction movie to describe it. In it, Doctor Morbius, the great mad scientist who recreates the advanced technology of an ancient civilization, is a philologist. I find it humorous and not insignificant that half century ago a Hollywood filmmaker could choose philology as the specialty of a mad scientist.

Just yesterday, I was pleased to have the opportunity to reflect on Jorge Luis Borges and his vision of the library. In turn, it made me reflect on the simple representation of root 2. Take a square, try to represent the size of the diagonal using letters or numbers from the top and numbers in the bottom using a rational number. Borges's library could not contain root 2 represented as one integer divided by another because there is no way to represent root 2 in any finite symbol notation—you could add an infinite number of digits to the numerator and the denominator, filling every book in the infinite library, and you would never be done. This, of course, is proved many times. And yet, it appears in Plato's *Meno*, where a slave boy gets led through the proof by questioning. Every pertinent, cool critique of media can be attributed to Plato. Not unlike Sideshow Bob in an episode of *The Simpsons* using television to critique television, Plato uses writing to critique writing. In *Phaedrus*, he starts with *eros* and shifts to writing, which many people find to be a non sequitur, unless they really love writing. It's the first great critique of this embodied communication. Essentially, what Plato says is: stop reading that book, kid, it will rot your brain—exactly what I was told about watching television. The idea is that every time you externalize knowledge, you lose. You become a little less intelligent, and your brain grows just a bit weaker.

But I think the argument, or at least the argument I take from the *Phaedrus*, is that the written text has meaning only insofar as it enters the brain and moves the heart—the point of text is to generate dialogue, to generate connections between people. For me, the real challenge is the dialogue among civilizations. This dialogue is often complicated simply by the fact that we can be very cynical about the term “civilization.” We often get caught up in the question of what makes a civilization ideal, and historically, we get caught up in implying that our respective civilizations have a hegemonic impact.

How, then, do we get past our anxiety, if not paralysis, about civilization? Answering this question is, in part, why I am interested in classical philologies, and I use this plural aggressively. In the United States, where we are developing a global culture, we must think broadly; we must think of classical philologies in the plural. In my Classics department at Tufts, I have a colleague who teaches Sanskrit and a colleague who works on classical Chinese, and I spent years studying Arabic. While I never published anything during those years, I did manage to lecture a bit in Arabic, and that was the point (and this connects to my larger point about the cruciality of multiple philologies). I wanted Arabic speakers, such as my colleagues at the University of Cairo, to hear Arabic—albeit bad Arabic—emanating from the mouth of a guy they thought looked like George Bush. I did this to make a point, and as a result, my department created a tenure-track position for someone who works on the contact between the Greek, Roman, and Islamic worlds. This is

significant because, although it's not popular knowledge, we wouldn't be here without the translation movement from Greek into Arabic, and then from Arabic into Latin; this focus on our debt to Arabic language scholarship constructs a different model of Classics and of how we in Europe understand the past.

In this way, we understand the past not to assert the primacy of a narrow or nationalist identity, but to participate in a conversation that exchanges ideas between very different cultural perspectives. In a climate that does not readily encourage such an exchange, how do we facilitate it? It won't be easy, but it is an essential challenge. Personally, I turned to Greek and Latin language scholarship to address that challenge. I did this in part because if I began with a language that is outside my own heritage, like classical Chinese, I would open myself up to the possibility of being accused of appropriating a cultural heritage that is not my own.

However, if I focus on digitizing and making available as much Greco-Roman culture as possible, I don't encounter the same dilemma. It's to my advantage that Greco-Roman culture has all sorts of interesting cultural connections. In fact, few know that the constitution of the Islamic Republic of Iran is, in some measure, based upon a reading of Plato's *Republic*, which is why Iran has a council of guardians and a philosopher-king. Surprisingly, it is a closer representation of Athenian democracy than anything in Europe. Most Iranians don't even know that—some of my more incredulous Iranian friends have double checked, and have been very surprised at what they learned.

Because I have two positions—one at Tufts University in the United States and the other at Leipzig in Germany—I lead a transatlantic life. For me, this is a wonderful thing. Much of my intellectual formation—indeed, much of my heart, if you will—emerges from German roots. This German influence extends back two centuries ago to 1815, when the first two Americans, Edward Everett and George Ticknor, arrived to study in Göttingen. They travelled on the second ship to leave Boston for England after the War of 1812, and they had to wait in England for the Battle of Waterloo to be fought before they could cross over to the continent. Over the following century, thousands of Americans followed them to Germany. What they learned in Göttingen, they eventually brought back to Harvard. Because of them, my teachers had direct affiliations with the German academic system, either through practice or emigration in the 1930s.

So, I am now the Alexander von Humboldt Professor of Digital Humanities at the University of Leipzig. For someone who doesn't really believe in the Digital Humanities, this is fairly ironic. Nevertheless, while I'm skeptical that the Digital Humanities constitutes an entirely separate field, it does offer a dynamic new space of encounter between many unnecessarily disparate disciplines, both within the humanities and beyond. As a part of this chair, the Alexander von Humboldt

Foundation gave me a lot of resources, and I have chosen to focus those resources on advancing Greek and Latin in a digital age—much to the polite horror of some of my colleagues. They grumble and say things like: *Don't we have Bach here? Don't we have lots of other more recent topics in Leipzig? Greek is nice, but can't you do something really interesting?*

Well, I believe that starting with Greek and Latin is more challenging and leads to more interesting questions than does starting with later subjects, however popular they may be. Shakespeare in the English speaking world and Goethe in the German speaking world may be more widely read than Homer and Plato, but Homer and Plato have a transnational identity (at least within a primarily European cultural space) that neither Shakespeare nor Goethe have. Moreover, if we want to understand the full tradition associated with Homer and Plato (i.e., how these authors' works were received and how they influenced culture over thousands of years), then we are obliged to work with a vast amount of materials in English, German, and many other ancient, medieval, and modern languages. If we start with Greco-Roman texts and tug on the related threads of influence, an ever-expanding skein of materials will unravel, one that will eventually challenge us to work with a superset of those more popular materials. Considered carefully, studying Greco-Roman culture and its influence (re)presents a grand challenge as we rethink the humanities in the digital age.

Indeed, it is one of the biggest challenges, one that draws simultaneously upon our intellect and upon our assumptions about how the humanities should serve society as a whole. Do we want to ensure that the human record is available to all humanity, or are we content to work with commercialized data for which our institutions (for those of us lucky enough to be professional academics at rich institutions) pay extensive subscription fees? If not, how do you sustain open data without charging subscription fees? It's certainly not a trivial question, especially when there's plenty of money out there. American research libraries spend about a billion dollars a year on collections. So, the money *is* in the system, but how do you organize it properly? How do you distribute it properly?

In my own academic silo, we spend a lot of time working on open-source Greek and Latin—a vast majority of which has been digitized. Much of my time has been spent re-digitizing things that are already available, but only available behind subscription walls. These materials must be re-digitized because if they are re-used, you will be sued—and rather intrusively—by prestigious academic institutions. I won't go into great detail, but this subscription model has all sorts of corrosive effects if you get trapped within it.

To combat this, my colleagues and I—the community of Digital Classicists—are trying to make as much material openly available as possible. In so doing, we've

been thinking about the next frontier for texts, so to speak. Our idea is that every text should be a multi-text that would enable scholars to trace the entire textual history of a work. We believe that in the current world of print, the critical edition is the reductive center of a black hole. The paradigm of the critical edition forces us to constantly strive for one constrained, “perfect” edition without considering its context. From our perspective, every schoolbook, every edition, and every printing is a historical event of some interest, a story in its own right. Thus this context, this familial network, now becomes an object of study, expanding the space in which we work.

This new scholarly paradigm is simply not feasible if scholars are focused on trying to produce a tractable body of sustainable printed editions, or if they are primarily focused on reconstructing the original. So, there are various technologies for creating these multi-texts. Open repositories such as GitHub allow us to track multiple revisions of any word in any edition of any identifiable work.¹ We can now push all these resources out to the public and say: *Have at it, guys. It's got problems, we're fixing it. If you take it, do whatever you want and we will be delighted if you can help out.*

In this new digital space, the most pressing research challenges I see are quite different from those I imagined when I was getting my Ph.D. in the early 1980s—in fact, I doubt I could have predicted how my conception of scholarship would change. In my view, the biggest advance in the study of Greek in the past five years has been made through the collaborative efforts of Federico Boschetti in Pisa, Bruce Robertson in Mount Allison, Canada, and Nick White at Durham, among others. This collaborative, international community is as straightforward as the goal of their work: get the Greek off the printed page and into a digital form so we can do something with it.

Our ability to generate editable, workable Greek texts from scans of printed pages is a huge advance. It allows us to pursue questions that, to be answered, require analysis of millions of documents and the application of entirely new methods of analysis based on research in corpus linguistics, computational linguistics, and information retrieval.

However, creating machine-readable Greek texts also raises new questions and poses new difficulties. First of all, the automated methods generate errors—the quality and complexity of the printed original determines the frequency at which they occur. This error rate challenges us, in turn, to consider how to detect and automatically correct the errors. But, perhaps more importantly, it also makes us seriously (re)consider what questions we can ask when we have error rates of 1%, 5%, 10%, or more. With this in mind, I now find myself questioning much more seriously what it means to have a perfect transcription of a single edition of a work.

How much do we lose if we don't have multiple editions available? In many cases, where editions vary in 5% of their readings, you are better off having two editions digitized to a 99% or 98% accuracy than a single edition that is 100% correct.

And, of course, creating a digital text goes beyond simple transcription. Consider the figure below:

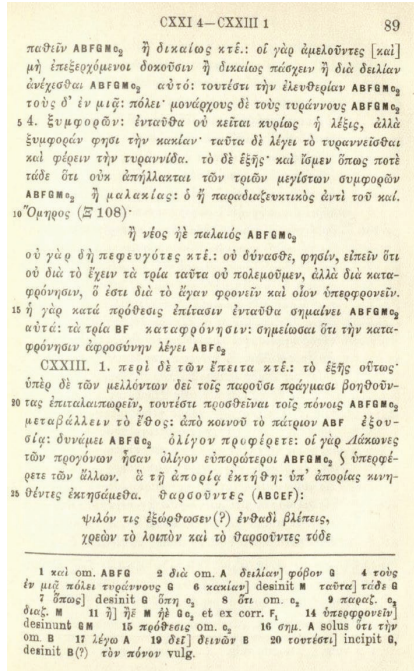


Figure 3.1. A page from an edition of ancient commentary about Thucydides' History of the Peloponnesian War. From C. Hude, Scholia in *Thucydidem*. Leipzig: 1927.

I can pay a data entry company to correct all the Optical Character Recognition (OCR) errors, ensuring that bold letters are marked as bold, or even capturing the general structure of the page (including the fact that the Roman numeral “CXXIII” introduces a new chapter in the text), but to get the real structure of this document into a usable form, we need to adjust for the idiosyncrasies of the document: abbreviations, note formatting, the fact that a quotation of poetry begins on the bottom of the page, etc. This is something data entry companies simply cannot do. An experienced individual—who understands the text—must create a new version, taking these features into careful consideration. Creating a version this way, arguably, would rapidly engender a new type of edition.

Let's say you create that new edition. If you choose to publish it under an open license so that access to the text is unlimited, yet another, new question arises: who is your audience? I learned very clearly when I was a graduate student at Harvard

who my audience was. My audience consisted of about fifty people who would write recommendations for me, invite me to cool places, be my little network, and might even read my stuff, maybe carefully—but probably not. That was, I think, a pretty fair representation of how many of us thought at the time.

Now, my audience extends far beyond standard academic networks, even beyond the fairly tech-savvy community surrounding JSTOR (which is probably the best tool to reach a wide academic audience today). Personally, however, I'm not interested in only reaching the people who have access to JSTOR. Our potential audience is much larger—it comprises the billion smartphone users in the world today. So, if you want to reach the world, you've got to think outside the silos and the paywalls.

The good news is that once you are able to generate machine-readable text—even with errors—automatically from printed pages, the scope of possible research expands.



Figure 3.2. The Fra Mauro map of the world as understood in the mid fifteenth century, before Columbus. Source: <https://upload.wikimedia.org/wikipedia/commons/8/8b/FraMauroDetailedMapInverted.jpg>

Above is the famous “Fra Mauro Map,” housed in the Marciana National Library across the canal from the Cini Foundation in Venice. It is a map of the world

as it was understood in the fifteenth century, before Columbus. In many ways, this is an unknown world because no one can study it in its complexity, and that's not just because of its scale (2.4 x 2.4 meters). For example, one hundred one-page poems in a hundred languages pose a big data problem, because each of these poems depends for its comprehension on very large linguistic and cultural networks of knowledge and you cannot learn a hundred languages—or, at least, most human beings cannot. Even if you did learn a hundred languages, you cannot think about a hundred languages with the same depth that you can with two or three. Understanding the system is a great challenge, but it is also an opportunity, thanks to the tools emerging at the cross-section between technology and academia.

For me, the ultimate question is: how would you take a document in any historical language and make it available in, say, n modern languages? I might start with classical/historical languages (such as Ancient Greek and Latin, Biblical Hebrew, Classical Chinese, Arabic, and Sanskrit), cuneiform languages (such as Sumerian, Akkadian and Hittite, as well as the various forms of Egyptian), in addition to the six UN languages (Arabic, Chinese, English, French, Russian, and Spanish), plus Italian and German to account for classical philology. So, how would you do that? Or, to give an example, how would you start with an aspect of popular culture—perhaps a Chinese Wikipedia page about Alexander the Great—and get people to the primary source(s), to the Greek, without losing the integrity of the document and its context? More than just linking to someone's translation, how do you establish a pathway to a comprehensive multi-text? That, to me, is the grand challenge.

I confront the issues engendered by that challenge by turning to Venice, where the finest, most important manuscript of Homer's *Iliad* is preserved: the great *Venetus A*, brought by Cardinal Bessarion along with other Greek manuscripts to Venice not that long before the fall of Constantinople. This manuscript was digitized in 2007 at immense expense. Ten people worked for three weeks in the Marciana National Library in Venice to produce scans at very high resolution, and in different wavelengths.

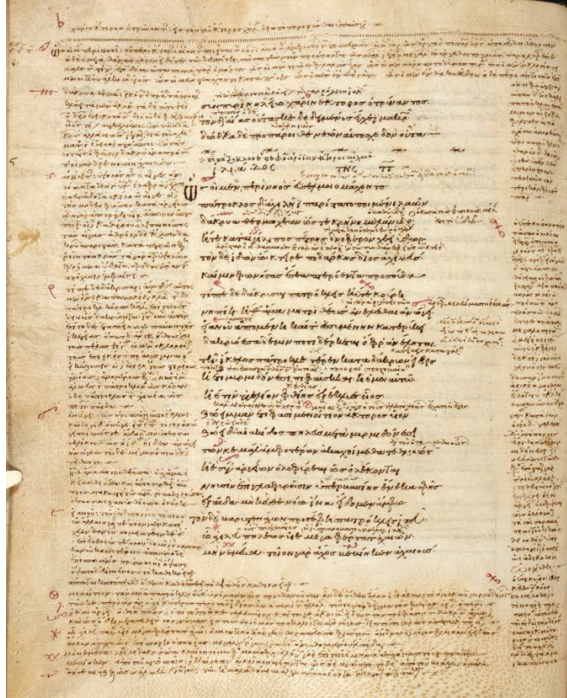


Figure 3.3. A page from the Venetus A manuscript of the Homeric Iliad, digitized by the Homer Multitext Project, showing the text of the Iliad surrounded by ancient commentary and with smaller interlinear notes.

While I am a staunch supporter of this effort now, when my former thesis advisor, Greg Nagy, said he was supporting this intensive digitization effort, my initial reaction was that it was a bit crazy. Most departments don't even have paleography classes anymore. We don't train editors in the United States in paleography, and if you do somehow acquire the skills to become an editor working with manuscripts, you won't get a job. Nobody does this stuff. But it turns out, my old thesis advisor is a lot smarter than me. Work on this manuscript turns out to be, I think, the most important project in the study of Greek and Latin today.

To understand why, I have to take a quick detour to address the challenges and opportunities that laboratory culture(s) pose for humanities education. In the first decade of the 20th century, the number of humanities majors at Harvard declined by 20%. Later, in 2013, 45% of the faculty in the main undergraduate division at Stanford were in Humanities departments, but only 15% of the students were. In part, anxiety about getting a job after graduation and relentless politicking for science and technology disciplines are responsible for this, but one often-unmentioned attraction of the lab sciences is that they provide students with an opportunity to contribute to science with a capital "S." In most humanities disciplines—

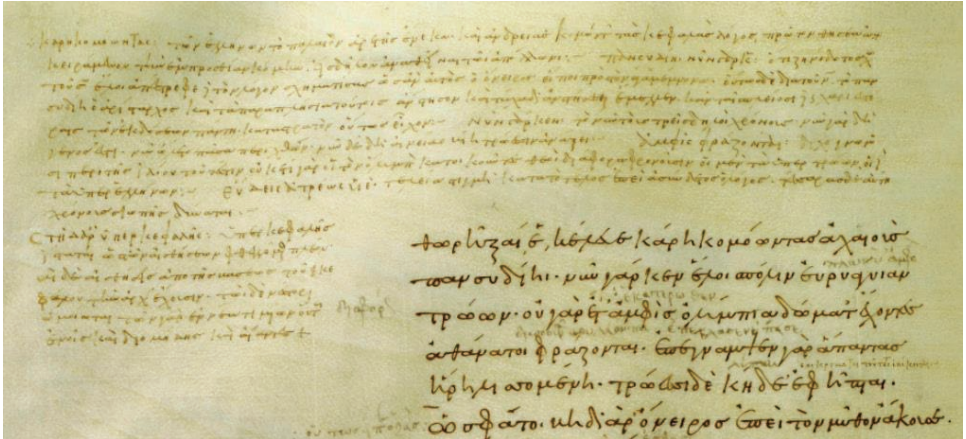
and certainly in Greco-Roman studies—the bar to making any sort of contribution is very high. Often, you have to be very far along in a PhD program before you develop any kind of voice at all. By contrast, talented and determined students can start out in a biology lab and work their way up to increasingly substantive participation and can ultimately design their own experiments.

While this may seem like a radical idea, it's rooted in centuries of tradition stemming from Germany. It is a practice that echoes what Prussian aristocrat Wilhelm von Humboldt said: “the instructor is not there to serve the student; rather, both student and instructor are there to serve *Wissenschaft*,” the German term for systematic research. This practice is the antithesis of the traditional Greek and Latin studies of which I was a part, where the idea that you might have something interesting to say as an undergraduate was considered either cute or obnoxious. My field was, and still is, very hierarchical and regimented. You don't acquire a voice until you've invested in years of study. Looking back, if I were eighteen and I had the opportunity to work in a lab that allowed me to contribute in some small way to science, why would I choose instead to devote my time to writing papers that no one but my professors would ever read? While I was so dedicated to Greek and Latin when I was an undergraduate that I might have majored in these languages anyway, I do think the decision would have been difficult.

In 2009, we at Tufts tried to address this challenge by designing a tenure track position in Classics. The job description closed by stating that “we especially welcome candidates who can support contributions to and original research by undergraduates, as well as MA students, within the field of Classics.” We posted the listing right after the financial crash, when there were no jobs. There we were offering a tenure track position, so consequently, we saw the whole field. Incredibly, out of approximately one hundred and eighty applications, only two people mentioned that last sentence. We interviewed eighteen people, and specifically asked them all, “how can you facilitate and support contributions to original research made by undergraduates, as well as MA students?” Typically, their immediate response was to shuffle in their seats, as if we were asking about their personal lives. They had never been asked that before. It was not something they were trained to think about. In fact, they were trained *not* to think that way, to assume that only advanced researchers could contribute anything of use to the field. Ultimately, we hired someone who did get the point, and who was able to develop a career that integrated students into her research.

If you had asked me if this was feasible ten years ago, I would have responded by saying that the students are just learning how to read Homeric Greek, so how could they juggle those studies with Byzantine manuscripts and the language of Byzantine commentators? Well, it's quite simple, really: you give them a chance, you put them

together, and soon you have a hundred thousand words of beautifully transcribed and annotated text from the *Venetus A*. Furthermore, it is a better representation than anything previously done by a single scholar with limited access to the images. Undoubtedly, a collaborative effort on publicly visible data works better.



Κάρη κομώντας : τῶν Ἑλλήνων τὸ παλαιὸν ἀρετῆς ἔνεκα καὶ ἀνδρείας κομώντων τὰς κεφαλὰς, λόγος πρῶτον Θησεία ἀποκεράμενον τὴν ἐμπροσθίαν κόμην εἰς Δῆλον ἀναθείων τῷ Ἀπόλλωνι. **Πανσυδίη νῦν γάρ κεν** : ὅτι Ζηνόδοτος χωρὶς τοῦ ς, Ἐλοι, ἀπέτροφε δὲ τὸν λόγον σχηματίσας, ὡς ἂν αὐτοῦ ὁ δνεῖρος εἴποι πρὸς τὸν Ἀγαμέμνονα. οὕτως δὲ διὰ τοῦ ν τὸ πανσυδίη ὁ Ἀριστάρχος, καὶ τὰ παραλήσια τοῦτους ἀνέστησαν καὶ τάχα δ' ἀνστήρεσθαι ἔμελλεν καὶ ν τὰς πλείους δὲ καὶ χαριεστέραις τῶν ἐκδόσεων πάντη κατὰ στρατὸν οὕτως εἶχον. **νῦν γάρ κεν** : τὸ νῦν τοὺς τρεῖς δηλοῖ χρόνους νῦν γὰρ διή γένος ἔστι· νὸν ὠλετο πάσα περιχθών· νῦν δὲ διή ἀνείαυ βίη Τρώεσιν ἀνάξει. **ἀμφὶ φράζονται** : διχογνωμοῖσι περὶ τῆς ἴλιου· τοῦτ' ἔστιν οὐκ εἶναι γὰρ οἱ τὸν Ὀλυμπον κατοικοῦντες θεοὶ διάφορα φρονοῦσιν, οἱ μὲν τὰ ἔπερ Τρώων, οἱ δὲ τὰ ἔπερ Ἑλλήνων. **Ἐβδεις Ἀτρέος νιὲ** : τελεία στιγμή κατὰ τὸ τέλος, ἐπεὶ ἀσύνδετος ὁ λόγος, τέσσαρας δὲ αὕτη χρόνους σιωπῆς δύνανται.

στη δ' ἄρ' ἔπερ κεφαλῆς : ἔπερ κεφαλῆς ἰστανταί ὡς τῶν αἰσθησεων φεγγόμενος πλῆον. αἱ δὲ αἰσθήσεις ἀπὸ τῆς βίσεως τοῦ ἐγκεφάλου τὴν ἀρχὴν ἔχουσιν. τῷ δὲ Νέστορι ὠμοιωται, τῶν γὰρ ἐννέα τιμίων οὕτως ἐν οἷς καὶ Διομήδης καὶ Αἴαντες:

θωρηξαί ἐ κέλευε κάρη κομώντας Ἀχαιοὺς
 πανσυδίη· νῦν γάρ κεν ἔλοις πόλιν εὐρύγυιαν ^{πλειομύθοιο}
 Τρώων· οὐ γὰρ ἔτ' ἀμφὶς Ὀλύμπια δώματ' ἔχοντες ^{ἐκαστέρωθεν}
 ἀθάνατοι φράζονται· ἐπέγναμψεν γὰρ ἅπαντας ^{διανοοῦνται· βελειοῦνται ἐπιτάσσων, ἔπεισε}
 Ἥρη λισσομένη, Τρώεσσι δὲ κήδε' ἐφήπται. ^{λίπων ἐπικρέμαται τοῦτ' ἐστὶ ἐπικείται}
 ὡς φάτο, βῆ δ' ἄρ' ὄνειρος ἐπεὶ τὸν μῦθον ἀκουσε·
 καρπαλίμως δ' ἴκανε θοὰς ἐπὶ νῆας Ἀχαιῶν,

Figure 3.4. An HTML visualization of a collaboratively produced diplomatic edition for a page of the *Venetus A* manuscript.

So, what happens after the text is transcribed? No matter how beautifully it is executed, it doesn't do most people any good to look at raw Greek text—as Shakespeare put it, “it’s Greek to me.” Luckily, we have developed new models, new methods, by which to read. See, for example, the tree-bank below, in which every word is morphologically and syntactically analyzed.

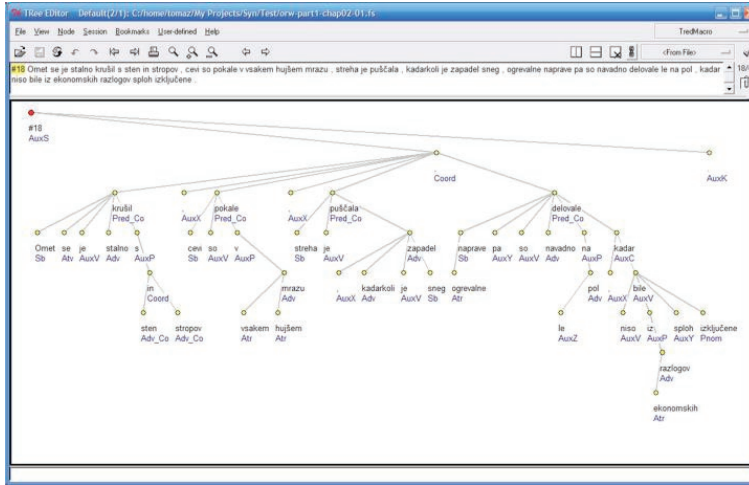


Figure 3.5. A syntactically analyzed sentence of Slovenian.

I don't read Slovenian, but I can use the syntactic analyses in the tree-diagram above to glean the structure of the sentence with considerable precision. I use this as an illustration of my point rather than Greek, because I want to show that syntactic analysis of this kind can open up a language for people who have not studied it.

Beyond linguistic annotation, we also produce what are called aligned translations. An example from an African language is shown below.



Figure 3.6. Alignments of words/phrases in an African language to an English text.

As you can see, the producers of these texts and their context are clear. This technique can also be applied to Homeric texts and studies.

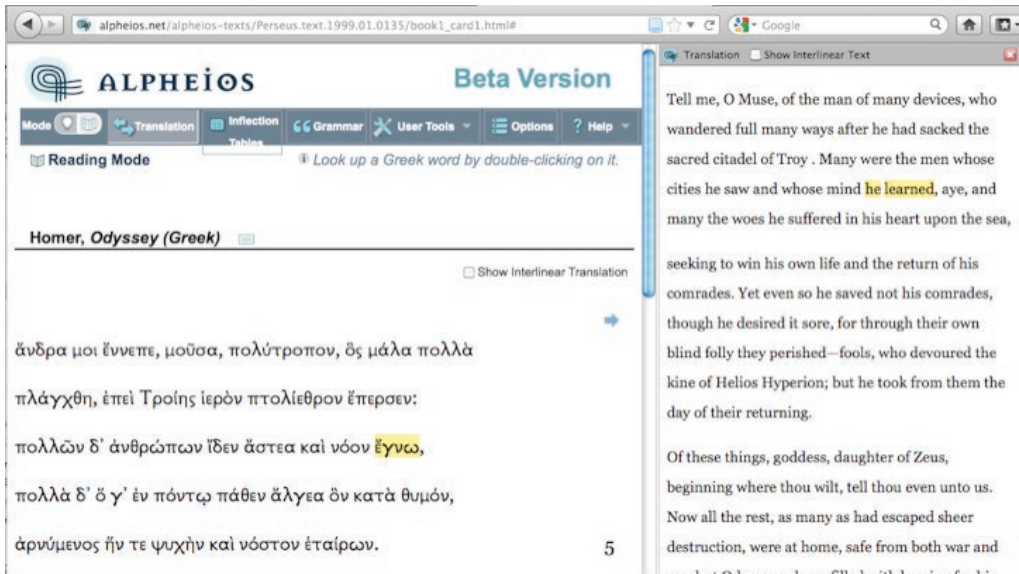


Figure 3.7. An aligned Greek text and English translation of the beginning of *The Odyssey*.

The translation of the *Odyssey* above is not new; nor is the practice of putting text and translation side by side. What is new, however, is the interface, the environment. It provides a qualitatively novel experience for readers because it allows them to dynamically relate the texts to one another in a way that was simply not possible in print. By placing the linguistic annotation and the aligned translations together, we provide a space where people can work directly with Homeric Greek, even before they have begun formal study of Homeric Greek itself.

I find the system brilliant, but it's certainly not perfect. It's not equivalent to having read Homer your whole life or having studied Greek literature, but it does enable someone to begin to interact with the Greek in the original. In my general course on Greek literature in English translation, students read small passages of Greek in Greek. I tell them, *you're in college, people—you work directly with the sources*. By looking at the contexts in which words are used, they learn what words really mean—and they master ten lines of poetry, every word. As undergraduates, this is their starting point. From there, they internalize as much knowledge of Greek as they need for their own particular purposes.

Actively producing these aligned translations and producing the syntactic analyses is an effective and novel way to teach the language. So much so that I never want anyone to translate anything for me anymore unless they align it to the original. That way, you get useful data out of it, because it's easier for them to see what

they're doing wrong. In many ways, this new form of education is both radically new and deeply traditional.

Finally, I'd like to return to re-thinking the position of and audience for European Classical languages. We need aligned translations in a wide range of languages, and language pairs: Arabic, Chinese, Croatian, French, Georgian, German, Greek, Italian, Portuguese, Russian, Ukrainian, etc. One language pair on which we have begun working is Persian and Greek. Imagine—there are Americans studying classical Persian poetry with tree-banks and aligned translations, and there are Iranians learning Greek at this very moment. In fact, we are producing the first Iranian Farsi system for studying classical Greek.

Moving forward, we must shift away from considering languages such as classical Greek and Latin as representations of the primacy of European culture, but instead as interesting and marvelous voices in a chorus of human cultures that are enriched by dialogue back and forth. To enact this shift in conception, we must use our own agency to open up the hierarchical world of academia to engage not only our students and fellow-citizens, but people from around the world, far beyond the established network of established first world universities. We have, I believe, an opportunity to both influence and ensure the future of philology. We can train better students using new methods. Those students can learn Greek and Latin by contributing new knowledge, by improving through innovation. If we take advantage of everything that is possible with our new tools and open methodologies, we'll have better students—people who will know more Greek and Latin in ten years than we did at the same point in our careers fifty years ago.

DEBATE

Geoffrey Bowker

I have a couple of comments. First, database citation is a really interesting issue, especially with regards to recognizing work that people have done, because what do you cite? Do you cite the person who put in the data, the person who curated it, the person who produced the algorithm so you could analyze it? These chains of data citation are a difficult problem—in the natural sciences they are just starting to play with interesting citation practices. But it's a really interesting problem.

I first heard the argument several years ago that the digitized version of some cuneiform tablets was better than the original, in the sense that you get lighting

conditions that nobody could possibly have when they're in the museums and the museums won't let the individual researcher use them. However, they'll make special allowances for people who are digitizing, so it enables you to see things in the cuneiform that you could not possibly see in the original.

Your whole theme of problematizing the primacy of Latin and Greek was really interesting. One of the issues that I have in history as a discipline is that it is tied to its own database and its own national structures. So we speak about the history of England, the history of this or that country, and movements like Sufism—which is not only Islamic, but also Gnostic Christian—which are incredibly important all across Europe and other regions (the Sufis played a major role in Kosovo, for example) don't have any good histories. The reason is that we don't have the data sets, databases, or the people who have the facility to actually work in the multiple languages from different traditions in order to produce that kind of history. The move that you're making is incredibly important, and is richly interesting in database terms.

Glenn Most

I don't think it's correct to say that the digitized image of a manuscript is always better used than the original. You can see certain things more clearly in the digital image than you can in the original, but a manuscript is a three-dimensional object, and what the digital image does is reduce it to a two-dimensional one in such a way that you can't tell whether something is a hole or a shadow, you can't expose the manuscript to different kinds of light from different angles or look through it to find its watermark. Sometimes you can't tell the sequence of interventions, and many other aspects of the three-dimensional real manuscript remain concealed in its digital image, so that the ideal thing, at least in the fields that I work on most, is to use both a digital image and have recourse to the original as well. I think that's also important with paintings, for example. So I regard this as a supplementary tool, a different mode of accessing information.

On another point, it's not clear to me who is going to use the digitized *Venetus A*, and for what purposes. You regard this as a very important project, and I entirely agree that it's a really interesting one, but I'm still curious about where it's going to go. If, for example, I wanted to use the information in the *scholia* of *Venetus A*, for most purposes I would much prefer to use Erbse's edition of the *scholia* rather than *Venetus A* itself. *Venetus A* is incredibly interesting for the history of the transmission in the Byzantine period, but I wonder how many people are going to be looking at it for that.

Gregory Crane

I agree that you cannot do everything with a digital representation that you can with the artifact itself. I think the Homer Multitext project is important because, first, it's not done by professors but by people who I didn't think would be able to do it. More importantly, it transforms the way in which students perceive the study of Greek. They're producing something new. You may not think a new transcription of a manuscript is all that important, but the fact is, what matters to people is that they do something that has significance. It doesn't have to be the cure to AIDS. But it is a real contribution to human knowledge, however small. It changes the narrative of the way people study Greek. When I was in college and called up my mother to tell her I was taking Greek, my father came on the line and said, "I'm spending fifty thousand dollars, and you're studying classical Greek?" With the Homer Multitext project, students call up their parents and say, "I am helping publish a manuscript that's never been published in this way before, and you can see it online. I'm doing something real." Then their fathers boast to all their friends about how great of an education their kids are getting. That's the importance of participation. It's the enabling of new communities to participate and have agency.

So, I don't see the future of Greek as mastering a set reading list—that's all over, they gave up on it in the United States. I see it as people coming in and taking a text of Latin or Greek that is available right now to the whole world on the world wide web and making that text useful. You figure out its context. You translate it. You provide morpho-syntactic analysis. You provide notes. Maybe the people doing it are not professors like us, but nobody else is ever going to do it. We have a hundred million words of Greek and Latin, up to 600 C.E. when you go into the postclassical era—we have billions of words in these languages. We've already found a billion words of Latin. The history and identity of Europe is constructed in Latin. It is a history unknown and unstudied, invisible because almost no one has the capacity to read these texts fluently. Latin and Greek at their fullest open up an expansive, beautiful space. And from my perspective, we have no editions of Greek and Latin. If you're going to think as hard as we do about a text, it will not add a great deal of extra time for us to record our analyses of the morphology and syntax. Even the translation. When your translations are aligned then you can start to see patterns. You can see word sense changes automatically over time. You can see a *ratio* shifting from a speech to a prayer. Watching billions of words, dynamically.

Filippomaria Pontani

I work precisely with the material that you have shown us. I'm doing the edition

of the *scholia* to Homer's *Odyssey*, so I know this manuscript fairly well. But I think we are talking about two different things. This exercise of transcribing the *scholia* is something that I can give my students in a paleography class at any time. I don't expect this to produce any advancement of knowledge, because in the end it is not one. It can be very satisfactory for them—many people who come to my Greek philology class love having direct contact with a physical object that is one thousand years old. But I would never give them the illusion that they are doing research, by the mere act of transcribing a piece of Greek that they are not in a position to understand in depth, unless they have a very rigorous training.

Those *scholia* cannot be understood without an awareness of the two centuries of scholarship that came before. The material aspects you were mentioning about the *Venetus A* (its punctuation and so on) are of course very important, but they too have to be studied within the field of the history of Byzantine punctuation and paleography, otherwise they lose any sense. There are lots and lots of studies on this. I just want to point to the danger of this—while I do believe it is a great opportunity and I find the multi-base is a very interesting project, in order to avail yourself of this technologically-based new data, you have to do it all properly, and not in an unhistorical way. You have to have the background that enables you to understand the historical layers. That's why I've devoted my entire life to this and believe in this. Otherwise classical philology would have no sense any longer.

One final point about this project, which I do appreciate greatly: the choice to digitize this manuscript instead of other manuscripts which are, if not as important as this one, certainly also very substantial, proceeds from an idea (an ideology, if I may) of what Homer is, that is peculiar to Gregory Nagy and to his school. This idea can be debated—I'm partly sympathetic to it, partly not—but it's just one way of seeing Homer, and it's not agreed upon by all. Now, the choice of this manuscript ultimately proceeds from a general view of Homer's poetry (which is made very clear on the site). So I would call attention both to this ideological motivation and to the idea that advancement of knowledge is a different field from exercise in schools, although both of course have their right to existence.

Murtha Baca

The presentations so far have had so many great lapidary statements. I really appreciate Greg saying that Digital Humanities is really a "space of encounter." I mean, what's the definition of it? We don't even know. It is not a discipline yet. Another one that I love is, "You're in college; work with the sources," and, "We need a lot of translations." These are truisms, but we really need truisms. Another one: "You have to think about survival." Nobody *has* to study Greek or Latin, and we do

have to think about survival and broadening our audiences.

Filippomaria, I am in agreement with you about how you have to study hard to be able to actually produce knowledge that's worthwhile. The age of the Web has created an illusion that everybody is an author. I can go tonight and make a blog or a website on anything—on Botticelli, on classical philology, on something that I don't know anything about. But I can publish that blog. Another really important thing that you brought is the question, "Who is your audience?" Where I work at the Getty Research Institute, one time there was an art historian who was an expert on something pretty abstruse. I asked her, "Who is your ideal audience? Who can understand what you're talking about?" And she said, "Maybe five to ten people in the world." I think that's a problem.

You also said the subscription model doesn't work—the JSTOR model—and I heartily agree with you. Because JSTOR, and, in art history, ARTSTOR, are closed, locked off, and undemocratic, because you can only get at it if you study or work at an institution that has a subscription to ARTSTOR. You also brought up the very important issue about mobile devices. For many people, the computer is not their main source of information: it's their smartphone. So this goes back to what Geoffrey said, too, about needing interdisciplinary teams: historians, but also designers, and information designers.

Finally on the question of what we lose with digital access. In many ways, digital access is better, because you can get access to the thing from anywhere—you don't have to get on an airplane, fly to the institution, page the object in special collections. The ability to zoom in when you're doing paleography is also important. It saves the original object from wear and tear. Nevertheless, I agree with the statement that there's no replacement for the original. One of the ways that we decided to deal with this on one of the projects that I'm working on, a 17th century manuscript, is to have a digital facsimile of it where you can flip the pages so it looks more look like the original object instead of just like individual images of each page. But then we also included my co-principal investigator, Nuria Rodriguez Ortega, in a short video, holding the manuscript and turning the pages. So that whoever looks at it can get an idea of how big this physical object is and what it looks like. And then I wrote a short essay on the physical object— it's on this kind of paper, it's stitched together this way, this is the kind of ink it is—so that users don't forget that there is an original physical object.

The director of my institute, Thomas Gaetgens had been very skeptical about digital editions. This relates to another really important point that Geoffrey made about recognition: we have to change the reward system because if a young professor constructs some fabulous digital resource, it doesn't help them at all to get tenure track, or a job. They've got to do write their book—one that they can slap down

on the table. We are trying to change that. We even convinced Thomas Gaehtgens that it was good to work in digital form.

Gregory Crane

I can't resist responding to you, Filippomaria. I would disagree and say that a paleographic transcription of a manuscript *is* a contribution to knowledge. There's a confusion between the kind of expertise that you've acquired and other kinds of expertise. My feeling is that you have now several dozen people who have some clue of what you're doing, and who would understand and love access to your knowledge, who did not exist before. We have different levels of complexity, and the value of knowledge of very abstruse topics such as *scholia* emerges more clearly to these people who worked on transcriptions of manuscripts than otherwise would be the case. The study of Latin and Greek may be thriving in Italy, but there are some countries where it is seriously challenged. And I've decided as my metric—an admittedly brutal metric—that I want Greek and Latin in people's brains. So if I could have a heat map of Greek and Latin operating in people's brains, I'd want to get that as hot as possible. Now, my hypothesis is that good ideas, smart work, and good scholarship are going to raise that temperature. I want to get Greek and Latin everywhere. So I look for activities that could extend the number of people thinking about Greek, that will allow Greek and Latin to play the widest possible role in intellectual life. That is my metric. Now, here's some numbers about where people study Greek and Latin. Though we can't get the numbers for Spain and Greece, Italy is the world champion for the study of Greek. Doesn't have much in the way of professor jobs, but there's a lot of work in the *liceo classico* still to go around. And Germany is around number two, with 800,000 students of Latin. It's also a curse because we're currently going through terrible cuts in Leipzig and I asked an official at my university if classics was in danger. He said, "No, we need Latin teachers." The foundation of the study of Greek and Latin comes down to training Latin teachers. That official has no idea, nor any interest in the research that we do. There's no sense that it matters, except insofar as we can continue to churn out teachers. We can do whatever we want in the way of research because nobody really cares. But those numbers of Latin students may not last forever. The European Union has now stipulated that the second language for students must be a spoken language, and if that is the case, it will drastically reduce the number of students learning Latin—and with it the economic base for chairs in Greek and Latin, at least in Germany. What's that going to do to our field in five or ten years if that goes through?

Simon Schaffer

Do you have any response to some of the points Murtha was making, for example, about the digital original, and about the questions around whether digital humanities is a discipline, not yet a discipline, or a zone of encounter?

Gregory Crane

On bad days in the digital humanities we tell the computer scientists that we're humanists, tell the humanists we're technologists, and then we do a kind least-common-denominator thing. I've certainly been guilty of that. But I think that the importance of creating a new zone of encounter is not to be underestimated. The classics library at Harvard is across the hall from what used to be Thorkild Jacobsen's office, where all the cuneiform cards are. I didn't know who the guys working there were for eight years, until I started taking Akkadian. Then I realized that these people across the hall are doing something very similar to what we do with Greek and Latin. Now, the people in New Testament Greek at Harvard are in a totally parallel universe to the classical philologists and so the department is very split. Now, at a digital humanities conference, I can talk to people working on Bach, or I can talk to people working on Romantic poetry or on novels in a way that was not happening before. So this is an extraordinary development, and I think that is why there is such vitality in this space.

Stéphane Van Damme

I was struck by the quick movement that classicists and philologists made into the digital humanities. My wife is a medievalist, and it is exactly the same for them. We need studies about that—why certain disciplines were so keen to develop digital humanities, and why others were reluctant.

I had a question about the authoritative editions, if I can come back to Filippomaria's questions. It takes time to build an authoritative edition, sometimes fifty years. It's clearly difficult now to solve these issues, because they involve publishing houses, rights, copyright. So it's very hard to simply transfer all of this scholarly work into digital form. So how do you plan to interest or enrol the scholarly community into this project?

Glenn Most

I wanted to say something about why computers were so successful in classics so

early. It has to do with two aspects of the study of classics. One important element is that ancient Greek and Latin are dead languages. Nobody ever has them as a native language, so therefore the only way that you can tell what was possible is by looking at the corpus of what was written down. So, from the very beginning there were *lexica*, and the *corpus* of ancient Greek was a finite *corpus*, at least until they started discovering papyri, inscriptions, and so forth. Therefore, the notion that you had to have the whole *corpus* available, and search it to understand any passage, was always there. Computers simply made it possible to do that more quickly. The other thing is that papyri and inscriptions are very often incomplete. The only way you can complete them is by figuring out what is missing, and the only way you can figure out what is missing is, again, to see what is possible, and very often the only way to see what is possible is to see what is actually attested. Papyrologists, very early, developed tools for doing accurate word searches on the basis of, say, three letters in the middle of a word, and you can't do that with any kind of written index. So with these twin impetuses, it's not surprising that classics was where digital humanities first developed.

John Tresch

As I understand it, the brief for this conference is not just asking the question of how new technologies of the library can be used to ask new questions of old texts or old bodies of knowledge, but also how older methods that are forgotten or disappearing can help us make sense of the methods that we're using now.

So one comment on some of the material presented about philology would be that it seems as though philology is already doing what Geoffrey has suggested all of us now need to learn: philology is a discipline that taught its practitioners how to read a database; tracing all the apparatus of *scholia*, of commentaries, and all of the markings around the text that make it possible to see where the text came from, as well as tracing a social network and history within the text itself are exactly the kind of skills that we need to acquire today. When it comes to a text, the data is not raw. In the practice of philology we see how the history of the text itself is visible on the surface of the text.

Geoffrey also told us that in this rhizomatic era, we're moving outside of the model of the tree. Though trees do keep coming up—that's obviously a philological term of art in tracing trees of descent of semantics of the words, and also trees of descent of texts. So one question is whether applying digital techniques to the classical *corpus* has somehow "de-arborified" the field in any way, if it's become a more rhizomatic than tree-based field nowadays. Has it been pruned in some way, or transplanted?

Then, a final point: I really liked Greg's conclusion, that to ensure the vitality of classical scholarship, we need to somehow detach it from the idea of the supremacy of European civilization. I wholeheartedly agree. It seems as though, in the digital era, there are new articulations of world history, particularly with regards to situating classical languages within a much more complex, already globalized society. This helps us rediscover the extensive communication among Persian, Sanskrit, and even Chinese texts and the people who carry them, for example. It seems that with these large corpuses it's quite possible to talk about "Greek and Latin" on their own, but that it's also possible and necessary to show that they're part of a world system already. I think that is a really important argument that philologists can make. However, it's not so different from the argument, as I understand it, that philologists made in 1800, which was, "We're doing world history." Goethe invents the term "world literature" after all, and Greek and Latin will be among many other languages; this is an important shift in both classical studies and Orientalism. Greek and Latin it will be first among equals. Is it possible that with the digital corpus, you're recreating that vision of a history of global civilization, and yet, with Greek and Latin as first among equals, as we bring in all these other languages?

Gregory Crane

Basically, Greek and Latin will be the first among equals in Europe, given the nature of Europe. In the same way, classical Chinese will be the first among equals in China and classical Arabic will be the first among equals in the Arab-speaking world, and so on. But it requires multiple voices in order to participate.

I think I want to get back to the shift for philology and how we move forward. We've alluded to what we call the "J-curve" earlier today, which is how productivity goes down before it goes up. I had to indulge in a spectacular J-curve when I started out. I could not use the most recent texts because they simply are owned by commercial publishers. I had to use texts that I wouldn't get sued for using. There are now 350,000 people a month who come and work on Greco-Roman culture on our site, which is only in English, which is slow and has all sorts of problems. Partially because of this, there are people studying Greek today, even reading Greek this minute, who would not otherwise be reading Greek. So it's a compromise. Now, our texts are problematic, of course. My challenge to my colleagues is to help provide better texts. The problem is, we're still feeding texts to commercial publishers who then own the results of publicly funded work. We need a mechanism for open editions to support the best scholarship, and I appeal to you for this. I appeal to your help. Just like I appeal to the world to bring their voices in, and say "here we are." If you feel that we should be paying more attention to Classical Chinese or Persian, then help make Persian available.

Geoffrey Bowker

The definition of the digital humanities, I think, is extremely interesting. Digital humanities is one of those terms that appears to be moving us towards a retronym, where we're going to talk about paper-based humanities in the future and we'll assume that humanities are digital. This is sort of the problem that the field of anthropology was faced with a number of years ago—the problem of being a discipline in search of a topic. I think humanities is in many ways in the same position right now. There is incredible humanities work that needs to be done about databases. It needs to be done about how do we read code and understand code, for example. It needs to involve all the critical skills that we've developed over time. I always worry in conversations about the digital when we just talk about importing across the old and not really looking at the new.

Murtha brought up this lovely point about the subscription model—in that case, it's really an institutional question. One of the things I love about the University of California is that we now have an open access policy, so that when we publish our articles, they have to be published and made available freely to the public.

Finally, I hear from all your comments that I really put my foot in it about the digital being better. Well, let me put my foot in further. I had a student a few years ago who was working on the history of photography. He loved gelatine prints for exactly the reason you love manuscripts, Glenn: silver gel prints have got texture to them—they've got reality to them. The problem is that silver gelatine prints only last about fifty years, after which the digital is definitely better than the original.

Murtha Baca

In that case, too, Geoffrey, the digital copy becomes a preservation mechanism. Because the original thing is going to go away, or degrade so much that you can't use it any more.

Geoffrey Bowker

Yes. Which would be true of all the forms that we've got right now, except we don't have good long-term curation for digital reproductions either.

I wanted to pick up on something John alluded to just now, about how old techniques are being rediscovered in new forms.. The vast work that's been done in the humanities about producing concordances, the concept of the Latin *hapax*

legomenon, which is the first appearance of a word in a text—those kinds of techniques are being “invented” and deployed by digital humanities scholars, by lots of scholars who don’t recognize that they’ve got a long tradition, a long filiation. So it’s a case of how we mix and match so that people can really understand they are part of this much longer critical tradition.

Matthew Battles

This notion that there is a scholarly tradition in the classics that lends itself particularly well to digitization, to computational methods, is very interesting. I’m persuaded by it and I think it’s a useful historicization. At the same time, it seems that if it were perfectly the case, then there would be no change, right? This set of disciplines would transport itself into the digital without change. Yet it seems utterly transformed by the kind of work that you’re doing, Greg. I’d be interested to push the discussion back from the training of scholars at the college level into younger students and secondary schools, where in some places (including my children’s school, Boston Latin), the classics remain at least symbolically important. I’m wondering what kind of reader, eventually what kind of human being can we imagine these networks, these resources beginning to produce? The secondary school reader is somebody different. It seems like it’s important that they appreciate the riches of sophisticated scholarship and the tradition, something that may have to do with the application of some of that rigor.

I also want to mention two other form of knowledge production, classification, and ordering. is GitHub is a site where people share code that they’re working on: and what’s the philological approach to GitHub? Finally, how do we unpack the virtues and practices that coalesce in terms like “openness” and “sustainability” in the kinds of energies that seem to be denoted by a word like “push,” or “get” as Geoffrey said. When do we begin to produce readers, humanists, as it were, who are reading these forms as well?

Ann-Sophie Lehmann

I want to point to an institutional paradox in relation to those new readers. I think a lot of your passion, Greg, arises from the fact that your discipline is on the verge of becoming extinct—hence relatively low student numbers. You can enlist them in research because you have small groups, which is one positive effect. In the discipline I work in, media studies, we have gigantic student groups. I wish I had the teachers and the time to enlist them in exactly this sort of close reading, into doing the science that we do to develop these new skills. We can’t because there’s

so many of them. In a digital humanities framework, where they could meet and where I could put one of my media students with one of your Latin or musicology students and make them each realize that what the other studies is interesting as well, that would be fantastic.

John Tresch

The solution is simple: you just require all the students in media studies to learn ancient Greek.

Ann-Sophie Lehmann

Then we're going to have fewer students.

Gregory Crane

And we'll have more.

Mary Crane's first book, published thirty years ago, studied Renaissance humanism in England. Her argument was that studying Greek and Latin was training for dealing with big databases. In other words, a king couldn't work by chains of direct control: I know you, you know your people. Instead, everybody becomes a database record, centralized. If you can do Greek and Latin, then you also have the ability to work in the chancellery.² In fact, I would say that's why Greek and Latin are still so successful, because if you can do Greek and Latin, you can learn the probability theory to read the machine learning, and do anything you want. I made a racket out of hiring people out of Greek and Latin because I know they're smart enough to figure anything out that they need to. So you should not be scared of this stuff, if you can already do the things you do.

I got into this digital work for a couple of reasons. When I was a first-year graduate student I was able to spend all my time on Greek and Latin texts. When I looked at primary sources, I found that I often disagreed with the conclusions that the secondary sources had drawn. That's what turned me into a scholar. It was the ability to see the foundations for every statement and pursue their conclusions. I wanted that to be something universally accessible to everyone, not just me in the world's greatest university library.

The other reason I went into digital humanities was that I was working with scholarship that was a hundred years old, so when I was asked to set up the first computer system for the Harvard classics department I saw that it was the future. It was clear that the field was going to be digital, and that was 1982. And thinking

about a hundred years in the future is something we can do as scholars. We may not have as many people reading Ancient Greek and Latin as read English, German or Chinese, but I am optimistic that there will be people reading Greek and Latin and thinking about Greco-Roman culture in a thousand years. And this is the privilege that we have. The digital humanities are about how you study Greek and Latin, and how you address the issues of intellectual rigor you describe but to do it as intelligently as you can with the resources available.

Filippomaria Pontani

Last night we heard a reading of Borges' "Library of Babel": the one real, existing book mentioned in that reading was the Gospel of Basilides, and the commentary on it. This is a lost book, of course, but a book we know of thanks to Origen and Jerome, especially Origen, who mentions it in a homily. It is a gospel in which, as you may recall, Christ was not crucified. The interesting thing is that our knowledge of this text is purely due to the acts of philology: to recover the existence of this lost text through the witness of another text, a typical *Quellenkritik* to put it German. Another detail in that reading: in the version we have listened to, the catalogue of the books in Borges' library includes "the translation of every book in all languages, the interpolations of every book in all books," full stop. However, some of you may be familiar with the second (and definitive) version of Borges' text, which does not stop there but actually carries on: *Las interpolaciones de cada libro en todos los libros, el tratado que Beda pudo escribir (y no escribió) sobre la mitología de los Sájones, los libros perdidos de Tácito*.³ So there are more books in the library of Babel than those recorded last night, and the existence of these books in Borges' library can be recovered through a philological collation of the different copies of Borges' library itself (square philology, if I may say so). This is why philology matters.

Simon Schaffer

I'd like to briefly turn back to the thought Greg mentioned from Mary Crane, that classical philology was not just imperialism by other means, it *was* imperialism. The relation between the two Humboldt brothers, the explorer and the linguist, is thus not an exception, but further evidence that this is the case. And as we turn in our next essays to Chinese libraries and the libraries of Orientalism, I think this line connecting the two Humboldtian sciences will be drawn even more strongly.

NOTES

1. <https://github.com/>
2. Crane, Mary. *Framing Authority: Sayings, Self, and Society in Sixteenth Century England*. Princeton: Princeton University Press, 1993.
3. See also, <https://www.newcriterion.com/issues/1999/3/things-that-might-have-been>. “The translation of every book into every language, the interpolations of every book into all books, the treatise Bede could have written (but did not) on the mythology of the Saxon people, the lost books of Tacitus.” (Borges, *Collected Fictions*, trans. Andrew Hurley. Penguin: New York, 1999, p. 115).

PART II

RE-ORIENTING COLLECTIONS

Unpacking the Chinese Library

Dagmar Schäfer

Unlike in Europe, in Asia opportunities for digitization have been optimistically embraced. They are conceived of both as tools for modernization and as tools to protect cultural heritage materials and shape their historical identity. This essay unpacks the issues faced by a European research institute library that has expanded its view of the history of science to encompass the globe, and is thus challenged by the rapid development of digital (re)sources and digitization tools in Asia. I focus on my own institution, the Max Planck Institute for the History of Science, Berlin (MPIWG), to address issues facing the wider scholarly community in which it is based.

Research at the MPIWG centers around the history of science—although researchers still have very different ideas about what the history of science actually involves. The library caters to a dynamic community both within the building—with the option to either work alone or collaboratively—and outside it, with colleagues working around the globe. The acquisition budget is huge, but physical space is limited: the library holds about 20% of its resources (books, digital resources, and “analogue” cultural ephemera) on site, and the remaining 80% is printed literature ordered through interlibrary loans. Despite all this, the library is attempting to create a collection on the history of science by means of its curation of new research: if you simply examine everything that comes into or leaves the institute, along with everything that is accessed by digital means, you will have a good survey of what is currently relevant to research in the history of science.

With the advent of the digital, physical location and attributes no longer reflect

what the library actually does or how it functions. As it has grown into a digital space, the library has also grown into a locus of conversation about the very nature of the history of science. On a daily basis, we negotiate what needs to be housed at MPIWG physically, and what can be accessed via other, usually digital, sources. MPIWG's collection has been built around the core tenets of the research agendas of three departments that, until 2013, were informed by the trajectory of the sciences in Western (i.e., European and North American) cultures. As its collection expanded to encompass the globe, the library at MPIWG requested literature on and from other cultures via interlibrary loan. This development was reflected in the material organization of sources: the Western canon was analogue and present on the shelves, while sources on “the rest” entered the library either temporarily or in digital form(s).

Established in 2013, the MPIWG's Department III took as its research domain science and technology in Asia, specifically in Chinese culture. China's historiography is vast; even an abridged reference library would easily fill all the unused space at the MPIWG. Spanning two thousand five hundred years, Chinese historiographic sources include private writings to philosophers, historians, and novelists, as well as varied historical ideas about libraries and the use, storage, and evaluation of the “written word.” I put “written word” in quotes here to draw a contrast and distinction with the word “book”—in agreement with Glenn Most's insistence on the difficulty of defining texts historically. Within this historiographical tradition, there is a long and ongoing discussion about “thought materialized in writing,” what kind of “data” is implied by the “written word,” and the broader question of what knowledge actually is. I can demonstrate this re-framing by defining the Chinese terms for knowledge practices rooted in the book.

書院

書院

書院

書院

Figure 4.1. *shu yuan* (書院).

The figure above shows the original Chinese term for a storage room for books, or more accurately, for an archive: a *shu yuan* (書院). Records dating back to the second century, when China entered the dynastic era, document the existence of imperial and elite *shu yuan*. These storage rooms for records of all kinds—which combined archival and library tasks—contained multitudinous materials, from the emperor’s private correspondence to memorial and archival records, from classic literature to personal writings on philosophy, history, poetry, and fiction.¹ Dynastic historiography since the Han era included a list of all holdings in the imperial library, giving us an excellent understanding of imperial approaches to canonical writings and elucidating what was considered by them to be orthodox literature.

書院

圖書館

圖書館

圖書館

Figure 4.2. *tu shu guan* (圖書館).

The second term is *tu shu guan* (圖書館), meaning “building for books and images” (Fig. 4.2). This compound term spotlights two different media: bound books (that is, printed volumes and manuscripts) and diagrammatic representations. Dating to the late nineteenth and early twentieth centuries, *tu shu guan* is the modern term for a library, connoting information stored via paper or any other flat surface, such as textiles or wood.

事物館

博物館

博物館

博物館

Figure 4.3. *bówùguǎn* (博物館).

The third term is *bówùguǎn* (博物館): the museum. *Bówùguǎn* is a traditional term, dating back to around the third century. *Bówù* means the “investigation of things,” where “things” means anything and everything that took on a form, including ghosts and all parts of the human body, as well as minerals and plants. It’s a term that probably comes nearest to traditions of alchemy, mineralogy, herbology, and so on. According to the Song Dynastic scholar Ouyang Xiu (歐陽修), the *bówùguǎn* is where one explores the natural world: “grasses and woods, worms and fishes [—] the expert of the Book of Poetry studies these together. The investigation of things is extraordinarily difficult.”² In the buildings for the investigation of things, erudite scholars (the “experts of the Book of Poetry”) studied flora and fauna through the lens of the written word. Thus, three sets of materiality emerged: (1) archival records and canonical literature; (2) books, manuscripts, illustrations, and diagrams; (3) things.

These terms illustrate the fact that, in China, a library was not defined by the format of the materials that it housed. Indeed, the study room of the Chinese scholar had at least four different treasure halls: one for “things,” one for paper, one for nature, an additional one I have not yet mentioned, for discussions with other scholars (i.e., oral transmission). Thus, studying and learning in what we would

now call a library meant making space for disparate forms and formats of information necessary to develop deep knowledge and understanding of the world.



Figure 4.4. *tu*.

Let us now turn our attention to *tu* (Figure 4), closely studied by Francesca Bray and her collaborators. As a concept, *tu* addresses all kinds of illustrative formats with a technical—rather than an aesthetic—purpose. In the twelfth century, the scholar Zheng Qiao (鄭樵) defined *tu* as a diagrammatic multivalence that complemented and, at times, superseded the power of words. Examples of *tu* range from architectural plans to maps. Most, however, are graphics illustrating processes of thinking or understanding through spatial relationships.

Tu can be two or three-dimensional, demonstrating that the challenge of dealing with varying physical formats is not a new problem for libraries: it is visible in the past as much as it is in the present. Scholars have engaged with *tu* in relation to writing since early times, but interest in *tu* spiked in the wake of the Song Dynasty's increased production of woodblock-printed materials, in the period roughly from the ninth to the twelfth century. This shift in printing techniques changed ideas about where data was stored, and how it was used. Stacks of wooden blocks were handled by printers and librarians with great care, because, at the time, these blocks were regarded as the origin of all paper books. Or, put the other way: paper versions, whether printed or handwritten, were considered to be copies. To own an idea, to own information or knowledge of any kind, you had to own the

woodblocks on which that knowledge was inscribed. If they could afford it, authors like Song Yingxing (宋應星) would collect the woodblocks of their own writings. Contemporary bibliophiles such as Qi Chenghan (祁承漢) estimated the value of their collected editions based on the degree of separation between the copy and the original woodblock or manuscript.

Focusing on this period from the ninth to the twelfth centuries we see how the changes in printing techniques and the social shift from a military aristocracy to a meritocracy impacted the intellectual debate on the role of books as information carriers, beyond simple questions of format. In examining this period, Hilde de Weerdt points to “an information revolution,” or a new information order. She notes that people became extremely anxious about textual copying, both in practice and in theory. It was in this context that they defined the relationship between how you copy, where you place, and how you retrieve textual information. Increasingly, scholars pondered how the material format of the written word affected the information that could or could not be retrieved from it. They concerned themselves with questions like: if woodblock and paper are the standard, what should be done with stone tablets that historians and elites had systematically employed to preserve texts and create reliable origins for the copying of textual records?³ Others asked about the role of texts on bronze casts, a material that—according to the classical canon—the first wise rulers used to illustrate the regions of the empire and to record tax obligations.⁴

One outcome of these discussions was the emergence of two disciplines: the discipline of epigraphy (*jin shixue*, 金石學), and the discipline of “studying the ancient,” i.e., archaeology (*kǎogǔxue*, 考古學). A major issue that emerged was whether information inscribed on objects or on things, at least material things, was more trustworthy than the text copied onto paper. Was the stone tablet copy more reliable, more original, because the carrier was more stable? Opinions clashed about how and why the information carrier was or was not trustworthy. Thus, the print revolution, paper copies, and the easy reproducibility of texts raised scholarly awareness and increased scholarly concern about the disruptions that mark any circulation of knowledge. Ultimately, Chinese scholars increasingly emphasized texts as the best repositories of information. But what might count as a “text” was surprisingly variable.



Figure 4.5. Qing Dynasty silk.

The vast range of historical sources suggest that that libraries in China, rather than simply collecting books, always strove to deal with knowledge production writ large. This meant that they dealt not only with “the written word” as text but with verbal transmission as a complex endeavor that included the material carrier of the words. Two examples of this from China are a silk cloth and a porcelain bowl. Fig. 4.5 shows a very late example of Qing Dynasty silk. Its inscription lists information about taxes, which official was in charge of the manufacture, and who actually made this product. A porcelain bowl from a shipwreck during the Song Dynasty has information about social relationships inscribed on the back. On the silk textile, scholars eternalized their poetry and at the same time negotiated responsibilities of production—naming, for instance, the original workshop in which a piece was produced or which official supervised quality.

If the growing field of the history of science is serious about taking a global perspective, it needs to consider how it will handle objects like these for future researchers and historians. How should a library react to and reflect the epigraphic habitat of China—particularly the fact that people have read information from all

kinds of objects, interpreted this information in relation to the text carrier, and in that fashion derived wisdom from a combination of inputs beyond simply paper documents? Pragmatically, the library has to provide access to different kinds of databases, going beyond the nineteenth-century separation into disciplines such as art, archeology, philosophy, or the division of formats between, for example, the three-dimensional objects that are considered to belong in museums, and the written texts that are considered to be a librarian's duty.



Figure 4.6. MPIWG Library, Berlin.

Now let us address the second challenge facing libraries that I mentioned earlier: the challenge that expansion into a global arena holds for a specialized library such as that of the Max Planck Institute for the History of Science. The Chinese imperial collection of the Qianlong emperor of the seventeenth—and eighteenth-century objects called “The Four Treasures” accumulated the riches of twenty-five hundred years of Chinese text production: the classical canon, commentaries, historiography, philosophy, private correspondence, novels, poetry, political treatises, and economic and social tracts. The emperor’s goal was to collect all the literature of the empire, in an effort to define what was worth preserving and relevant to his time. This accumulation of texts—a frozen moment in a reference corpus’ life—is exactly

what a library should not become. Instead, a library must reflect the dynamics of changing mindsets about format, knowledge, classification, and content. As a library catering to researchers, what is found on the shelves of the MPIWG's library and the ways it is curated inherently make a statement about the very nature and composition of the history of science. From this perspective, it would be inappropriate and ineffective for an historian of China to use a Western classification system such as the Dewey Decimal system: this would force the librarian to classify what Shen Gua, for instance, knew about sounds into a category such as "physics, in the twelfth century," even though the relevant scholarship explicitly states that such classifications are of little help. The field of early modern European history encounters a similar problem, except that historians of this field would claim that, in this case, the classification is valid because Shen Gua's ideas eventually resulted in what is known as modern science.

One method that libraries use in the face of increasing global complexity is to provide complementary digital texts for analogue collections. Sinologists and historians of China embraced digitized texts early on because of their vast potential, and also because the Cultural Revolution deprived them of access to original texts for decades; examples include digital translation projects such as the Chinese Text Project which is meant to facilitate sharing and scholarly discussion.⁵ Its emphasis on linking primary texts and references mirrors the pathways and associations that Chinese literati would have drawn, elucidating and conveying to a broader audience the principles and character of China's tradition of philosophy, history, and science. Another important open access digital initiative is the China Biographical Database (CBDB) overseen by Peter Bol at Harvard University, an online relational database of biographical information about roughly one hundred and fifty thousand individuals in Chinese history.⁶ The database also features social relations based on primary sources. Established in the 1970s, CBDB ran on one of the first university computers in the United States, and has probably migrated to new systems several times while growing almost as large as the database of Cuneiform tablets, now hosted by UCLA. The CBDB database is "peer-reviewed" by an expert scholarly community that rates it as 80-95% reliable. Original references are reproduced within the database, but do not yet link directly to a copy of the original text. While it is never referenced in academic publications, the scholarly community uses it regularly as a search and reference tool.

Recently, the CBDB has been improved by text tagging, concentrating attention on what people draw out of the huge mass of digitized data; at the same time, the CBDB is being used to identify information and to tag texts from other databases automatically such as "factoids" in biographical texts. (Another database that has become a general working tool for Chinese history is the China Historical GIS sys-

tem created by Peter Bol and Ge Jianxiong from Shanghai and Harvard University. It was originally meant to help reproduce the historical changes in political borders and landscapes, but has since turned into a general mapping tool for geo-reference-able historical information. The system focuses on the dynastic period (circa 220 C.E.) up to the 1820s—which indicates that its major users are historians. Like the CBDB, this database is constantly used, but rarely referenced.

Clearly, databases based on primary texts, artefacts, or scientific analysis have replaced more traditional methods of search and retrieval, technologies such as concordances, dictionaries, or reference works. The full text itself becomes a kind of the dictionary, wherein otherwise hidden linkages are revealed. The possibility of having full texts available to work with also allows us to both test and understand how linkages were created, and how standards were set and maintained (or not) across time and space. A project at the MPIWG examines the creation of such standards in the genre of local gazetteers (*difang zhi*, 地方志), a profession that has existed from 900 C.E. to today.

Similarly, the East Asia department of the Staatsbibliothek, Berlin, shifted from acquiring paper texts to digital full text at the start of the twenty-first century, and is now one of the biggest repositories of Asian digital sources in Europe. The local gazetteers—or local histories, essentially—house full text references for information on localities in China and their historical changes in a structured format, including information about changes in administrative staffing, architecture, taxes, local products and so on. In short, it's encyclopedic.

Chinese historians have always used local gazetteers, but the corpus in its entirety evades analysis due its sheer size—more than eight thousand records up to 1850. However, digital versions and the availability of full texts enable scholars to start asking new questions. For instance, how, in a territory as huge as Asia, was terminology standardized and shared, or how it did it differ among regions? How did the local collection of data relate to imperial or capital uses, or to elite language? Is it now possible to identify and compare conceptual patterns in the ritual reception of geographic space described in almost all local gazetteers? In this way, digital resources not only bring about a quantitative, but also a qualitative change in historical work, allowing us to dissect issues in new ways, reveal hidden linkages, and display these new insights all at the same time.



Figure 4.7. Map of coverage of local monographs.

Fig. 4.7, above, shows the coverage of local monographs. The light blue points indicate extant or documented local monographs, which gives an interesting view of what Chinese scholars considered central state terrain. We could also assert that the map displays how text and topography constitute each other, because these local monographs were the reference point for officials to grasp “Chinese localities” both materially (i.e. through taxes, material production, and raw materials) and socially. Generations of local officials and gentry revised their own local gazetteers, creating an identity for their locality. Before digitalization, historians mapped general patterns across the corpus of local gazetteers—things like how temple buildings differed or how disasters were perceived. This historical research provides the basis and model on which to develop algorithms for computer analysis, and to reorder information for further analysis. An open question for colleagues at the MPIGW is where we will put this newly created data—the new version of concordances or reference repositories—and how do we make it available, to avoid redundant work. In many ways, these new research methods and the creation of new layers of data challenge the traditional way in which libraries are set up. How is this all supposed to work? The library is part of a process in which both the researcher and the consumer of research are equally important. Effectively, what is at stake is the transparent,

smooth functioning of the full cycle of academic life—from the analysis of sources, to data production, to interpretation, and back to the creation of new sources, with all of these stages valid and accessible. This full academic cycle forms the outline of any project in which our library is involved; at its heart stands the idea that our work involves the creation of research data layers, which then need to be organized in a sort of middleware, between the original sources and our final research outputs. Using this workflow and these tools solves the problem of providing access to licensed texts. It also takes the research one step further, as everything we create is fed back to the middleware, meaning that a more analytical level of research—for example, a concordance level—will also exist on the middleware for future scholars.

In the digital world, research results are immediately apparent to the user, who can then incorporate those results in a novel way in his or her research. Thus, several routes are opened, in contrast to the one laid out in the traditional analogue library, between source and interpretation. Translating these variable research methodologies into the analogue world by making them visible, and then guiding users through the maze, is one of the challenges that our library faces in the future.

DEBATE

Glenn Most

To begin with, you said that a Chinese library would be organized differently from a European one. Could you give examples of the ways in which a Chinese library might be classified and organized that would be different from a European one? Also, in terms of the local monographs or gazetteers: are these official documents done by government officials for the government, or for outside readers? Who are they done for, and who's paying for them?

Dagmar Schäfer

A library is very different in the Chinese context. Basically libraries were started by the Warring States, or by the Han Dynasty at the latest, as imperial collections. And as imperial collections they have both archival collections and books; they include everything written down on silk paper or bamboo. By the tenth century, big collections appear, of which one part is stored at the court, and some libraries are in what you would call private academies. The principle is that the material defines what the library is. If books are there, it's a hall for books, or a hall for paper, or a

hall for things written on all kinds of materials. Therefore, a *shu yuan* is different from a Stele hall (*Bei lin* 碑林) for texts carved on stone. Materials define what the library is and how it functions. And then, starting from, let's say roughly from the 14th to 15th century, private collections emerge, where people collect printed matter, manuscripts, and everything else—Cynthia Brokaw, Kai-wing Chow, Lucille Chia, and Hilde deWeerd have written about this.

By that time, the manuscript was really keeping up with the book—but interest extends beyond the printed book: there is greater interest in exotica. There is also a kind of school system with open libraries which make texts and the canon available. At the same time, there are archives with many kinds of written information, and private libraries containing printed items and manuscripts; these libraries are never public. The study rooms are accessible, but the library can only be accessed via the catalogue. The libraries, of bibliophiles, such as the aforementioned Qi Chenghan, were very nice spaces. Qi imagined and implemented the *shu yuan*, the library as a garden, and that's probably what it was: a big territory with different buildings, wherein each building contained different categories, and there would be separate rooms where the material could be read. That would probably be something we would call a library.

In terms of the local monographs: local gazetteers were written by people from the ninth or tenth century. At this point, China became a meritocracy, and officials took charge of local offices and wrote these local gazetteers as guides for the next person who would be coming there, because they worked on rotation. But the local gentry also started to write gazetteers, or contributed to them, because they thought it was important to help build a place's reputation so that it would grow. It was not only officials who wrote them. Everybody who is interested in the locality could contribute, it's a collective effort.

Geoffrey Bowker

What kinds of standardization procedures were used? Were there local cultures of collection, local cultures of classification, were national standards developed? And, if so, how were they enforced?

Simon Schaffer

Is there science? Are there poems about science? Are there standards? How were they reinforced?

Dagmar Schäfer

There is no science in China.

Ruth Padel

But they invented bronze. They must have had treatises.

Dagmar Schäfer

None of these sources really fit any category. Details about a bronze molding would probably be found in one local monograph, or a private writing, or in a kind of encyclopedia. It's a problem: how do you actually organize it? The Needham Research Institute has been working on this. A private writing by Shen Gua, who writes about the compass in the 10th century, ends up in 'astronomy,' or in 'instrument making'. But the rest of that private writing is about different things, like poetry, or how to fight locust disasters. To really make this work it would be necessary to tear the text apart and put it in many different categories. Whereas in a European library, there is no such category as 'private writings'. Thus, placing it becomes a challenge. Digitization helps, but the categories have to be made so that researchers can find the material. This is why East Asian scholars have libraries that are organized so differently, and do not work with the Dewey system. As for the matter of standardization, this is what we are trying to find out with the research on local gazetteers: were there standards? How did people maintain these standards? If local officials rotated does that mean the next place they went to had the same terminology? We don't know that yet.

Ruth Padel

Techne is an important word for us because it's both arts and science in Greek. So the Chinese, who invented everything that we think of as *techne*—paper, printing, and gunpowder—didn't have a category for writing about such things?

Dagmar Schäfer

There was a category, for instance *Bo wu* 博物, erudition about things. But this also contains information about young women dying and transforming into fox ghosts.

Ruth Padel

That's under the same branch as writing paper or bones?

Dagmar Schäfer

Yes, and in the same branch there would be information on duck breeding, which turns up in a 7th century text. According to that author, paper and writing explain a similar principle to duck breeding—and that's why he puts it under one category.

Simon Schaffer

So the famous joke by Borges (picked up by all Foucauldian scholars), is actually a very precise, philological remark about the difference between the Western library and the Chinese hall of records.

Dagmar Schäfer

Yes. Absolutely.

Ann-Sophie Lehmann

Are there images of practices? How are those being archived and related in the database system? A wonderful way of digitizing material is to provide interconnections between things and people and texts. A database that resembles that a bit is that of the British Museum, which is growing—it seems somewhat intuitive, as both books and things are part of it, but the relations aren't always clear. For now, it's a great playground. I wonder if this aspect of the British Museum has something to do with the colonial relation. By way of importing so many objects from Asia, do they almost involuntarily have to recreate such a relative database here? Finally, how does the 'middleware' allow you to work around copyright issues?

John Tresch

To add my own related questions, you're saying that what we might call science would be called in China "knowledge of things" and these would be found in private writings, in the same texts as very different material. How would a researcher

coming from the West who wants to look up natural history pick those texts apart? How do you build that structure? Do those databases help do that, do they allow us to impose our categories on these very different kinds of texts, and if so, how?

Similarly, how do the differences in the material basis of the objects show up in these databases? The local monographs seem to be mainly paper, while and other databases you have mentioned seem to be doing what Ann-Sophie says the British library does, by mixing different kinds of objects. How does that show up in the interface? How do you reference that? Is it enough to have digital interfaces that itemize very heterogeneous kinds of objects, or do you also need some of those objects there? Not just the paper but the ceramics and the furniture?

Dagmar Schäfer

Is the digital enough? No, certainly not. But there is the problem of cultural heritage. Many of the texts I would like to have, or would like to see editions of, are not easily available to me other than as digital objects. The MPIWG library I'm describing is a kind of first access point. The British library is an imperial institution, they have the same problem, which they also have with Indian objects: the researchers there are very advanced, but they still don't really know how to categorize. They constantly have this problem. It's very difficult to get the concepts that you find here and in the Academia Sinica to match up. Both sides are aware of the problem, but both work within their own system.

So for instance Chinese landscape painting, *Shan shui* 山水, is not the same thing as European landscape painting. So how do you actually match it? And since *Shan shui* landscape paintings are on porcelain and paper and silicon, the Chinese would basically categorize them that way, by the material basis. How do you fit that in? In the digital world we try to make these connections, but for example, when you search for "natural history" you get prompts asking "do you mean good"? "Do you mean *beaux*?" et cetera. And you need to understand why these concepts differ; for example, there is no nature/nurture divide in China. Or, *zi ran* 自然, which is translated as "nature", is a term invented in the nineteenth century because missionaries realized that the Western approach to nature was very different from the Chinese, who almost never excluded humans from nature, because humans are part of the natural system. How do you work with these issues? Digital methods are not enough. But they are a way to start dealing with these questions and to get a more sophisticated approach to them.

Take for instance a fifteenth-century book on *Wu li* 物理, the principle of things (which is also the modern word for “physics”) and put it in the category of physics—even though physics, probably, is not in it, since it’s about the principle of things, which is something different. These matches need to be made and you have to make compromises. This is a huge issue for which libraries have to take responsibility: how do you get the user to understand what he or she actually sees. Our databases don’t do that, they are basically defined for the users who know what they will find, or already have at least some knowledge of that. This is not only for the Chinese world, it’s for any world.

Working around copyright is a problem. What I’m calling the middleware does work around copyright. Many of these databases are actually created to earn money—whether this is by the Chinese government, or some Chinese institution. They are so expensive that few institutions can afford them. Many national libraries try to get them, but not every university can afford them. But we want to make a claim with this set up that not only getting the data out but thinking of it in new ways is already an academic effort. So, getting it out and editing is supposed to be taken care of in the middleware: we produce an additive text version, we produce dictionary setups, we produce new terminologies or thesauruses that we put in this middleware and we make the claim that this is not the same as the raw data that you find in the digital full text. Tagging already makes those original digital texts different. This is really an initiative where we try to recognize the many people that really deserve credit in making something readable. This also means we need to work with that middleware and not only with the raw text, as we had previously worked with concordances, or additive text, or annotated text editions. This is basically what the middleware tries to take care of and it is also a way to solve the copyright because it creates a new text.

Another issue is the flatness of the digital world. My so-called digital content creator Chen Shih-pei who is from the Academia Sinica, usually answers that all objects are digital objects; for her it doesn’t matter if they are three dimensional. I don’t think the digital world can replace the other one, but it can show us relations. And I think that is really where the knowledge of these things lies. It’s not the object that really counts, it’s the infrastructure. Because that allows you to represent a knowledge system with relations of different kinds. So, it can give an entry point for the Europeanist who thinks of knowledge in terms of nature/nurture divide, and it can at the same time lead him to say, “these were the reference points.” Really thinking more about the knowledge and the infrastructure would be very interesting rather than concentrating on which objects are in there.

As for whether the display is three—or two-dimensional, or is it “near to nature” or not—it never will be. It’s always different. That’s not the purpose of the digital

object. It cannot replace the painting on the wall, but that's not what it's supposed to do. I think these kinds of data are not to replace or represent the object, they are showing new possibilities for locating and knowing it. I think that's what the library should take control of.

Murtha Baca

Is the Chinese Biographical Database not cited because it's online?

Gregory Crane

One reason why you wouldn't cite it is because these things aren't persistent. And their rights situation can be ambiguous. But it's a problem when there is a system where everybody uses it, but nobody cites it. That's a broken system. It's unstable and unsustainable system. It can't last like that.

Dagmar Schäfer

The rights situation is a difficult issue.

Gregory Crane

We haven't really talked about the issue of rights. Often these are not copyrights, but contract laws, which are a very different kind of thing. In the United States we have a private system of education. So if you're in a private institution you have no real obligations to the public. But in Europe, you're a public servant. We have this problem, where we're still handing over the results of our work to commercial, for-profit, enterprises. There's also a challenge about what counts. I would say that middleware is the editorial level. That's where the modern editor would work, interacting with dynamic systems, improving, augmenting; the academic layer looks like the top of a hierarchy, that's the Modern Language Association model of the essay, where the monograph is the thing that gets you a prestigious job. But the middleware layer is essential. That middleware layer doesn't work entirely if you do it automatically. It requires expertise. And we're trying to understand what that means. Those damned machines are 80% accurate sometimes, 95% accurate sometimes, 99% accurate sometimes, and different accuracies support different kinds of activities.

Murtha Baca

It's still not clear to me why people don't cite the Chinese Biographical Database. Is it because it's considered not stable, or not academically valid?

Dagmar Schäfer

It's a question of tradition. It's not that it's not stable, it's a very reliable database—which doesn't mean that that it doesn't contain mistakes. But it's very reliable and it's renowned, the people who are working on it really know what they're doing, it's peer reviewed. But the tradition, in our field, says you have to go back to the source; you have to know which edition you're using. I think the Chinese are concerned about that, really knowing if it's this edition or this person, published in this year and stored in this library. This is what you have to do in sinology, in Chinese philology. I would doubt that it is very different in other fields.

Murtha Baca

What would happen if someone did cite it?

Dagmar Schäfer

Nothing would happen, but graduate students would not be able to do it. They would be asked by their professors to change the citation. Even if you found it there, the expectation would still be that you actually have to go in and track it back to a source. It's a traditional idea of how a scholar should actually work.

Simon Schaffer

It's very clear that, at least in the village of Cambridge, England, the only people who can publicly cite Wikipedia are the people with tenured jobs.

Ann-Sophie Lehmann

Don't we just have to do both? I do both, because that way you know. It's easy, actually! Just one more line of text.

Dagmar Schäfer

Exactly; but I cannot agree more with Simon.

Aihwa Ong

Simon mentioned Borges' essay on the Chinese dictionary, cited in Foucault's *Order of Things*: and that text actually confronts your question directly in the first chapter. Foucault talks about how the Chinese classificatory system is a jumble of things and experiences, a bewildering set of relationships. He contrasts that apparent chaos with the Western order. In the West, there was a reordering of reality that came with the Enlightenment. So the Chinese cosmology has a logic that's very different than that of the modern West. I think the emphasis is on narratives and interrelationships rather than disembodied things: humans are not disembodied from nature, things are not disembodied from relationships. Perhaps in the ancient classificatory system that you mentioned, the focus is really on interrelationships rather than on things. So it's remarkable that you're also saying this is a property of the modern database.

Dagmar Schäfer

Exactly—it's remarkable. This is exactly what databases allow you to do: on the one hand you can store things anywhere, but at the same time you can really go and inquire into the interrelationships. I should add that the Chinese, by the nineteenth century, embraced Western categories. By the end of the nineteenth, early twentieth century, all the older archives were destroyed and things were reorganized. And that older archival structure is not really preserved.

For instance, in the Qing Dynasty, there was a different idea about what visuals do and what texts actually do, so by the 20th century all diagrams ended up in the "maps" section of the National Library. And all written texts end up in the archives of the National Archive. The definition that is then used is the Western definition. I always say that the Asians are more Eurocentric than we are, using the categories that define the modern world. But they know that it doesn't work as soon as they go back any further than the 19th century, and that it doesn't work with concepts like *li* or *qi* or *xing* or the like. Or the five phases. So they have to deal with that problem, while they are pushing for the very modern categories—and this produces all kinds of ambiguities and schizophrenia that they are trying to deal with. They do

a really great job of that in the Academia Sinica by, for instance, working with the Getty to make a thesaurus. It's always been about the ordering of things. And it's not chaotic, it's very clear. You cannot display the older system in a modern library, but you can in a digital database—or you can at least try.

I do think these systems are generally reliable and persistent. They may have times when they aren't, and they have times when they need improvement. It is the same problem as in Wikipedia: you have points in time when everybody is feeding into it and there's no real authority over who is actually working these systems, like *ctext*. But in general, there is a tendency in the Asian context, because there is so much text over so many centuries, to get it all out and to get people to work on it. That is what makes it sustainable, because more and more people get interested in it who don't necessarily care about anyone's particular philology project. So *ctext* is not actually bad. Not that everything is good, but it's not bad.

Murtha Baca

I don't think anybody should quote Wikipedia, whether or not they have tenure, because it's too unstable. Whereas something like the Chinese Biographical Database is great! We have editorial rules for it, because we quote online sources all the time, but we also have a rule that our database and vocabulary editors cannot quote Wikipedia because it's too unstable. But we do quote the Grove Dictionary of Art, morning, noon and night, and the *Allgemeines Künstlerlexikon*.

In terms of copyright, it was a very good point you made about the new product. That's another thing that we handle in our databases because we have very conservative lawyers at the Getty who deal with these intellectual property issues. When an organization like the Academia Sinica or the RKD in the Netherlands contribute to our databases they sign a contributor agreement saying "we're giving you the data." But, our databases are considered "compiled resources" because we also use published things like the *Times Atlas*, the *World Atlas*. Once you put these things together with other things and edit it, it becomes a "compiled resource." It becomes a new thing, and we can claim copyright on that new thing.

Dagmar, you said something about the users who know what they will find more or less. But I think we can also use language to help users find what they don't even know, or things they don't know what to call. Or if they don't know what's in that database. Even when you come to a museum website, especially a museum that you're not that familiar with, you don't know what to search for because you don't know what they've got in their collections. So, many museums now provide browsing categories. These are based on a local thesaurus.

I agree that it's all about the relationships. If you have structured data that ac-

tually encodes the relationships among the things in the data, it can really enhance the research quality. There's the hope that the move to open data will make this a reality on the web. Recently, I spoke at a conference in Dresden where I showed an example of an object in the National Palace Museum for which the Chinese name was *feng kai*. But the British Museum calls the same thing *famille rose*. If we had the vocabularies to get those terms linked, you would find them both, no matter what the museum called them. I could have shown an example from any museum, including the Getty, where the Western museum imposes its name on something. But if we start using this kind of data that encodes the relationships, we can break those barriers.

Dagmar Schäfer

The question is how do you actually make the match? That's why initiatives such as the Getty's are really important and that's what they basically do. They also try to automate part of the system because there is not enough human force to do it by hand. In some cases, it's probably also done better. But there are just too many things that we are not aware of, and this is why automation really must happen. I think the middleware thing is not about hierarchies—it's just the question of who is actually taking charge of which part of the process. At the moment, the researchers are taking responsibility for everything. So basically there are research projects that use some kind of data, they talk about relationships, and then they have to store the data. The project vanishes, the data is somehow around, but it's not really clear where things are going, so digital projects tend to just die. And then they do die, and the work that has been put in them has no place, not in the library, and not really in the web. The web doesn't really store it, it's "there," but not there.

Murtha Baca

The web is not a storage place. But because of the web and because we want to reach as many users as possible, we now have to start thinking about our collections and the cataloguing or metadata in terms of what it will look like outside of its context. Digitization doesn't mean access; it just means you digitized something. But unless you really think through the collection information, the vocabulary, probably no one can find it. So, we have to think what our collection information will look like when it's taken out of its local context, so a user can find it and understand it.

Dagmar Schäfer

And a research institute like ours doesn't want to store the data—neither the digital object, nor what we are producing. It's really not about hierarchy: we would give the book to the library, too, so why can't our data go back to the library? This is an unsolvable problem, at least for our institute. We have lots of servers full of stuff that we don't want and that are ultimately inaccessible.

Gregory Crane

There's the difference Murtha raised between "finding it" and "finding and understanding it." If you can understand the Chinese, you probably can't do the classical Arabic, and if you can, you probably can't do the Sanskrit. So that's the next stage. But digitizing doesn't mean access, you may be able to find it but so what? What we've seen with things like *Ctext* is an extraordinary shift in what you can do and who would be able to make use of that. Even if it's not the use which a person who spent twenty years learning or thirty years learning classical Chinese could make of it, it is not nothing.

Murtha Baca

What happens after the project is over? Both, where does the data live—where does it get archived or preserved—and also do the resources continue to live and be maintained on the web, and by whom? Digital things are usually conceived as projects, instead of programmatic activities. So there might be a three-year grant: you do your thing, you put it on the web and then you walk away. That isn't really the best way to work if you're producing a valuable thing that you want to persist in some way, and maybe continue to grow. It's a different timeline, I think, than those imagined when someone starts a library or a museum.

Geoffrey Bowker

I wanted to ask about the performative nature of the library and of the collection. Let me give a little bit of a background for that question: Thomas Mullaney has worked on the looseness of ethnic classification in China, and Judith Farquhar, working on Chinese Traditional Medicine, attempts to show that specific medical interventions made by the Chinese track to specific ethnicities. You're not going to win an intellectual property case unless it tracks to a given ethnicity—some iden-

tifiable group of people—which probably never existed at the time. So what is the role of the library, and of the organization of knowledge, in building states? This is the sort of thing Stefan Tanaka talks about in modern times in Japan. As Japan came out of the Meiji era, new organizations of knowledge were made such that Japanese knowledge will be in sync with Western knowledge. So, they invent an ethnic history; they invent a linguistic history; they invent a geological history that all fits in with the mainstream.

Filippomaria Pontani

Returning to philology, does this sort of project actually enable you to give some idea of the historical depth of texts that are transmitted? I heard from Ted Shaughnessy's lectures that the great discoveries that have been made over the last thirty or forty years are often new versions of well-known texts such as the Lao Tze; I wonder how such discoveries have changed the perception of the stability of those texts in Chinese culture. I wonder whether any of these projects tackles this issue.

Stéphane Van Damme

I am wondering whether the book, or what you call the local monograph, is still the real unit of information. If you can combine things—when you have maps, when you have text—you have different kind of information. The category of the book is called into question by interrogating the materiality of texts. Rather than stay between the front and back covers, is it possible to map itineraries of knowledge, for instance? Or to go beyond or to go below the category of books? If so it might be worth basing the methodology for choosing sources on trust, and reliability, rather than authenticity. In addition, what kind of continuity exists for knowledge between the archive, the library, and the museum?

Dagmar Schäfer

I think we all have the same problem. The identity of the library-museum, which is changing very quickly, is part of the development of the library as it finds its place in the future. This is true in Europe and in the Chinese context. There are huge tensions because on the one hand, we are a text-centered culture, but on the other hand we also have lots of material culture that we need to deal with. So how do we actually bring those together, when in the last hundred years, imperialism, and politics made us separate these two things? The digital world has become the

place where you actually try to approach the problem and discuss it and find ways of representing what institutionally you cannot really change.

As for your question about whether the book is the unit of knowledge, the book is already an imposed category in China. But there is also the tension that the fields of sinology, Chinese studies, and Chinese history have for most of their existence relied on texts rather than objects. This point is actually part of my new project on the histories of planning. In particular, when printing appeared and really proliferated in Chinese society in the ninth and tenth centuries, it wasn't really about the text; what they did was really think about how the materiality of data or information is related to what you want to say, or how you make knowledge. There is a much broader culture about where information is placed, what empiricism is, and the like. This is something that we have not really (at least in the history of science), worked with because it's difficult. If we start with the science category, we then start to look at books because that's where we think we'll find theoretical knowledge. So the way in which you look at knowledge production is very much related to philology, heavily focused on texts, and it neglects how people think about infrastructures of information, and how those are needed to build up knowledge or wisdom. Intellectual history is also very much inclined toward texts and philological methods, and has only recently looked at this other kind of information.

The historical stability of texts is a big topic in Chinese discussions. In particular, in the last twenty years or so, thanks to the boom in construction in China, we have become really aware that everything that we thought to be a canon is actually not. Things that we thought were stable texts by the third century, are definitely not because every tomb, everything these construction workers are opening up shows you a different version of text, A, B and C. There was an imperial culture that tried to create a stability of texts, but there is a huge variety below that. As Greg was discussing with Greek and Latin, digital efforts really make it possible to talk about that, to find that information and data, and thus to think about the stability of text differently. Also, with those texts that we actually have, there's a question of how it adds up. Some people think that something has changed, even though there probably isn't a change in the quantity of information or the format of the book; but the commentary changes the arrangement, and for the Chinese, that turns it into a new book.

Simon Schaffer

And what about Geoffrey's question, about the library as a state formation?

Dagmar Schäfer

Yes, and its relation to ethnicity. This is another issue with cultural heritage. The local monographs and gazetteers, for instance, are used for contemporary property debates. Or, in the case of ethnicities who claim a relation to specific products—such as the silk from Hangzhou—they work with these texts in folklore and cultural databases. And they use these to build their identities. But it is an ongoing historical process. The local monographs or gazetteers have always been used to inscribe the idea of what the material identity, the social identity, the ritual identity of a place is. And yes, exactly: the Chinese government makes a lot of use of that. Especially with lawsuits and the like; they're quoting these sources. This makes them all the more important to think about.

Simon Schaffer

I want to remind us what Aihwa said about the cosmological dimensions of these ways of ordering knowledge, whether in libraries, archives, or databases. One of the enormous results of making this Chinese material available is, as Foucault pointed out, that it massively destabilizes Eurocentric senses of what is European. It's the mirror-phase. Your gazetteers, for example, make me think about the genre of local monographs in early modern Europe, which in English was called *chorography*. Anachronistically, much of the material which historians of Western sciences celebrate as major breakthroughs in the early modern period, including the whole of Linnean natural history, first appeared in a series of such local monographs. Linnaeus was writing the chorography of Lapland, about Ingermanland, about Westermanland, and so on.

Very few historians of the eighteenth-century science would now class anything by Linnaeus under the heading *chorography*—but in the disciplinary terms of the time, that's where it should be. When I get home, I'll go to the University library, and convince them to take all the shelves dedicated to the scientific revolution and redistribute them between Lapland and Worcestershire, so that none of my students will ever be able to find them again. It'll be great.

NOTES

1. M Kern.
2. 草木虫魚, 《詩》家自爲一學, 博物尤難 (笔说·博物说)
3. As an aside, elites and the court invested in so-called stone forests (*beilin*, 碑林), that is, the inscription of canonical literature into stone stele that were then collected.
4. De Weerd, Hilde. *Information, Territory, and Elite Networks: The Crisis and Maintenance of Empire in Song China*. Cambridge, MA: Harvard University Asia Center, 2015.
5. Link to China Text Project.
6. Projects.iq.harvard.edu

Mobile Philology and the Invisible Library

Stéphane Van Damme

If scholars have stigmatized the invisible hand of the market, they rarely question the character of the nation-state and its impact on the ways in which knowledge is produced and maintained. It is rare to hear a historically-leaning debate about the changes in the nature of national libraries over time, or about the multiple definitions of the term “universal” which is often tied to such libraries. In the last decade, however, controversies surrounding projects sponsored by Google, including Google Books, and other new, seemingly totalizing modes of collecting and accessing information, have raised alarming questions about the past, present, and future of knowledge production and dissemination. Have we entered the era of the total commercialization of print? Is the era of the national library coming to an end? Questions of this nature have finally led scholars to challenge the definition of the national library and its implicit goal to “universalize” all knowledge. Indeed, suspicions toward the dominant knowledge paradigm have engendered many digital projects of knowledge accumulation and access, such as portals including Europeana¹ or the Digital Public Library of America, platforms which often present themselves as decentralized, open-access alternatives to earlier forms of knowledge storage.² For the most part, debates about digital resources such as these have been philosophical in nature, based on “principles,” or else have been very practical, based on new digital tools—largely ignoring their historical connection to their predecessor, the national library.³ However universal the collections built by national libraries during the old regime may have appeared, by the time of the welfare

state, libraries' conception of the public good did always not align with the reality of the state's practices—a discordance that is still prevalent today. Now, insights from science studies, book history, and museum studies urge us to reconsider the historical aims of the national library, and to re-contextualize them, revealing them to be less universal than they are politically, economically, and historically situated. As Alice Pochalska states in *Libraries and Culture*, "the concept of the national library demands to be reexamined."⁴ Further, as Elisabeth Losh points out in "Reading Room: the Nation-State and Digital Library Initiatives,"⁵ contemporary digital library initiatives raise important questions about the identity and universality of historic libraries. Losh's critique of the virtual state library is particularly relevant to the process of re-examining the role and methods of the first French Royal Library.

Library science emerged in the eighteenth and nineteenth centuries from the expertise of booksellers like Jacques Charles Brunet, and from their scholarly productions, such as his *Manuel du libraire et de l'amateur du livre*.⁶ Technologies invented during the French Revolution (i.e., the *Bibliographie générale de France*, originally called *Bibliographie universelle*, and the card catalogue) transformed the *Bibliothèque du roi* into a *Bibliothèque nationale* (i.e., a state library) via the mass aggregation of catalogues, and thus the aggregation of a specific type of knowledge.⁷ Thus, by (re)examining biblio-experiments of eighteenth-century Europe, I will attempt to redefine and re-contextualize the origins of the national library vis-à-vis Losh's theory of the *virtualpolitik*. In other words, by taking a detour back to the historical origin of national libraries, I will address the future of knowledge production, maintenance, and dissemination.

Today's dominant hierarchy of knowledge has its roots in the Age of Enlightenment—an age characterized by the dissemination of books and thus by an unprecedented proliferation of information, whence our current privileging of accumulation stems.⁸ This Enlightenment economy of knowledge was based on predatory practices, reconsideration of which calls into question the epistemological foundation of the Enlightenment itself. In his 1770 novel *The Year 2440*, Louis-Sébastien Mercier calls out the Royal Library as a curated library, rather than a universal one. Because of this narrowness of vision, the caprice of collectors, arbiters of the Royal Library, was suspect. Before and during the French Revolution, both royal and national libraries were viewed critically as institutions that established complex machineries of regulation to control both information and those who consumed it. Thus, from the very beginning, the utopian project of a so-called infinite library was accompanied by (rightful) skepticism and critique.

The change in scale and audience of knowledge during the long eighteenth century was itself a result of varied strategies (such as intelligence gathering, political economy, colonial enterprise, etc.) employed by the monarchy to expand its own

domain. Thus, recent movements toward a “globalization of knowledge” are not the outgrowths of a benevolent act of universalization in the sense of democratization on the part of eighteenth-century states; rather, “universalization” was a political move, instrumentalized and then implemented by royal powers through manuscript reproduction, accumulation, and library construction. Indeed, recent Digital Library Initiatives⁹ have launched debates that invite us to consider the construction of central, royal, or national libraries as integral to the early stages of the globalization of knowledge.¹⁰

During the seventeenth and eighteenth centuries, a tension emerged between the expansion of a global network of books (what I call the “invisible library”) and the monumentalization of cultural equipment, in the physical form of museums, libraries, and buildings for administration and for scientific academies. To put a finer point on it, the “invisible library” was a global institution built through the circulation and collection of rare manuscripts on a global scale by scholars, adventurers, collectors, Jesuits, Jansenists, and so on employed by the Royal Library in Paris, an institutional and architectural site which was undergoing expansion at the same time. The manuscripts comprising the invisible library accumulated at an unprecedented rate, and ultimately contributed to the globalized philological pillaging that took place in Europe during the seventeenth and eighteenth centuries.¹¹ This invisible library collided with other projects centered around the idea of an ideal library or the “infinite library,” admirably described in a special issue of the journal *Libraries and Culture*.¹² Like the infinite library, the invisible library was engendered and maintained by several phenomena that I will now identify. First, in Paris, the Royal Library stood in proximity to a geographical network of important institutions: Jean-Baptiste Colbert’s office, the administrative headquarters of the state, the French East India Company, and the Louvre, which housed the Academy of Science. Second, a long-distance network of agents and field philologists was established, creating an intellectual force able to identify rarities for the library. Third, the practice of copying manuscripts rather than purchasing new ones became dominant. Finally, an epistemological and philological revolution occurred.

GATHERING MANUSCRIPTS AND RARE BOOKS: A *VIRTUALPOLITIK*?

Even as they emerged, royal libraries across Europe were subjected to a debate about their definition, their area(s) of expertise, and their implied expansion. At the same time, an “invisible college,” the metaphorical academic counterpart to the invisible library, materialized. I argue that the Royal Library is linked to the invisible library by association with the “invisible college” of the Royal Society. The

practice of copying manuscripts was crucial in moving beyond the paradigm of acquisition and the economy of the rare gift to a paradigm of manufacturing. By producing facsimiles, the Royal Library could broaden its scope—thus, purportedly, achieving its goals of universality. If, thanks to these circuits of manufacturing and distribution, the Royal Library became an information hub, the network then de-materialized and de-territorialized royal power—but also recomposed its identity as a Royal Library into what I call an invisible Royal Library. This invisible library comprised a network of agents, bookdealers, philologists, librarians, local informants, merchants, diplomats, and missionaries who helped to gather rare books and manuscripts all over the world, but it was also shaped by technologies of information (such as lists, catalogues, copies, etc.) that made possible a new kind of information mobility. Thus, this invisible library became also a “virtual and potential library,” comprising lists of books, reports, memos, instructions, and provisional catalogues, all of which represented both the archive of this action at a distance and the instruments of the utopia of a universal or infinite library.¹³ The printed edition of the catalog in 10 volumes from 1739 could serve as a strategy of dissemination for the glory of the king. The list of copies sent as gifts reflects a genuine cultural diplomacy.¹⁴

The idea that the Royal Library was universal and public-facing was a political fiction, and its expansion as such was characterized by the government’s media-making strategies—an expansion that still affects our information and media sharing practices today. In her book, Losh concludes that the government’s *virtualpolitik*—its digital *realpolitik* aimed at preserving its own power—is today focused on regulation, casting as criminal common online activities such as file sharing, videogame play, and social networking. To paraphrase Frank Popper, who has developed the concept of “virtual art” to make sense of digital practices’ impact on the arts, this virtual biblio-economy is defined by epistemological, ontological, and ethical implications deriving from “global virtualization.”¹⁵

The mobilization of sources of knowledge via digital technology has altered traditional conceptions of the Royal Library as being part of the royal treasury. But, Popper stipulates, there are often ambiguities, or philosophical paradoxes, among the categories through which we understand the status of cultural products, such as the virtual, the potential, and the actual. By comparing different central libraries’ strategies regarding the universalization of collections, and by exploring the invisible networks built by these national institutions, it is possible to better understand the paradigm of textual accumulation pursued in these libraries. Today’s globalization, ultimately, contradicts old definitions of the universalization of knowledge, reflecting both a new political economy and a new philology.

In terms of political philosophy, tensions existed between two possible defini-

tions of the library. The first definition is the medieval definition of a domestic library, which has been associated with the Trésor des Chartes (the “Treasure of Charters,” the ancient royal archive, concerned above all with documents concerning ownership and privileges granted and agreed upon by the monarch) and the concept of *dominium* (the lands, fiefs, and rights directly possessed by the kings of France) since Charles V. At that time, the court library, like the court, was roving; it wasn’t until the reign of Louis XIV that the collection came to be housed permanently in the rue Vivienne in Paris, eventual site of the Royal Library and the École des Chartes. The second definition of a universal library is linked to Louis XIV’s project, which dealt with the concept of *imperium*.¹⁶ On the one hand, the king was encouraged to preserve the library from outside, and on the other, a network of intermediaries, dealers, and collectors was developed to prepare for the opening of the library to the public in 1721. The discourse surrounding the Royal Library was at the core of the debate among political thinkers such as Gabriel Naudé and François de La Mothe Le Vayer, advisors of Cardinal Mazarin and Colbert. Even then, the status of rare books and manuscripts was called into question.¹⁷ Were rare books and manuscripts considered among the precious objects of the *mobilier*, or royal household? Or were they part of a new economy of knowledge and intelligence?

Despite it being under scrutiny, no consensus was reached about the definition of a public library during the seventeenth century. In this debate, the beliefs and actions of the royal powers, embodied by the Jesuits, conflicted with the rhetoric of free thinkers. In objection to the clerical definition of the universal library, which was dominated by biblical thought, a group of thinkers led by Gabriel Naudé wanted to link the library with the government and restrict access to it. In opposition, the Jesuits published a *Bibliothèque instructive et curieuse* that promoted a select library for the *honnête homme*. For both camps, the medieval conception of *universitas* was called into question; the national dimension of the library became central. Looking back at history, it is clear that from the very beginning, separation between the private and the public was problematic for royal libraries. In many ways, the Royal Library could be seen as a composite entity, a combination of private libraries. For example, the more than 6,000 ancient manuscripts in Colbert’s library were purchased by the Royal Library in 1727. The oriental fund included approximately 250 manuscripts, 112 Syriac manuscripts, as well as medieval Latin ones. The modern papers that were acquired included state documents.

The confluence between private, public, and administrative spheres proved to be a dilemma for other central libraries as well, such as the Biblioteca Magliabechiana in Florence, the British Library, and the Library of Congress.¹⁸ Even in the United States, the decision by the Library of Congress to accept the donation of Thomas Jefferson’s library was not popular.¹⁹ Since the Library of Congress was first created

by the national legislature, and “the Library of Congress served as the first library of the American government,”²⁰ when the British army burned the Capitol and the Library of Congress and Jefferson—who was president between 1801 and 1809, and who took great interest in the Library of Congress—offered, at retirement, to sell his personal library in 1814, many were skeptical about the reasons for his offer. They were rightfully wary—Jefferson’s collection didn’t simply double the number of books in the Library of Congress, but expanded its scope beyond the existing legal and political parameters. Jefferson “believed that the American legislature needed ideas and information on all subjects and in many languages in order to govern a democracy.”²¹

In his book about Jean-Baptiste Colbert (1619–1683), Jacob Soll posits that Colbert was the real master of knowledge and information during the reign of Louis XIV.²² In this interpretation, the nerve center of the system resided in the Colbert library, which Soll describes as “an encyclopedia of the state,” and which is described by Étienne Baluze as housing state papers relating to the administration of Cardinal Mazarin, as well as its own accounts.²³ Colbert’s integration of the library of administrative knowledge into the traditional library was novel. Like Francis Bacon, Colbert believed that knowledge had a practical value for government policy. This proximity of the library to the ministry helped to merge learned book culture with the archival management of the state’s activities.

GATHERING MANUSCRIPTS: A POLITICAL ECONOMY

The globalization of manuscripts and rare books has had rather questionable consequences. The ancient practice of research on manuscripts and medals gradually became more global with the Orientalist pursuit, but in this process, manuscripts were commodified—much like digital publications are commodified today.

As early as the 1700s, under the aegis of Louis XIV, Antoine Galland configured an association in the commercial world through mercantilist companies, diplomatic networks, and antiquarian research. Under the guidance of Abbé Bignon, the Royal Library was the nerve center of this economy of knowledge. Gifts, as well as collections of books, manuscripts, and medals were promoted by royal power. Through the efforts of Bignon, the collection of oriental manuscripts in the Royal Library grew tremendously between 1720 and 1730, resulting in a large catalogue of oriental manuscripts by 1739. The first volume of records indicates a change in geography, reshaping the significance of the “oriental” between 1620 and 1720. What Bignon did was to set in place a policy of increased funding, first for research in Greece, Constantinople, and Egypt, then from 1684 on, in China, and

finally from 1720 on, in India. In 1727, Bignon sent a memo to missionaries and East India Company merchants to guide their research: “The acquisition of Persian manuscripts, to suit the King’s library, must be [found] in the city where the Great Moghul is ordinarily resident; those who will be responsible for their research must not only read the Persian language but must also consult local scholars about their learned choice.”²⁴ This memo both expresses the principles of the collection built by Bignon and draws an intellectual horizon. Here, manuscript research is akin to a mercantilist conception of knowledge, based on the desire to enrich the state and to increase the nation’s prosperity through accumulation. This kind of mercantilism is, according to Jean-Yves Grenier, “a political economy at the service of absolutism.”²⁵ To transfer this conception to the realm of knowledge, rare books and manuscripts became the equivalent of precious metals that would make possible the growth of the stock that represented the Royal Library.

An abundance of manuscripts became the counterpart to an abundance of money. Focus on the quantity of manuscripts rather than on their quality, but also on the materiality of books (bindings, illustrations, etc.), comes to the fore in this symbolic and bibliophilic dimension of the library:

These manuscripts should be in beautiful handwriting and accurate, their bindings should be beautiful and good, and if the binding is damaged or completely bad, it will be necessary to repair or replace it in its own country of origin, before sending it to France. It is necessary to ensure that the manuscript is complete, that there is no shortage of pages, and to pay attention to the beginning and the end of the manuscripts, and to be careful not to acquire odd volumes.²⁶

This attention to the quality of bindings and design stems from the cultural preferences of booksellers, rather than the demands of scholars. A century later, in his *Manuel du libraire*, Brunet stressed the importance of bindings; he celebrated for the *amateur de livre* the virtue of observations for the recognition of value.²⁷ The connection between librarian and bookseller, between the restorer and the keeper in the museum, was analogous to the connection between gardeners and naturalists.²⁸

This intellectual mercantilism was based on a distinction between two economic circuits: international trade and domestic trade. The establishment of this invisible Royal Library was subject to the constraints of manuscript circulation within the East India Company: the Jesuits were constantly complaining about the action of the French East India Company, and the lieutenant of police in France complained about boxes of books and manuscripts that remained blocked in customs as though they were any other imported goods.²⁹ The economic value of these exchanges was constantly present in the correspondence of the time. Political prestige has a cost,

sometimes exorbitant.³⁰ But the stakes involved in this circulation were also cognitive in nature, as shown by the letters of intermediaries writing to collect or order manuscripts. Officers of the East India Company and Jesuits such as Father Le Gac inquired about the ability of people in Paris to read these books, and therefore of the value of the books' use, both scholarly and bibliophilic.³¹ This nuanced and at times contradictory use of manuscripts reflected the paradigm of accumulation. By 1739, the number of volumes that had successfully reached Paris was 287.

COPYING ORIENTAL MANUSCRIPTS: A VIRTUAL GLOBALIZATION?

The third phenomenon to note is what I call the "virtual globalization" that resulted from copying oriental manuscripts on a large scale. The practice of copying was already a norm when Colbert instituted a systematic campaign, instigating religious and aristocratic acts across France with the intent to create a genealogical collection within the Royal Library with an expressly political function.³² This political and administrative revolution took place in the wake of the antiquarian diplomatic revolution. Antiquarians like the Maurists made comparative use of philology, numismatics,³³ and archival discoveries arising out of "searches." Current archival research and a close examination of primary sources (primarily medieval charters) have led to a major revision of the historical narrative of this revolution. In the new narrative, the constitution of a textual tradition—a corpus, collections, libraries, and archives—played a crucial role in identifying a series of "problems" linked to the origins of political bodies (i.e., parliament, university, city, nobility, and so on). The aim was to be rid of the medieval and ancient legends (those "problems") that had polluted the narratives of the founding of a given institution, notably through false genealogies (i.e., the genealogies of Saint-Denis, Paris, or the monarchy). The renowned historian of early modern Europe Anthony Grafton postulates that "mechanisms of certification and verification"³⁴—here, Colbert's campaign and the systematic copying of oriental manuscripts—were largely stimulated by the emergence of counterfeiters, which in turn "fostered the emergence of a more detailed and precise image of the past."³⁵

Around the world, scholars, booksellers, and collectors searched for texts on philosophy, medicine, literature, and astrology, as well as the Old Testament and canonical law. At this time, interdisciplinary connections abounded—politicians asked scholars of the orient to study astronomy, and booksellers introduced themselves to kings as experts on coins and currency. From France, this practice of replication spread globally, with particular vigor in the Orient.

A first example of this fervor spreading across societal and disciplinary boundar-

ies is that of the numismatic scholar Jean-Foy Vaillant, who was sent to Egypt and Persia at the same time as his Catholic counterpart, the Jesuit Johann Wansleben. At this time, European manuscripts were less in demand. In his book *Orientalism in Louis XIV's France*, Nicholas Dew underlines the weight of the correspondence networks surrounding François Bernier, a traveling intellectual and physician. Bernier's peers Thévenot, Chapelain, and La Mothe Le Vayer urged him to publish his travel writings about the Mughal empire in April 1662.³⁶ Using colonial archives, Dew underscores the importance of Chapelain's circle in the East India Company and in the colonial administration. Bernier in India could rely upon the Company's representative, François Caron, who met Bernier several times and invited him to produce a report in March 1668.³⁷ Bernier's travel account gives significant place to the description of the circulation of metals within Hindustan. When Bernier decided to return to France, Chapelain advised him to introduce himself as a collector of medals and manuscripts for the Royal Library.³⁸ New research on the Academy of Inscriptions and Belles-Lettres has revealed the connections between scholarship, the diplomatic network, and the Royal Mint.³⁹ In the early eighteenth century, as he was championing a strategy of vast and voracious manuscript gathering, Abbé Bignon was in contact with important figures in capital cities, especially with Hans Sloane in London and Pius Nikolaus von Garelli, Librarian of the Emperor in Vienna.⁴⁰ My final example, Abraham-Hyacinthe Anquetil-Duperron, another renowned French Orientalist, exhibited practices in his work and travels that indicate the same connection between science, commerce, and politics.⁴¹ Duperron used astronomical observations to dismiss superstition, just as Bernier did in his travel account. Duperron was asked by Caylus and Lamoignon de Malesherbes to observe the transit of Venus in 1761 and received from the Abbé Barthélémy a box of books and instruments.⁴² As if they were an allegory for the larger paradigm of exchange, even the instruments of scholarly origin were sent through the East India Company—and thus, Duperron corresponded with the Company's director as well.⁴³

The practice of copying manuscripts collected by Orientalists can be considered part of the practice of virtual art, to return to Frank Popper's term, in the sense that it employed "actions at a distance." By producing artifacts, it allowed for the mass accumulation of oriental manuscripts, and exertion of control over those manuscripts. From this configuration stemmed the effects of actions at a distance: globalized knowledge, and a drastically increased scale of book circulation. Orientalist manuscript reproduction also has a specific from historicity, as it restages ancient and medieval scribal practices in a new geo-political order. In examining the repercussions of this phenomenon, copying reveals itself not as a neutral practice but as a culturally, economically, and epistemologically loaded technique; indeed, it transformed a bibliophilic culture from a culture of objects and stability to a culture of

flux and instability. As the art historian Anne Lafont states—specifically about the Google Art Project, but the sentiment already applies to the moment in time that I am discussing here—the essence of art ceases to inhere in its materiality (i.e., in the possession of a painting) but in its reproduction.⁴⁴ If this holds as true today as it did in eighteenth-century France, questions about the origin of the fear of being dispossessed by the Royal Library arise.

AN OPEN-AIR PHILOLOGY?: THE CASE OF ANQUETIL-DUPERRON

This new organization of knowledge influenced philology irrevocably; it affected mobility, the center of recognition, and even altered the practice of philology itself. The centrality of copying necessitated the establishment of a mobile philology, or “field philology.” According to Hillel Schwartz, the culture of copy is a culture in which the “acts and images of doubling” are fundamental to culture and humanistic discourse.⁴⁵ In the process of digitization, the copy is not identical to the original, since it also includes supplementary information that describes and organizes it. The transformation of a physical object into a digital one involves a detailed “workflow” that articulates a complex nexus of labor relations, patterns of consumption, and contractual obligations.

In the eighteenth century, copying a manuscript was an arduous and involved enterprise that required “open-air” philological practices.⁴⁶ Anquetil-Duperron was regarded in the Orientalist tradition as one of the first “field Indianists.” In Paris, he was part of the first Orientalist circle around the Royal College and the Royal Library. Because of his religious education as a Jansenist, Anquetil-Duperron developed an interest in the theology and civilizations of the East in the wake of studies concerning primitivism, most notably Zoroastrianism (the study of which played a huge role in the study of comparative religion during the eighteenth century). In 1755, Anquetil-Duperron traveled to India to collect manuscripts and learn languages *in situ*; he spent the period between 1755 and 1763 traveling in south India and discovering texts in Parsi communities. In 1771, he published a French translation of the *Zend-Avesta*, which was based on a modern Persian-language translation provided by a Parsi priest in Surat. The discovery and publication of this document led to a large mobilization of European scholars, including the British Orientalist William Jones and the Dane Ramus Christian Rask, who collected several more Avesta manuscripts in 1820. From then on, Anquetil-Duperron was considered a heroic figure in the Orientalist tradition.⁴⁷

For Anquetil-Duperron, the practice of copying manuscripts involved a vast range of agents and operations in competition with other networks.⁴⁸ In the field,

the replication process was dangerous, which Anquetil-Duperron illustrated in his accounts of his travels. As the great historian of Orientalist philology, Raymond Schwab stated in his 1934 biography, the publication of Anquetil-Duperron's travel account in India strategically staged the young scientist as an adventurer. Indeed, Anquetil-Duperron began the second part of his book by stating: "The first two years of my travels were a mix of races, hazards, disasters, and resources, the cause of which must be sought in the enchanting pleasures of colonies, in my youth, in the heat of passion and in the state in which our institutions were on the Coromandel coast and in Bengal."⁴⁹ The first of three volumes of the *Zend-Avesta* continue in this vein, essentially usurping the place of a preliminary methodological discourse. This move was both strategic and timely: when Anquetil-Duperron arrived in Surat in December 1758, the city was caught in considerable tensions between the Moors and the English, as well as between the Dutch and the French, with each nation—not to mention the East India Company—defending its own competing privileges. In fact, the entire collection of manuscripts reflects Anquetil-Duperron's stay in Surat where he was initiated by two religious chiefs, the *destours* Darab and Kaous.⁵⁰ These conversions and their reporting were entirely intentional, as part of Duperron's self-construction as hero and traveler.

DISPUTED PHILOLOGY: GO-BETWEENS CALLED INTO QUESTION

Despite its imperfections, Anquetil-Duperron's work provides one of the first decipherings of the two most ancient forms of the Persian language, Pehlvi and Zend. On March 15, 1762, he deposited eighteen manuscripts in the Royal Library. A year later, he became an associate member of the Academy of Inscriptions and Belles-Lettres. In 1756, the Academy of Inscriptions granted Anquetil-Duperron the title of Correspondent, and from that time on, the letters he sent back to France from his travels were read at the academy's meetings. Following his lead, Anquetil-Duperron's colleague, the Abbé Barthélemy, attempted to decipher the Palmyrian and Phoenician languages.⁵¹

But publication practices like those of Anquetil-Duperron were not fully accepted. Anquetil-Duperron's positive reception did not quell the debates that ensued over the authenticity of his manuscripts. Some scholars, such as the Abbé Ladvocat, dismissed Anquetil-Duperron's manuscripts, deeming them too similar to legends and fables to have any historical value.⁵²

Even if on April 26, 1770, two curators of the oriental manuscripts in the library published a further certification, ruling in Anquetil-Duperron's favor, it did not take long for the rumors of Anquetil-Duperron's manuscripts' possible fabrication

to cross the English Channel. In 1771, William Jones, at the time an ambitious young English scholar in London, published a short work in French in which he accused Anquetil-Duperron of publishing apocryphal works. These strong accusations resounded throughout England and Germany until 1789. Between the publication of the *Traité* in 1770 and his departure for India in April 1783, Jones published several more pamphlets against Anquetil-Duperron. In 1771, the date of publication of the *Lettre à Monsieur A*, Jones published his own *Dissertation sur la littérature orientale* and his *Grammar of the Persian Language*. His trajectory was ascendant, and his reputation as an Orientalist was growing—in direct opposition to Anquetil-Duperron's.

In his pamphlet against Anquetil-Duperron's works,⁵³ Jones' argument centered around two issues: dubious translation; the use of local intermediaries. Jones' pamphlet begins with a paradoxical eulogy comparing Anquetil-Duperron to Christopher Columbus. But then he goes on to denounce Anquetil-Duperron as an impostor who pretended to discover two new languages,⁵⁴ disqualifying his travel practices as improper and illegitimate sources of knowledge. Jones even went so far as to mock Anquetil-Duperron's willingness to learn rare languages.⁵⁵ Finally, while blaming Anquetil-Duperron for his use of local intermediaries, Jones' criticisms targeted larger critique against the corruption of empire and the danger of using local go-betweens.⁵⁶

Refuting Jones, Anquetil-Duperron defended his Orientalism as a form of field science and advocated for practical field trips in order to gain knowledge of local languages. Clearly, Anquetil-Duperron believed that a European-based science cabinet was not sufficient for gaining credible knowledge about the rest of the world. However, the charges that Jones and his supporters leveled against Anquetil-Duperron remained part of popular opinion in England and Germany. Scholars accused the *Zend-Avesta* of being fiction.

CONCLUSION

I'd like to postulate that the parallel between the past and the future that I have attempted to draw in this essay can be seen as an heuristic in two ways. First, by comparing the acts of copying and digitizing, I want to draw attention to the ambiguities of the earliest technologies for globalizing information generated by the Royal Library. Collecting manuscripts, in this context, was not a harmless intellectual or bibliophilic practice; rather, it was part of a more global discourse and information order at the crossroads of political economy, commercial networks, and scholarly practices.⁵⁷ Such collecting was not anecdotal, but took place as part

of a new set of tools created by the royal state in France to manage intelligence and information gathering, such as bookkeeping, inventorying, and archiving.⁵⁸

Second, by supporting mobility—essential to the field science of books and manuscripts—royal librarians encouraged the acquisition of a new type of expertise and skills. The famous quarrel over authenticity launched by William Jones against Anquetil-Duperron could be seen as a way of denouncing field science and local mediations, as opposed to the purity of “armchair science,” conducted far from imperial locales and isolated from imperialist interests.⁵⁹ After the French Restoration, from the 1820s, there was a tension between two different kinds of philological knowledge: one in which it was considered an armchair science, associated with the new *École des Chartes* and with manuscripts of the *Trésor des Chartes*, and the other in which field philology applied only to non-European civilizations. Both practices and collections were sustained by the royal and national libraries.

Far from representing a morally and politically neutral process of antiquarian or erudite accumulation, the gathering of oriental manuscripts in the context of competition and warfare among European nations was deeply politicized. The metaphor of an infinite or universal library surrounding the emerging national libraries of this period did not match up completely with the reality of the “invisible library” that was being built by interpersonal exchange, copying practices, and the circulation of texts through imperial networks. These roots of the national, universal library must be grasped in order to reckon with the new cultures of circulation and restriction, copy and original, which are taking shape in the age of digital globalization.

DEBATE

Glenn Most

You said at one point that the library—I believe you were talking about the Royal Library—was opened to the public in 1721. I would be very curious to know more about the debates that preceded that momentous step and why people thought that this was such an important thing to do that they went against all the traditions involved in doing that.

Stéphane Van Damme

In fact, there was a competition among several Parisian institutions and libraries, especially the monasteries’ and religious orders’ libraries which were already

open for three or four afternoons in the week. So the idea of Bignon, this famous director of the Royal Library, was to open the King's Library to a selected audience, a handful of scholars, and they could register with and borrow books from this library. That is, it is not only a place for consultation, but also lending. We have the catalogues of it, so we can also follow, for instance, during the encyclopedic phase, the team of the *Encyclopédie* that was integrated more or less into the Royal Library and was constantly revising their knowledge by using it.

None of this history is controversial, but there is still the question: Where is the public? That is a problem. The problem of the usual history of the National Library is: 1) It is very genealogical; 2) It is very teleological, which means that we start with a national nineteenth—and twentieth-century National Library and then trace backward. Basically, I think we need a recontextualization of earlier libraries to understand the historicity of such practices.

Simon Schaffer

I just want to underline that when you say “open to the public,” it does not refer to all that we mean by “open to the public” today. I assume that you have to have a certain status, you have to have other recommendations.

Stéphane Van Damme

Correct. I should have put that into quotation marks because it is the expression used by the book historians, specialists of the Royal Library today. They speak about public access, but what does that mean? That is why also all of these philosophical points about the library are so important because they are very complex, in fact. They turn around the issue of the universality of knowledge. Clearly in competition with the Royal Library you have the Catholics, obviously, and I mentioned the Jesuits, but skeptical thinkers could be very close to the Jesuits by putting forward the idea of a “selected library,” even the “pocket library,” insofar as the idea to have access to universal knowledge is very dangerous for them.

John Tresch

Thanks, Stéphane, your talk was extremely interesting, and related to Dagmar's talk in a lot of ways. One of these is the national significance of “putting together an archive and a library” in a way in which allows for different articulations of the nation, through different kinds of libraries. In the French case, you've shown won-

derfully how variable the identities of that library were over this long period.

I have a first question about the details of philology and what you call the “diplomatic revolution in philology,” which apparently involved using archives, documents, numismatics to argue national and dynastic claims. How general was this revolution? Is this new articulation of archives and political aims something that occurs in all philology traditions or is that specific to the French case? If it’s accommodated in the *École des Chartres*, this unusual institution, it seems like it’s very French—but that may not be true. I would also like to know a little more about how this revolution ties to the transformations in the administering of the materials of the library, in terms of access, storage, etc. What kinds of new questions and what kind of new materials did the diplomatic revolution involve?

My second remark is about the national identity and aims of this enterprise. In studies of the history of philology, we often hear about the German story, and the German philologists’ privileging of Greece—Rome also, but Greece above all—at the start of the nineteenth century, at least. These histories have allowed us to think about the ways in which projects of German national identity were and were not tied to the claiming of a glorious past. But you haven’t been speaking about Greece. Is it that France is not interested in that project of reconstructing the Hellenic past, or does that happen elsewhere, or is it simply that you are focused on this Orientalist aspect of compiling the National Library? If so, does it intersect with projects of Hellenic philology and—whether it does or does not—can you say a little bit about why there was such an interest in Zoroastrianism and the religions of India, beyond just the acquisition of rare, wonderful books that can stand in for a universal collection? Why would a French National Library be concerned with those traditions in particular?

Stéphane Van Damme

We saw yesterday in Glenn Most’s talk that a social history of philology is starting to happen—one can look to the work of Anthony Grafton or Ann Blair in this context. And it is really difficult because we still have a quite strong nineteenth-century definition of philology which blurs the old regime practices, especially for the German tradition—and we obviously have a bibliography on that. For what I would distinguish as “early modern philology,” obviously you have work on the sixteenth century and Renaissance humanism, and on the nineteenth century, but not too much in between. It is my argument that there is a circulation of practices after the diplomatic revolution. I have also to add that this is not fully demonstrated yet.

So it’s more or less the same people in the French situation, and in the same institutions, *l’Académie des Inscriptions et Belles-Lettres*—though clearly you have a shift of attention from Roman and Greek Antiquity to Oriental Antiquity at the

beginning of the eighteenth century. This shift has been studied. A scholar like Anquetil-Duperron was an apprentice in this field; he knew Hebrew, Latin, and Greek, obviously, but nothing about oriental languages. But his idea of this apprenticeship, which is striking, is not to stay in Paris, since he could learn Arabic and Persian in Paris, but to move and to learn with a local population. It is the same strategy made by the missionaries in the south of India. I think it is interesting to go further and to identify what circulation of practices and methods entailed at this turning point in the eighteenth century.

The second element is the shift in geography: what I saw from the archive, quite clearly because I was at first interested in Mount Athos in Greece, is the shift to the Middle East and India. And at the end of the eighteenth century the emphasis is put on the Indo-European roots and origins. I would say it is very close also to Germans' philology and their fascination with India at the beginning of the eighteenth century; however, they do not have a field philology because their fascination with India remained very textual and abstract. I think there is a very interesting tension between this field philology and armchair philology. Even if Jones contributes more and more to field philology after his departure to India, his controversy with Anquetil-Duperron reveals the problems of credit and trust in this new economy of knowledge.

John Tresch

I'd like to go back the comments that Matthew made yesterday about differences between data, information, and knowledge, and questions a lot of us have about the categories used to make sense of these encounters with texts and people—as well as Greg's quote from Wilhelm von Humboldt yesterday, that “students and instructors are there to serve *Wissenschaft*.” So just to put it on the table, I'm wondering what kind of ideal of *Wissenschaft* or *connaissance* or *savoir* or *science* is getting established at this point in relation to these textual practices.

Stéphane Van Damme

Geof showed us Benjamin's quote on the transitory definition of the book: the book is just a form, a vehicle from one database to another. For me, it is very interesting to destabilize the category of books, even manuscripts, because philologists were always so focused on the specific materiality of what they found. It is interesting because, in terms of units of observation, what they are looking for sometimes is called abstract, and sometimes called something else. It is really interesting to take into consideration the interplay of scales in these pursuits and not focus just on the manuscript or the book as a stable entity.

Ruth Padel

Your talk made me think about some of the metaphors bubbling under the surface about what knowledge is and what it is for, and what a library is and what it is for. Because in the period, knowledge is being accumulated, and it is not just for teaching, whereas by contrast nearly all of us here are university teachers concerned with how you convey knowledge. There is this language of possession and capture or mapping, and mapping as also a way of possessing.

I thought it was wonderful that you prefaced it all by the battle with the Google empire because that put it in a particular context. For me it brought up a tension between, on the one hand, a kind of generosity of knowledge accumulation, giving it out and letting everyone add to it, and on the other hand, that impulse to accumulate treasure and put it behind bars. Glenn showed us the gestures, of a sort of secret scripture, but then *that* in turn can bring out a sort of competitiveness of knowledge. What is this impulse in us that makes us want to attack (or makes some people want to attack) another person over how they see words and how they know things and whether the knowledge is theirs?

Matthew Battles

Thank you for teasing out of this invisible library, and particularly the infrastructure of this network of people and places and architecture and furnishings, and the ways in which these things eventuate as epistemology—it is all terrific. I would also like to circle back to where you began with the question of the Google Books Project and the reactions to it, mainly in the forms of European and the Digital Public Library in America. I am interested in thinking through how we might use rich examples like these and understand these emerging phenomena. I cannot talk about *Europeana* because I am not familiar enough with its invisible infrastructure, but I have been fascinated by DPLA—and in certain respects each one of the terms DPLA (“Digital” “Public” “Library” of “America”) is problematic.

It begins in this perfectly salutary assumption: that what the Google Books Project is trying to do is terribly important, so important that a private entity shouldn't be doing it, so the notion was to create a public entity to do what the Google Books Project was doing. Now the question is: Where is the public in that? This concept of the DPLA began to emerge out of a really fascinating set of social phenomena and interactions among people, including principally technologists—advocates of open-linked data—libraries and library technologists, people who create metadata schemas, and folks in a broader community consisting mostly of librarians. This was headquartered at the Balfour Center at Harvard.

A culture emerged and was revealed in this process that put in their place certain of these terms in ways that I find interesting, interesting in that I think they may be analogues to the terms you're discussing, terms like "royal" and "national" and "universal." With respect to the "public"—and the eighteenth-century case reiterates this—in the Digital Public Library of America you hear terms like "open," "accessible," "transparent," "free," and "public," though these things are very much up for grabs. So the DPLA, which begins as a kind of credible Google Books Project, turns out to be something else entirely, something very interesting and in many ways promising and curious and useful: it is now essentially an organization that is processing digital metadata attached to media. The media are largely already created, already digitalized by mostly public entities, state libraries, local libraries, state archives.

So, rather than the Google Books Project which was trying to organize the world's knowledge in a quite specific form by taking books, scanning them, and turning them into digital objects, the DPLA becomes a kind of exchange, a kind of intermediary among all of these different, already digitized entities. They do self-process, which itself is an attempt to model a new civic multi-participation, a series of open meetings convened in various participatory orbital shells around Cambridge and around the country, a kind of taxonomy of service hubs and content hubs. This is a complex ecosystem that continues to change and shift, out of which comes something that's much different from the Google Books Project. So I wanted to get all of this stuff about the DPLA on the table, to ask how we can begin to organize it using the kind of examples that you have illustrated.

Stéphane Van Damme

I do not know if I fully agree with you about the links to draw between then and now. I am also fascinated by this idea that there is a philosophical debate about the library, that the library is not only equipment but a political issue. It is a really interesting place to think about culture, and I would say also power. It's exactly a case of possession and appropriation in the Foucauldian mode. As noticed brilliantly by Elizabeth Losh, the French National Library at least is a very "total institution." You are watched constantly—you cannot access the books freely. More or less everything (if you work on early modern history like me) is in the Rare Books Library. So the access is more and more difficult: you have to pass five or six check points to access the library. It is not "public." You also have to pay, whereas the British library and the Library of Congress are free, provided you have ID. I like also the idea that if you are a public civil servant you do not have to pay to do your job; that is, to pay twice. It is a very political debate about the relationship between the library,

the nation-state, and the welfare state. Clearly, we are also fighting over definitions. The “public” for Google means universal library open access. The French model is much more closed. So you have this dual conception of the library. The political communities of the national libraries in Europe are more selective and elitist; you have strong boundaries between expert scholars, lay users, and librarians. We do not mix these roles in France; this probably occurs more in Britain than on the continent, but we have no relations with librarians, ever. I think this distinction is the product of a long history, a long process, and that is why I would say that for me it is like laboratory, a total institution—it is very authoritative.

Filippomaria Pontani

I was just fascinated listening to your account. You were talking about universal library issues, card catalogues, issues of authenticity, national identity, field philology, new furniture in libraries... That is everything that Alexandria’s library was about. We had everything in Alexandria—that is probably the first example of this. We have new book formats, we have new furniture, we have a new declared idea of embracing the entirety of knowledge, we have people sent out to gather manuscripts, we have people moving far from their homelands in the attempt to find the first copy of Homer that was read in that place, in that island, in that city. We have issues of authenticity of course, which pop up for the first time systematically in Alexandria. After all, you know very well that some of the rhetoric that the French use is clearly inspired from Ptolemy’s rhetoric.

This brings me my question: are these enterprises possible outside of this strong political absolutist intellectual thrust? That is, you can resist it and create other centers like Pergamon did in the past, but is it really possible? Is it possible to compete against a strongly ideological and motivated idea of collecting things in order to show an identity? Because, after all, Alexandria wanted to establish itself as the heart of Hellenic culture throughout the Mediterranean—and they succeeded incredibly well, for centuries and centuries. With regards to the debate of today I sometimes get the answer that we are trying to resist something that overcomes all of us (think of Gallica, for instance) and I wonder whether we really are capable of doing something different, of competing, without an ideology as strong as the one that Google Books puts into practice.

Dagmar Schäfer

I probably just have an extension of John’s question because I am really interested in this dialectic that you have described with respect to the place where you gather

knowledge. You made a nice point about the Jesuits being in India and basically not having access to texts and then starting with field research. The Jesuits, especially out on a mission, present a very different idea about power than that of the state or the East India Company.. I wonder how you actors are actually reacting to these other models of power while they are shaping the National Library and the public access system, all the while encountering their own difficulties, and also finding other systems that deploy these kinds of networking techniques: placing people and outposts somewhere and then figuring out how to keep the larger network together.

Stéphane Van Damme

Yes, you are right, Alexandria is one of the models at our disposal to think about the King's librarians; it is a precedent. And, as you said, it is very compatible if you look at books or studies about the Alexandrian library or the shaping of Roman universalism—Claudia Moatti and Christian Jacob, for instance, among others. Clearly it is interesting to look at what Jacob calls “places of knowledge” from this perspective, and also to pay more attention to the fact that these institutions were part of a political, imperial project— that it is not just intellectual equipment to ease access to texts. So there is also an economy of knowledge. What struck me in the case of the King's Library is the fact that this economy is already a certain type of “globalization.” I would contrast globalization and universalization—globalization is not the same as what we mean by universalization. In globalization there can be an economy of singularities, rarities; it is different, insofar as you do not have to accumulate everything, but only find one example. It is a kind of art, an art of selection. It is really interesting to look at the instructions, the lists sent to the collectors and mistakes they make in their choices. Is this a republic of letters? I would say it is not the early American Republic, but the French Absolutist republic; they have their specific economy of knowledge I would say.

Murtha Baca

Maybe globalization is not the word because globalization suggests the 24/7, interconnected activity, including acceleration and all these things associated with contemporary technological and capitalist innovations. Maybe what you are trying to say is that what is at stake is a world-making, a kind of traditional empire project of world-making after its own image.

Stéphane Van Damme

And it is linked also to the idea of *Gallica*, for instance. What Bruno Racine said about *Gallica* is not a claim for universalization, but a French global strategy. I would also like to be clear about this: there is much less transparency on the French side than on the American.

Gregory Crane

As far as ranting against Google, they were doing something libraries weren't able or willing to do on their own. Likewise, we all tell the story of these orientalist bad guys who had all these communicable diseases; even though they worked hard and learned languages that are really hard, they are all bad because they were advancing the European political hegemonic project. That's all entirely true, there's no question. And yet it is sort of weird how it blows back. I told my Iranian graduate student and my Ph.D.'s about Sir William Jones and these other European orientalists. Then that night I got a mail from her titled, "Learning Persian with Sir William Jones" and she had found his grammar of Persian, a 1797 version of it, digitalized by Microsoft (and Microsoft is competing with Google), available from an email archive. So I looked at it and in fact represents my vision of how I would like to teach Greek, which is you start by learning the alphabet and reading a poem. The first paradigms were for "rose" and for "nightingale" and starts in with Persian culture. I was reading this on a plane ride, trying to quietly read this Persian poem, and this guy leans over and says: "That is *Bukara*, not *Bukhard*!" And in fact this was one of the most famous poems in Persian culture—everybody learns it at ten years old—and this Iranian couple were completely transfixed that someone was learning their classical poetry. If I had been studying a conversation in Persian, they would think I was a spy, or part of a military-industrial or political complex; but because I was looking at this classical Persian poetry it created a totally different kind of vibe. So that is not nothing. Through a text like William Jones's Persian grammar, there is an enriching of this dialectic in a weird and complicated way. So I agree that we need to rethink and recover more fully these orientalist deeds, respecting the fact that they were part of the French East Indies Company and so on, but following all the other ramifications as well. And this happens when you get the voices from places like Iran, that otherwise would be absent.

Murtha Baca

It also came from your student. And may I also say that when I was at Columbia

University we actually read these things. So you do not need this kind of digital mediation. I mean we actually dealt with Western humanists as well as what they call Middle Eastern humanists.

Gregory Crane

You are right, and it is true. This is a 1797 book, it is a beautiful scan, from a very precise moment in time, a particular version, and it talks about which version it is. Of course I could get that with the actual text, but I wouldn't have been allowed to be reading it on the plane.

Simon Schaffer

Jones's Persian grammar, and the Persian dictionary, and the translations, that are all Jones' first project in the 1770s before he goes to Bengal, are after all not made by him. They are made by a small group of Persian scholars who were in England. Are they named in Jones' book? They are not. So I absolutely accept that Jones' model of oriental philology is admirable in a sort of way, especially on long airline flights, but, to go back to what Stéphane has been talking about, it is not just the South-Indian criticism of orientalism that one has to deal with, one also has to deal with what has been called the problem of invisible orientalism. There were major networks of Farsi, Bangali, and Hindi speaking experts in England who had come there usually to examine the kinds of diplomatic missions that Stéphane has talked about. They tend to provide the infrastructure of expertise for figures like Jones. I mean, it is absolutely like the not-quite-utopian image with which Glenn's essay ended, right? The philologists are all arriving on horseback—and then they beat the crap out of each other. So I absolutely accept what you are saying but I just want to issue a caveat.

Gregory Crane

I just want to point out that Jones actually mentions some of this, but weirdly: he says that using this grammar book, it will take you six months to learn it, but you still have to find yourself a native speaker to fix the pronunciation. This is the only reference I have seen to that wider setting.

Glenn Most

To add a small footnote to what Simon was reminding us of: these invisible

orientalists in the seventeenth and eighteenth centuries were the followers of the invisible Jews in Italy and in northern Europe, who had given all of the Renaissance governors and scholars everything they knew about Hebrew.

Ruth Padel

What about the competing mission of the universities? The universities had been going since the Middle Ages in Paris and other places. I'm thinking about their walls, too: the architecture of these collections and these halls for books is redolent of both ecclesiastical settings, and of the court. So the library is a place that belongs in this tripod of different places of power, all in competition: universities, churches, courts, different forms of repositories for these tablets of power.

Glenn Most

That brings us back to the political and state-building question John raised. You were mentioning political philosophies, referring to Charles V; what is the relation, again, between the political philosophy, the university, and the world of philology in talking about building knowledge and access? This I think is the most important question your paper raises. Plus, as I was mentioning before and as we were all have noted, while we were thinking about focus on Portuguese, Danish, French and so on, we have to attend also to the political philosophies, oriented imperialism or colonialism. So I think this is another approach, via questions of access, and the philosophies underwriting these projects.

Stéphane Van Damme

Yes. First, just to reply to Greg, it is not my perspective to denounce imperialism; my aim is to show and to map the interconnections between a network of institutions and the globalization of knowledge—that is all. In response to Simon, I insisted on the young William Jones, and obviously I know he will become the President of the Asiatic Society. But it is quite interesting to notice he has a position before leaving England and, as Simon said, as an invisible agent, with these invisible instruments, he is part of the invisible library. We have mentions of a lot of Chinese people who were brought back from China at the end of the seventeenth century, exactly for these purposes: to read manuscripts and share expertise. I think it is interesting to put them also in the picture.

For the question about the university: Yes, that is why Paris is very complex because you have these short networks, state networks, but you have other librar-

ies that are obviously very powerful. The *Universitas* is also, as we said, a political philosophy even if it wants to avoid this kind of definition. Even then, all of the thinkers, all of the debates are on how to define a Gallican definition of universality. It is interesting to notice that the Jesuits are also keen to contribute to this kind of nationalization of the cultural field. So with respect to the concept of *Universitas*, you are right, and as has been said, we have several precedents: we mentioned the Hellenistic model but you have also the very powerful medieval model. For Charles V, the Court Library is a treasure, it is not a library in the modern sense—it is a *coffre*, and it is fascinating because it is both an archive and furniture, moveable goods, part of the *mobilier royal*. So you have this kind of old definition which is interesting to consider in this recontextualization of the National Library.

Matthew Battles

A lot of these points go back to the economies of knowledge and to the part the National Library plays in the elaboration of concepts of intellectual property rights (and of course this will be different in civil versus commonwealth traditions). The National Library becomes a fundamental part of this infrastructure for the creation, regulation, definition, and control of intellectual property. And again we need to try to think about how the story of this early-modern-into-modern story tells us something about the modern and the post-modern.

I think the situation here is a little more complicated and interesting than any binary, good guys versus bad guys: we've got Google versus Elsevier, and we've also got Wikipedia and a cluster of values associating with terms like the "open web". There is an agonistic relationship among these entities and values, gearing up for a war against traditional publishing. Which reminds me of the triad Ruth evokes, of the Church, the State, and the University. I am just wondering how we attach some of these entities of today: Google, Elsevier, and the open web, which is again emergent to a certain extent (even "disruptive," to use another term from within the community), are all mobilizing a set of insurrectionary energies that the Digital Public Library of America also comes out of, and it is this community of folks who are advocating for accessibility and openness. So there are these new conflicting forces: Google information services, the Elseviers etc., traditional publishing, and the open web. I am just wondering if there is a complementarity or a comparison between the Church-State-University triad with cluster of forces we now see emerging, to fight out the future of publishing and licensing.

Aihwa Ong

It is rather different now because the institutions themselves are also mobile, as opposed to situated as in earlier periods. This means, now, that it's not just the experts who circulate, but also these institutions that are organizing knowledge.

Murtha Baca

With this echo of Church and State, and getting in bed with the devil, you see something similar now with OCLC, which now links from WorldCat right to Google when there's a full digital search.

Stéphane Van Damme

Yes, these are all interesting questions and comparisons. In my paper I had to cut out a discussion of the relationship between national libraries and the market of books, but what I originally wanted to say was that from the very beginning and especially from the sixteenth century there was what they call the *dépôt legal*, which established an obligation for every publisher to send a copy of every book to the National Library, to the King's Library—and obviously the King's Library is also the center for censorship. Censorship does not mean only censorship, it means also privilege, and specifically an economic privilege given to a publisher. So you also have this interesting circle which consists in controlling the production of printed books. It is very interesting because there is, under this Colbertism, beyond the French Revolution, the idea that the National Library is a protected market.

Ruth Padel

That is terrifying! It's a terrifying thought, because we are all trying to access knowledge and give and communicate knowledge, and if this whole apparatus is there to protect the market, what on the earth are we doing?

Gregory Crane

Well, you have to bring in the Mickey Mouse copyright world; the U.S has a copyright that was changed, we had a culture of copyright to protect the market but not the market for books, Disney, and what I call property apparel. And now there's this outrageous intellectual property regime where people get sent to jail for downloading a cartoon. It really connects to what you have just said.

Simon Schaffer

Very good, thank you very much everybody for these fantastic discussions starting from our talks this morning: Dagmar, who got us thinking about national collections, the attempt to create and present a heritage through collections, and especially about the differences and similarities between collecting objects in three dimensions and texts, and finally how the boundaries between those two blur in the Chinese setting. She also got us thinking about what it would be like to make a collection that is not built around objects but around relationships, which seems to have an uncanny connection to some of the ways we're thinking about what we can do with computers and databases—which as Geof showed us are maps and collections of relations. Stéphane's essay gave us a very concrete vision of the networks that supported a certain moment of philology in France, tying that to statecraft, national representation, Orientalism in various forms, and the creation of markets for new kinds of objects. A lot of these themes, as well as the broader rubric of the interaction between East and West, are going to be echoed again in Aihwa's paper.

NOTES

1. <http://www.europeana.eu/portal/en>.
2. <https://dp.la/>.
3. Jean-Noël Jeanneney, *Quand Google défie l'Europe: Plaidoyer pour un sursaut*. Paris: Mille et une nuits, 2005; Bruno Racine, *Google et le nouveau monde*. Paris: Plon, 2010. On the Google Doctrine, see Evgeny Morozov, *The Net Delusion: The Dark Side of Internet Freedom*. New York: Public Affairs, 2011.
4. Alice Prochaska, "National Collections, Global Collecting: The Responsibilities of Librarians as Collectors". *Libraries and Culture*, vol. 37, n° 1, (2002): 72-76.
5. Elisabeth Losh, *Virtualpolitik: An Electronic History of Government Media-Making in a Time of War, Scandal, Disaster, Miscommunication and Mistakes*. Cambridge: MIT, 2009, pp. 239-240.
6. Jaques-Charles Brunet, *Manuel du libraire et de l'amateur de livres...* Paris: Brunet, 1814; *Dictionnaire bibliographique, historique et critique, des livres rares, précieux, singuliers, curieux, estimés, et recherchés qui n'ont aucun prix fixe, tant des auteurs connus que de ceux qui ne le sont pas, soit manuscrits, avant & depuis l'invention de l'imprimerie ; soit imprimés... avec leur valeur... Auxquels on a ajouté des observations & des notes pour faciliter la connoissance exacte & certaine des éditions originales, & des remarques pour les distinguer des éditions contrefaites. Suivi d'un Essai de bibliographie, où il est traité de la connoissance et de l'amour des livres... [-Supplément...]* Paris: Cailleau et fils [puis Delalain], 1790-1802.
7. Paul M. Priebe, "From Bibliothèque du Roi to Bibliothèque Nationale: The Creation

- of a State Library, 1798-1793“, *The Journal of Library History* 17.4 (1992): 389-408.
8. Kevin J. Hayes, “The Public Library in Utopia”, *Libraries and the Cultural Record* 45.3 (2010): 333-349.
 9. <https://memory.loc.gov/ammem/dli2/>.
 10. Judith Andrews and Derek Law eds., *Digital Libraries: Policy, Planning, and Practice*. Surrey, UK: Aldershot, Hants, Ashgate, 2004.
 11. Simone Balayé, “La bibliothèque du Roi, première bibliothèque du monde (1664-1789)”, in vol. 2 of *Histoire des bibliothèques françaises. Les bibliothèques sous l’Ancien Régime*, edited by Claude Jolly. Paris: Promodis, 1988, pp. 209-234.
 12. *Libraries and Culture* 37.1 (2002); special issue, “The Infinite Library.”
 13. This paper is intended to bridge several fields that address the issue of national libraries and their knowledge practices. I draw inspiration from works on media archaeology, the history of virtual art, and reflections on digital archives and libraries. As a historian, I know that this kind of anachronistic approach has traditionally been considered a mortal sin, but I find it very stimulating if we want to go beyond traditional histories of libraries. We could also benefit from a consideration of the history of library science.
 14. BNF, Archives administratives, 64, fol. 44, 24 mai 1740, cité par Emmanuelle Chapron et Anne Saada, «La bibliothèque, la carte et le territoire», in Pierre-Yves Beaurepaire (dir.), *La communication en Europe de l’âge classique au siècle des Lumières*. Paris: Belin, 2014, pp. 215-263, en particulier pp. 248-250.
 15. Joel Slayton, “Foreword”, in Frank Popper, *From Technological to Virtual Art*. Cambridge, MA: MIT Press, 2007, ix.
 16. Robert Damien, *Bibliothèque et Etat. Naissance d’une raison politique dans la France du XVIIe siècle*. Paris: PUF, 1995, pp. 95-115.
 17. F. La Mothe Le Vayer, *Oeuvres complètes*. T. X, *Petits traites en formes de lettres*. Paris, 1669, chap. XIII, pp. 106-107.
 18. P.R. Harris, *A History of the British Museum Library, 1753-1963*. London: British Library, 1998.
 19. Losh, in *passim*.
 20. John Y. Cole, *Jefferson’s Legacy. A Brief History of the Library of Congress*. Washington: 1993, 13.
 21. *Ibid.*, 13.
 22. Jacob Soll, *The Information Master: Jean-Baptiste Colbert’s Secret State Intelligence System*. Ann Arbor: University of Michigan Press, 2009. See, in other contexts, Mary Elisabeth Berry, *Japan in Print: Information and Nation in the Early Modern Period*. Berkeley: University of California Press, 2006, in particular chapter 2, “The Library of Public Information”; Filippo de Vivo, *Information and Communication in Venice: Rethinking Early Modern Politics*. Oxford: Oxford University Press, 2007. See also Paola Molino, *L’Impero di carta*. Hugo Blotius “Hofbibliothekar” nella Vienna di fine Cinquecento. PhD diss., European University Institute, 2011.
 23. Soll, *The Information Master*, 2.
 24. “Mémoire concernant l’acquisition des manuscrits persiens, qu’il conviendrait de faire

- aux Indes pour la bibliothèque du Roy,” Bibliothèque Nationale de France (BnF), archives du département des Manuscrits, Ms. Nouvelles acquisitions françaises, 5441, fol. 362–365, reproduced in Henri Omont, *Missions archéologiques en Orient aux XVII^e et XVIII^e siècles*, 2 vols. Paris: Imprimerie nationale, 1902, 2: 829–832, citation on page 829.
25. Jean-Yves Grenier, *Histoire de la pensée économique et politique de la France d’Ancien Régime*. Paris: Hachette, 2007, 116.
 26. “Mémoire concernant l’acquisition des manuscrits persiens, qu’il conviendrait de faire aux Indes pour la bibliothèque du Roy,” in Omont, *Missions archéologiques*, 2:830.
 27. Brunet, *Manuel*, xxx.
 28. On the role of the *restaurateur* and the museum keeper, see Charlotte Guichard, “Taste Communities: The Rise of the Amateur in Eighteenth-Century Paris », *Eighteenth-Century Studies*, vol. 45, no. 4 (summer 2012), 519-547. «La coquille au XVIII^e siècle : un objet frontière?», *Techniques & culture*, n° spécial *Itinéraires de coquillages*, 2012-2, 59, 150-163. Id., «Les Formes de l’expertise artistique en Europe», introduction générale, *Revue de Synthèse*, n° 2011-1, 1-13.
 29. See for example the letter written by Father Fouquet to Abbé Bignon, August 28, 1722, in Omont, *Missions archéologiques*, 2:811.
 30. Letter from Bignon to Le Gac, January 20, 1732, in Omont, *Missions archéologiques*, 2: 846–848.
 31. Letter from F. Le Gac to Fourmont, Pondicherry, February 20, 1732, Omont, *Missions archéologiques*, 2: 845.
 32. Balayé, “La bibliothèque du Roi”, 210.
 33. On numismatics in Paris, see Thierry Sarmant, *La République des médailles: Numismates et collections numismatiques à Paris du Grand Siècle au siècle des Lumières*. Paris: H. Champion, 2003.
 34. Christian Bessy and Francis Chateauraynaud, *Experts et Faussaires: Pour une sociologie de la perception*. Paris: Métailié, 1995, 204. More generally, see part 3, “Les inscriptions de l’histoire.”
 35. A. Grafton, *Faussaires et critiques-Créativité et duplicité chez les érudits occidentaux*. Paris: Les Belles Lettres, 1993, 14-15.
 36. Dew, *Orientalism in Louis XIV’s France*, 160.
 37. *Ibid.*, 161.
 38. *Ibid.*, 163.
 39. Fabrice Charton, “‘Vetat Mori’: Une institution au service du prince de la Petite académie à l’Académie royale des inscriptions et belles-lettres (1663–1742)” (PhD diss., École des hautes études en sciences sociales, 2011).
 40. Balayé, “La bibliothèque du Roi”, 233.
 41. Sanjay Subrahmanyam, *Europe’s India: Words, People, Empires, 1500-1800*. Cambridge: Harvard University Press, 2017, chapter 4.
 42. Anquetil-Duperron, *Voyage en Inde 1754–1762*, 341.
 43. *Ibid.*, 341.

44. Anne Lafont, "L'Art Project de Google", *Critique*, June-July 2014, n°805-806, 552-556; see also Winnie Wong's book, cited in Aihwa Ong's chapter in this volume.
45. Hillel Schwartz, *The Culture of the Copy: Striking Likenesses, Unreasonable Facsimiles*. New York: Zone Books, 2014.
46. I re-use in these final part materials drawn from my article: Stéphane Van Damme, "Capitalizing Manuscripts, Confronting Empires: Anquetil-Duperron and the Economy of Oriental Knowledge in the Context of the Seven Year's War," pp. 109-127 in *Negotiating Knowledge in Early Modern Empires: A Decentered View*, eds. László Kontler, Antonella Romano, Silvia Sebastiani, Borbála Zsuzsanna Török. New York: Palgrave Macmillan, 2014, 109-128. Blake Smith, «Un cosmopolitisme sans islam: Dara Shikoh, Kant, et les limites de la philosophie comparative dans l'Oupnekhat d'Anquetil-Duperron." *Cosmopolitismes en Asie du Sud: sources, itinéraires, langues (XVI-XVIIIe siècle) / Cosmopolitanisms in South Asia: sources, itineraries and languages (XVI-XVIII c.)*, ed. Corrine Lefèvre and Ines Županov. Paris: Éditions de l'École des hautes études en sciences sociales, Collection Purushartha, v. 33, pp. 121-140.
47. Raymond Schwab, *Vie d'Anquetil-Duperron, Suivie des Usages civils et religieux des Parsis*. Paris: E. Leroux, 1934.
48. Gérard Colas, «Les manuscrits envoyés de l'Inde par les Jésuites français entre 1729 et 1735», in François Déroche and Francis Richard eds., *Scribes et manuscrits du Moyen-Orient*. Paris: Bibliothèque nationale de France, 1997, 346-362.
49. Anquetil-Duperron, *Voyage en Inde 1754–1762*, 173.
50. *Ibid.*, 339–340.
51. Françoise Briquel-Chatonnet, "L'abbé Barthélemy, déchiffreur du palmyrénien et du phénicien," in *Histoires de déchiffrements : Les écritures du Proche-Orient à l'Egée*, ed. Brigitte Lion and Cécile Michel. Paris: Éditions Errance, 2009, 173-186.
52. Schwab, *Vie d'Anquetil-Duperron*, 87.
53. William Jones, *Lettre à Monsieur A*** du P***. dans laquelle est compris l'examen de sa traduction des livres attribués à Zoroastre*. London: P. Elmsly, 1771.
54. *Ibid.*, 6.
55. *Ibid.*, 11.
56. I have followed here the general interpretation proposed in Simon Schaffer et al., eds., *The Brokered World: Go-Betweens and Global Intelligence, 1770–1820*. Cambridge: Science History Publications, 2009.
57. In recent historiography, insistence is placed upon the on go-betweens, and on the circulation of information in colonial contexts: see Sanjay Subrahmanyam, *Three Ways To Be Alien: Travels and Encounters in the Early Modern World*. Waltham, MA: Brandeis University Press, 2011.
58. Jacob Soll, "Colbert, Louis XIV and the Golden Notebooks: What a King Needs to Know to Rule," in *Exploring Cultural History: Essays in Honour of Peter Burke*, ed. Melissa Calaresu, Filippo De Vivo, and Joan-Pau Rubiés. Burlington: Ashgate, 2010, 151-168.
59. On "armchair explorers" see Neil Safier, *Measuring the New World: Enlightenment Science and South America*. Chicago: University of Chicago Press, 2008, chapter 3.

CHAPTER 6

In a Time of Earthquakes: Chinese Artists Shake the World

Aihwa Ong

EARTHQUAKE ART

This talk is about forms and networks of circulation, collecting, and accumulation: of artworks and concepts, of people and reputations, of information and value. It has many connections with the previous essays about the virtual library and the mobile forms of collecting and copying in Ancient China and Early Modern France, but updated to the accelerated global locations of the contemporary art world. It's a development and refocusing of themes I explored in an essay in 2012 on Chinese artist Cai Guo-Qiang and his riffs on the history of Western acquisition of Chinese materials, much of it passing through Venice, from the time of Marco Polo until today, and the ways in which artists are able to work their "Chineseness" into a form of branding and value-making in the dislocated sites of the global contemporary art market. The central actor in my paper today, Ai Weiwei, has become far more famous than Cai Guo-Qiang, to the point where he has now become an international icon.¹

Following the 2008 Sichuan Earthquake, Ai Weiwei catapulted onto the world stage as the *enfant terrible* of China's art world with his *Earthquake Names Project*. The project memorializes the innocent victims of shoddily-built schools by reassembling debris taken from the rubble. A serpentine installation made up of thousands of backpacks commemorates student victims. The collected artworks, which include recovered steel-reinforcing rebar arranged to suggest broken earth, expose

hidden political abuses that are rampant in China. Perhaps because of the audacity of his protest on behalf of voiceless victims in the country, Ai was arrested in early 2011. He was charged with the crime of tax evasion, but during his 81-day imprisonment, Ai was mainly questioned about his political activities. Upon release, Ai defiantly continued his protest—this time, in the medium of film—by producing the documentary, *Never Sorry*.

As an artist who specialized in depicting hidden social and political ills in China, Ai attracted international attention. Exhibitions of his works proliferated in Western capital cities. In Europe and North America, Ai is celebrated for working at a nexus of the political repression and artistic revolt, and is lauded as an artistic exemplar working in the Western *avant-garde* tradition today. His astute ability to enrage his homeland's ruling regime has won him accolades, including this assessment by a Canadian journalist: "Is Ai the most important artist on the planet because of his politicization, or in spite of it? The answer, simply, is yes."²

In contrast to the reception of Ai's politically-infused works, other examples of contemporary Chinese art are viewed by Western observers as less high-minded or innovative. Take, for example, Dafen, an art village in South China that has produced copies of Western art classics for the global market, and which is located near the Apple factory zone. Unsurprisingly, the metaphorical stereotype of China as one mass assembly-line has reinforced a Western view that much of contemporary Chinese art is derivative and mechanical. In her book *Van Gogh on Demand*,³ Winnie Wong disagrees; she argues that there is a complex synergy between creativity and copy, performance and struggle, in shaping art markets. She positions artists from Dafen as engaging in a form of postmodern appropriation. According to Wong, these artists, by making copies of Van Goghs and Matisses, reanimate the aura of Western masterpieces which has faded under the glare of global commercialization. Thus, the artisanal practice of Chinese art reproduction ironically counters the depleting effects of the worldwide circulation of images of Western art.

The growing flows of contemporary art out of China are disrupting international art markets as well as art practices. One effect is the destabilization of conventional museum approaches to artworks produced outside the North Atlantic sphere. In 1989, a conference entitled *Magiciens de la Terre* in Paris challenged what French curators recognized as the colonial biases of art exhibitions. The proposition was that by increasing focus on more "third world art," for example, from Africa, Western museums could move away from ethnocentrism in the organization of their exhibitions. While this was a first step, there has been little serious engagement with changing meanings of "the third world" (an obsolete term for non-North Atlantic countries that have traditionally been associated with primitivism and backwardness), and the art forms originating outside the North Atlantic. While this was

a first step, there has been no dramatic shift to serious consideration of evolving meanings of what is contemporary, what is Asia, and what “contemporary art” may be about today.

CHINESE ART AS INK ART

Many museums in the United States continue to hold on to notions of Asian art stemming from the ancient trade with China. Western curators, scholars, and collectors, steeped in the tradition of appreciation of China’s distinctive aesthetic traditions, tend to view contemporary Chinese art as a transition between what they call the two worlds of “continuity or rupture” with past Chinese art forms. For instance, the Metropolitan Museum of Art in New York has long been a major leader in collecting and curating the (re)presentation of Asian art in the United States, thereby aiding in legitimating its objects, establishing frameworks for evaluation, and thus providing powerful effects in structuring the market for these collectible objects. It was not until April 2014 that the Met launched its first exhibition on contemporary Chinese art entitled, *Ink Art: Past as Present in Contemporary China*.

On line, the Met claims that the show “will demonstrate how China’s ancient pattern of seeking cultural renewal through the reinterpretation of past models remains a viable creative path.” Furthermore, the curators claim that despite new modes of expression, viewers will recognize “thematic, aesthetic, or technical attributes...that have meaningful links to China’s artistic past.”⁴ While this model provides a set of lenses through which to view Chinese art, it narrows consideration of contemporary art to its role of reanimating ancient forms.

Art history views contemporary art in and from China as descended from the mountain-water (*sansui*) landscape calligraphic tradition.⁵ This construction not only gives primacy to ink paintings, but also puts contemporary art forms into the straightjacket of repetition and rectification of an established classical form. This tradition suggests that contemporary Chinese artworks can only exist in continuity or in tandem with ancient traditions.

Such claims of continuity are made even when the Met exhibition displays contemporary pieces that mock Orientalist assumptions of cultural renewal. Even when ink is used, some paintings deliberately disassociate and even critique ancient aesthetic forms. For instance, Zhang Huan’s *Family Tree* series depicts the progressive blackening of the artist’s face by inked characters (see Fig. 6.1), Zhang Huan seems to be suggesting that ancient calligraphy and by extension the Mandarin language and culture can smother individual character.



Figure 6.1. Exhibition poster, Metropolitan Museum of Art, New York. 2013.
Family Tree by Zhang Huang.

At the same Met exhibition, Xu Bing's *Book from the Sky* mounts another challenge to the revered art of Chinese writing. Long banners filled with carefully written, made-up characters are draped across a large, traditionally-appointed Chinese room. This elegant space exudes a hushed reverence for the aesthetics of Chinese writing, even though it is rendered in a style that is essentially meaningless to those who can read it. Xu Bing seems to be saying that in this new China, while ideographic characters are not defunct, they seem to be an obfuscating written form for grasping contemporary thought and reality. After all, Chinese calligraphy is an ancient, elite cultural medium (it takes years and resources to master) that can viewed as an oppressive class practice over which most people will never achieve control. This revered writing form is inseparable from Confucianism and other ancient ideas associated with oppressive, hierarchical values seen to be out of step with today's world. Indeed, under the guise of valorizing the ancient forms, there are other artworks in the same Met exhibition that mock a fetishized reading of contemporary Chinese art as irrevocably tied to the ink tradition.

The contemporary Chinese art milieu, I suggest, is crystallized by a "global assemblage"⁶ of artists working in China interfacing with North Atlantic collectors, curators, and audiences. Also in play are different meanings and intentions that animate the trans-Pacific art world currently dominated by Western art establish-

ments. As examples of artworks originating from China circulate throughout the world, the “Chinese” in “contemporary Chinese art” cannot be divested of the notions of “what is art” and “what is contemporary” from divergent vantage points. The “Chinese” in this globalized art environment refers not only to originating cultural traditions, but also to the distinctive experimental space and its ironic, disruptive effects on norms of aesthetic judgment and curatorship in the West. In cross-border venues, Chinese artists run into the predicament of being stereotyped less by Orientalist desires than by avant-garde expectations of how artists from the People’s Republic of China ought to perform.

THE *ENFANT TERRIBLE* OF CHINESE ART

Ai Weiwei has become the *enfant terrible* of the globalized Chinese art milieu by manipulating the disjuncture between Western valorization of ancient Chinese art and expectations of the role of contemporary Chinese artists today. One can trace the beginning to a triptych by the youngish Ai Weiwei *Dropping a Han Vase, 1995*, that captures his famous performance at a German museum. This celebrated image of Ai as a destroyer of ancient Chinese objects has since circulated to major museums in the West. Other examples of Ai’s desecrating works include dipping ancient urns in automobile paint and writing “Coca-Cola” on a Neolithic vase.

As an anthropologist, I find it both appalling and intriguing that by destroying and desecrating ancient Chinese treasures, Ai Weiwei has ascended in global esteem. Why do Western museums that cherish ancient Chinese art forms celebrate their destruction by Ai Weiwei? Clearly, as a museum category, Chinese art can no longer hide from the realm of geopolitics.

There are different interpretations as to why Western museums and critics find such stunts compelling. For some, Ai’s destruction of Neolithic urns dramatizes how rampant consumerism in China today has destroyed the culture’s ancient roots. An opposing view maintains that Ai enacts a symbolic shattering of antiquated Chinese cultural forms that exert an enduring oppressive influence on contemporary Chinese politics and culture. By provoking contradictory readings and critiques, the urn-smashing exercise plays with Western fears of the potency of China stemming from its ancient roots in combination with its emerging capitalist power. As a destroyer of Chinese patrimony and a provocateur of China’s might, Ai Weiwei has been celebrated for smashing his way onto the global stage. Ai’s iconoclastic acts resonate powerfully with Western anxieties about China.

It seems to me that for Western curators and audiences, art as vandalism, though a longstanding trope of the Western avant-garde seems particularly politically

meaningful when enacted by Ai Weiwei. This is evident when considering cases of art vandalism from the recent past that were judged as being merely criminal. In 2012, the artist Maximo Caminero smashed one of Ai's urns that was being exhibited at a museum in Florida. Caminero claimed his artistic protest was directed not at Chinese antiquities but rather at the museum practice of showcasing Ai's works but not those of local artists. Surprisingly, instead of expressing solidarity with less famous colleagues, Ai demanded compensation, and Caminero was subsequently fined one million U.S. dollars for the destroyed urn. A former refugee from the Dominican Republic, Caminero mimicked Ai's desecrating act as an expression of both admiration and criticism of the artist as celebrity, an irony perhaps not lost on the Chinese artist himself.

Vandalizing ancient treasures as an act of protest is thus judged in the context of a specific protest. In contrast, whereas Ai Weiwei's vandalism of Chinese art objects in a Western museum is still considered acceptable—and even celebrated—there was widespread condemnation of the (admittedly much more massive) destruction of sixth-century giant Buddha statues in Bamiyan, Afghanistan, by the Taliban in 2001. Thus not all destruction of ancient art is judged in the same way by international museum authorities. In one case, we have a charismatic Chinese artist who seems to personify our model of the avant-garde artist, and in the other, a religious fundamentalist organization bent on purifying their culture. To Western eyes, the jihadist militants are world destroyers, but Ai Weiwei is a rare Chinese hero who, by destroying artifacts of Chinese feudalism, champions cosmopolitan culture.

Beyond these oppositions, I read Ai's urn-smashing with a slight nuance. By staging his vandalism of Chinese antiquities in a German museum, Ai simultaneously repositions himself as an artist, and reframes Western perception of what Chinese art(ists) can do. His act has been read as a protest against the untrammelled commercialization that has destroyed Chinese history; but at the same time, by defacing ancient urns and displaying them in Western museums, Ai enhances and underscores their value as precious art objects that have been contaminated by capitalism. He demonstrates that he belongs not to a singular civilization, but to a global society. In one maneuver, he shatters the Orientalist framing of Chinese aesthetics, and repositions contemporary Chinese art as a global political phenomenon.

In other words, Ai Weiwei is an adroit artist who is alert to geopolitical tensions and cross-cultural (mis)perceptions. Contemporary Chinese artists exhibit a "rooted cosmopolitanism." Their works should be considered as artistic explorations of what China's present and future can be.⁷ Indeed, such aesthetic works address an imagined audience, invariably one located in the North Atlantic world where people pay attention to art as a mirror for contemporary Others. From such viewpoints, the "Chinese" in "contemporary Chinese art" cannot be considered

separately from the distinctiveness of the artworks as they are being evaluated through an ideologized lens. The “Chinese” in this global art collectivity refers not to cultural traditions or essences, but to the distinctive experimental space, and the very ironic challenges that Chinese artists have unleashed on Western art elites and audiences for whom contemporary art has become a privileged lens through which to grasp contemporary China as both threat and hope.

Through Western eyes, contemporary artists are viewed as witnesses, diviners, and visionaries of their homeland. By engaging in a profoundly anthropological, aesthetic enterprise, Chinese contemporary artists make arguments about the human condition in contemporary China. Their aesthetic interventions attempt to capture the past-present and envision alternate present-futures in China, as well as in China in the global context. Invoking “China” in multiple registers is part of the dynamic work of (re)making new conditions of possibility for addressing diverse issues in contingent time-space configurations. Artworks, even those held in storage while awaiting an eventual sale or gift, are therefore not imprisoned in a temporality we call “contemporary,” but rather are performative of a form of “anticipatory politics.” By intervening in the present-future of China, such artists express their embeddedness in Chinese culture while addressing cosmopolitan interests in China now that it has become a global power. As “rooted cosmopolitans,” these artists configure strategic and provisional affiliations in the world. By establishing their presence on global platforms, Chinese artists pursue some kind of universalistic ethics and yet are very firmly anchored in China and its fate.

Because they transmit contemporary Chinese experiences of upheaval, as well as actual geological, cultural, and geopolitical ruptures, I argue that their practices can be called “earthquake artworks.” Contemporary artworks gain power not so much from within tradition, but from commenting on the extreme and varied dislocation that Chinese people and the nation at large experience. Somewhat paradoxically, by making artworks that transform the everyday into living ethnography, or transfigure our notions of cosmopolitanism, Asian artists also open themselves up to the seductive lures of Western fame.

SELF-ETHNOGRAPHY: THE ARTIST “SPEAKS BITTERNESS”

In an anthropological sense, Chinese artists are “contemporary” because they act as observers and recorders of actual lived realities. Indeed, Hal Foster has compared contemporary artists to ethnographers in that, as fieldworkers, they engage in practices of appropriation. Even when artworks are often semi-masquerades of the real, the artist’s self-fashioning remains unchallenged.⁸ Contemporary Chinese

artists engage in this epistemic-aesthetic exploration of the daily travails and minor histories of Chinese reality. By giving ethnographic significance to everyday (dis) locations, Chinese artists practice a kind of democratizing art—an art as living ethnography.



Figure 6.2. Cai Guo-Qiang, *Bringing to Venice What Marco Polo Forgot*, 1995.

Courtesy: Cai Studio, New York.

Ai Weiwei is an exemplary artist-ethnographer of this ilk, one who draws inspiration from events big and small in recent Chinese history—from the Sichuan Earthquake to the discarding of traditional artifacts in the life of a prostitute—that cumulatively capture the dislocations of China's cultural earthquake. Through the ethnographic reassemblage of found objects (backpacks, doors, stools, bicycles, clothing, books, etc.) Ai's artworks critique political corruption, the breakup of an ancient civilization, and the suffering of ordinary people in an age of rampant capitalism.

After his arrest in 2011, Ai Weiwei exploited his time in prison to powerful effect by turning to self-ethnography. In 2014, Ai exhibited *S.A.C.R.E.D.*, a series of installations that re-create his imprisonment, and that are sharply focused on the silent suffering of the individual as a prisoner of the state. Against overwhelming powers, Ai resorts to ethnographic realism to convey the naked authenticity of this imprisonment. The installation shows Ai closely accompanied by guards at all

times—eating, sleeping, showering, and even relieving himself. In the scenes, the materiality of state surveillance over the living process is juxtaposed to its immateriality: the materiality of things, of human waste, set against the immateriality of human rights.

It is important to note that as a form of self-ethnography Ai's prison installations are *not* a celebration of subjective individualism in the Western sense. What is being claimed by Ai's depiction of his humiliation at the hand of the state is an insistence on the collective rights of individuals. In contrast to the Western canon, Ai's artistic style is continuous with the Chinese practice of *suku*, of "eating or speaking bitterness." Since the communist revolution, *suku* has been a mandated form of registering complaint against society in order to expose and expunge it. Ai deploys art as a tool for the revelation of bitter personal experience in order to expose problems of a sociopolitical collectivity and to demand social justice. He has argued that the art world and the world of social media can be allies, united as anticipatory infrastructures for claiming human rights. In a tweet related to the exhibition of his prison installations in Brooklyn, Ai claims that "art is activism, activism is art; inspiration comes from daily life. The small things, the people we meet—are not from books, but from daily life and events. Everybody can be an artist."

RETHINKING EAST-WEST

Other provocative Chinese artists also stand at the crossroads between politics and aesthetics, the material and the immaterial, but their recombination and repositioning of old and new objects are key to more subtle political commentaries. Mobilizing traditional objects, and juxtaposing them with the collections of today's equipment, are keys to their interventions. Two other Chinese artists who are celebrated in the United States—Cai Guo-Qiang and Xu Bing—use ready-made objects to redraw and reinterpret East-West relationships, recasting encounters that are opportunities for cross-cultural re-symbolization and healing. In globally-connected cities, Chinese artists can cultivate potential audiences who may be more receptive to alternate notions of East-West relations. They deploy curative, therapeutic forms to dispel Western anxieties about an increasingly powerful China.

A resident of New York City, artist Cai Guo-Qiang has, in his many installations, reinterpreted East-West encounters in order to recast global events and reposition cross-border entanglements in a more positive light. Cai's most famous performance is *Bringing to Venice What Marco Polo Forgot* (Fig. 6.2), performed at the 1995 Venice Biennale. By sailing a Chinese junk boat down the Grand Canal, Cai raised a provocative question: if Marco Polo had carried Chinese medicinal

A HOMELESS DISSENTER?

By contrast, Ai Weiwei's practice typically consists of "in-your-face" performances. More recently, however, he seems to have shifted away from China as the all-consuming target of his dissension, making artworks that are site-specific to Western landscapes. One of the latest of these works was an exhibition aptly titled *@Large: Ai Weiwei on Alcatraz* (Fig. 6.4), which opened in June 2014 on the island of Alcatraz in the San Francisco Bay. It is important to note that at the time, Ai was prohibited from traveling outside of China. In the West, the exhibition was advertised as a showy fundraising ploy for the California Park Services, but Ai used the occasion to assert himself as an international freedom-fighter. With the exhibition, he sent this message: "The misconception of totalitarianism is that freedom can be imprisoned. This is not the case. When you constrain freedom, freedom will take flight and land on a windowsill."¹⁰



Figure 6.4. *Refraction* by Ai Weiwei, Alcatraz, 2014. Credit: Robert R. Ng.

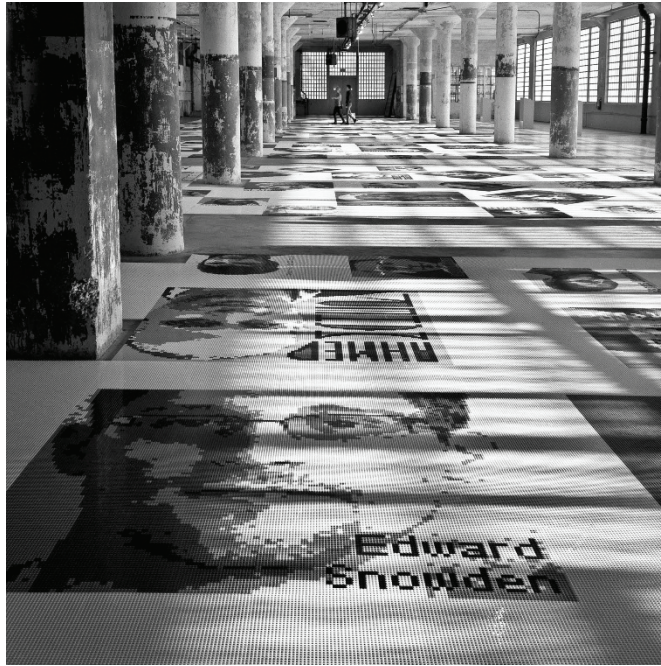


Figure 6.5. *Trace* by Ai Weiwei, Alcatraz, 2014. Credit: Robert R. Ng.

The statement not only alluded to Ai's inability to travel outside of China; it also positioned him as a critic of political oppression on a global scale. The main exhibition at Alcatraz, *Trace* (Fig. 6.5), is a floor display that comprises a community of imprisoned activists portrayed in Lego blocks, which clearly and excellently signals Ai's shift in practice. In and through *Trace*, Ai moves beyond China by making images of seventy-five famous "prisoners of conscience," from blind activist Chen Guangcheng to Nelson Mandela, and from imprisoned Nobel laureate Liu Xiaobo to NSA whistleblower Edward Snowden. The Legos suggest a flattening of political points, as assembled on Twitter. The larger implication of this piece is that Ai is now operating not from China, but "at large," moving from a specifically situated culture to the boundless space of a globally anointed artist.

Ironically, Ai's exhibit at Alcatraz unwittingly eclipsed memories of Native American protests over the use of the island and the centuries-long oppression of indigenous peoples in the United States. While visitors to the exhibition did hear haunting Hopi chants from one of the dank cells (a faint gesture to Native Americans imprisoned there in the late 19th century), there was absolutely no mention of the American Indian Movement activists who occupied the prison in 1972, claim-

ing native sovereignty over the island, and rejecting its use as a site for museums.

Only Ai Weiwei could have engaged in this kind of trendy, long-distance proxy that subsumes California's history of oppressive politics. During my visit to the exhibition, I was both amused and impressed by his impresario performance *in absentia*: beefy prison guards more familiar with closing heavy metal cages circulated the grounds while directing visitors by saying things like "Ai Weiwei this way." By making Ai Weiwei a household name, the California Parks Department gentrified the infamous prison real estate, anticipating an alternate future for the space as a venue for global art.

For Ai, Alcatraz was a convenient platform from which to launch his re-entry into the world. Shortly after the exhibition, the People's Republic of China returned his passport, allowing him to travel overseas. Now, Ai is free from the clutches of the Chinese state—and perhaps released from his role as the passionate ethnographer of Chinese earthquakes. Now ensconced in Berlin, he seems poised to be the homeless *avant garde* artist of the world, a vision that is championed by Uli Sigg, the Swiss collector of contemporary Chinese art who has helped stoke the critical enthusiasm and rising value of such works. But, cut off from his Chinese roots, will Ai Weiwei cease to be China's *enfant terrible*? Will he become just one among many versatile Asian artists who zigzag around the world in the service of an ungrounded global art and politics?

Ultimately, contemporary Chinese art is an aesthetic expression of anticipatory politics that requires both rootedness in Chinese culture and the agility to straddle cosmopolitan expectations. Major artists from China must navigate two kinds of political anticipation. The first is that the art world expects laudable Chinese artists to be dissidents who criticize the Chinese state. Ai Weiwei's design of the Olympic stadium in Beijing captures this predicament; the "bird's nest" design symbolizes his contrary positioning between an ancestral location in a nation that constrains freedom, and an individual desire to slip from his bonds and take wing. The second kind of anticipatory politics is performed by Chinese artists who are less easily described as "dissidents," because their more ambiguous practices anticipate the emergent global politics that is engendered by earth-shattering transformations taking place in China today.

DEBATE

Geoffrey Bowker

Though this is definitely not my field, I was interested in the theme of dislocation and continuity. Could you talk a little bit about what happened under Mao Tse-Tung? When you referred to the “traditional” you referred to old forms of Chinese art. But presumably there was a moment of dislocation and discontinuity after 1949? So what happened in that intervening period? How much continuity was there between that moment of modernization and the traditional Chinese art forms? Related to that is, what are they teaching in Chinese art schools? Have they been teaching the traditional forms, the Socialist Realist forms, the *avant garde* forms?

Aihwa Ong

There are other kinds of framings, but I’m trying to argue that when I look at this collection of art works, I see them as constituting a real rupture. Certainly there was a Socialist-Constructionist period vastly influenced by the Soviet Union in the early years of socialism. Also, in many Chinese provinces there are academies that continue to teach traditional practices and skills. But I’m specifically trying to trouble the term “contemporary” in the Western context because it is merely a time marker, while within the “contemporary” there are a variety of coexisting styles. In Hong Kong they’re beginning to track and keep account of the varieties of currently existing Chinese art forms that you can find in China and around the world. My talk only explored a narrow, specific set of these styles.

Glenn Most

I have a question about Ai Weiwei, and another question. I understand and sympathize with your argument that he isn’t a completely ruthless non-Chinese painter, artist, and creative person; one has to understand him within his traditions. But looked at from the point of view of Europe, much of what he’s doing is very similar to the traditional European *avant garde* in so many ways. I wonder whether this is one reason why he has such success in Europe, aside from the political aspect, because he’s easily understandable in European artistic terms. Though this might not also be true about his intention, at some level. The second question is about contemporary Chinese art. You mentioned a Swiss collector, but does anybody collect it in China, or is it primarily collected outside of the country?

Aihwa Ong

Well, that's what I mean by "rooted cosmopolitan" in referring to a figure like him. With him, there is the mixture of being really anchored in the problems of China, and of being Chinese, and trying to deal with these issues through the lenses of different time periods while at the same time espousing a universalist ethic and emphasizing human rights. So it's a mix of styles—in a word, he is not homeless, he's a "rooted cosmopolitan." The collector Uli Sigg would think "Well, maybe Ai Weiwei will one day will be just representing *avant gardism* as a homeless figure." But I'm trying to make the argument he can never be homeless. For a long time he could not even leave China; but even with his passport, he's still profoundly concerned with China and the possibilities for an alternate future in China.

Glenn Most

Do contemporary Chinese artists like him?

Aihwa Ong

I don't think so. No, the general thinking about him in China is just awfully ugly. Many of these things don't make sense to them. They consider him a creature of the West, a Western figure. He's a creature of Western museums, curators, and collectors, and whenever I ask people in China, they answer that they just don't really like him. Perhaps there's this sense of him being a bit of a turncoat.

Ruth Padel

I was interested in the reception of Ai Weiwei by the Chinese public on the whole. I'm thinking also of making a parallel with Salman Rushdie, who felt that he'd written *Midnight's Children* and indeed *The Satanic Verses* for migrants from the subcontinent; he told me once that he was writing his works for them, not English audiences. So India turning against him made him feel rather blindsided. He felt that they resented him for showing off their government to the West. Does that feeling not have any resonance at any section of Chinese society?

Aihwa Ong

I don't know specifically, but maybe. There are some activists in China who

appreciate Ai's work. Not as art, perhaps, but as theatre, and perhaps he is about theatre and less about art. But, it's very complicated to be a Chinese subject because you don't easily discard your loyalty, your patriotism for your nation, regardless of the government and how foul it is. So they're trying to deal with those issues and of course there are thousands of protests in China going on all the time to correct the political situation. But to display it in the way Ai does is perhaps not kosher for many Chinese people.

Luca Massimo Barbero

You were mentioning both materiality and meta-reality, which I think is a rather interesting point of view in the case of producing contemporary art. You also pointed to the problem of, precisely, the "contemporary" in Chinese contemporary art. So, Ai Weiwei is a Western creation, or his reputation is maintained because of an incredible popularity with Western audiences, and you said that this at least partially stems from a deliberate move against tradition. One of the questions that comes to mind in this context is why, with such political or conceptual social political themes playing into their art, Chinese artists need so many objects, so many physical bodies of work? That's what Ai Weiwei actually does—proliferate physical bodies.

The second point is: I'm with you when you say he's not exactly representing himself, but not one hundred percent with you. How come he's usually using old devices, old handmade materials—the first sculptures were neo-Dada, there were chairs, there was furniture. I'm also thinking about his Guggenheim installation using broken porcelain, and so on. What's the relation between the material, the immaterial, and going against tradition using traditional objects? I'm also thinking more about fireworks and other performative artworks. Chinese artists you've described seem to be re-performing a certain kind of *avant garde* scene, at least in the Western perspective, because we recognize those performances insofar as they resemble the Western *avant garde* tradition, even if they're using Chinese values and social contexts.

Aihwa Ong

Yes, there is this Western influence, but there's also an appreciation for ordinary Chinese artisanal capacities, skills, and artifacts. When I say that there's a rupture, I'm talking about a rupture with traditional Chinese high aesthetics, which is about transcending this world and its cares. That traditions is not about this world—this petty, everyday junk that people live with. My Chinese colleagues, for example,

refuse to ride bicycles because it's kind of low class. But with these Chinese artists, there are all these handmade household objects that are now being treasured and displayed. The junk of a prostitute is on display in a Western museum. Ai Weiwei is trying to capture these ethnographic elements of everyday people whose lives are dislocated and in upheaval. He wants to show, to give back perhaps this image of a rapidly disintegrating world, even if it's shown in the West. It's a mix of styles. And materiality is part of it. And meta-reality. I'm not saying they didn't learn anything from the West, but they're trying to say, "We learned from the West, but we're not really so much *about* the West; we're really concerned about China."

Dagmar Schäfer

I want to ask a question about Ai Weiwei's understanding of history, the approach to history that he's actually reflecting in his way of using objects, because I think there is a little bit more to it than we've admitted so far. So, if you look at Ai Weiwei and his approach to history, how would you describe it?

Aihwa Ong

Well, this is where Orientalism comes in. Have you seen the movie *Raise the Red Lantern* directed by Zhang Yimou? In it, he uses this Oriental imagery of a "pure" China, one with none of the messiness of the Communist upheaval, because he wanted a Western audience. There's a kind of seductiveness to this notion of a "pure" China. These people are monsters at seducing the West with ideas like this. But at the same time they are also doing other, possibly more subversive things. I'm not trying to say that these artists are pure figures of protest—they are also interested in capitalism, making lots of money, and global fame. But they are also interested in fighting for human rights in China.

Luca Massimo Barbero

Don't you think that sometimes their game is aimed toward seducing the Western market instead of the Western public?

Aihwa Ong

Both!

Luca Massimo Barbero

Alright. Because when you were talking about cosmopolitanism, I tend to think they're playing pretty heavily with cosmo-capitalism. It's again the idea of reproducing a double play of seductions. One element in this double-play is the artist reproducing her—or himself in the image of an exotic ideal, in the Orientalist image, which is very dangerous.

Aihwa Ong

In a sense, if you are from Asia you cannot escape being Orientalized. This image becomes a token of exchange that you can give back. It's the currency you have to operate within. Self-Orientalizing is very well-recognized—you have to self-Orientalize because, if this is the projection that people impose on you, rightly or wrongly, then you have to return that projection to them in the same coin or language. Cai Guo-Qiang, for example, refuses to speak English. He has lived in Brooklyn for almost twenty years; he doesn't ever utter a word of English.

Simon Schaffer

Lots of people in Brooklyn don't speak English.

Aihwa Ong

All the same, these poses are part of the act. I'm trying to say these are not pure figures, and just as Luca pointed out, they need to be very savvy to have risen so far up the global art market food chain.

Matthew Battles

I'm interested in this concept of rooted cosmopolitanism. I wonder to what extent it can be, as it were, uprooted and transferred, if there are other soils that are fertile for this particular kind of cosmopolitanism. To look for some directions towards answering that question, I wonder, first of all, about the artist's biography. Correct me if I'm wrong, but Ai Weiwei did spend a period of time as a young artist in New York City, more or less attempting to be a rootless cosmopolitan. I mean, he was trying to be a New Yorker, to embrace the cosmopolitanism of New York City. I'm wondering how he renews that encounter with China in his work (if it can even be considered a renewal.) That's one question.

And then there is the question of the art market. I think it's interesting that he's not collected in China, or not extensively collected in China. But at the same time, isn't it true that Chinese art collectors have played a role in the global art market in the last few years? I mean, there's been the disruptive element of the sheer amount of money that has been mobilized to buy European art specifically. This has been talked about in interesting and troubling ways in the West, perhaps in a kind of middlebrow critique of China as a whole.

I think this can relate to your discussion of Ai Weiwei's Alcatraz project and the effacement of Californian dispossession of Native American peoples there. Of course Alcatraz is a prison; it's implicated in an American history of criminal justice that is dispossessive through and through. So, certainly in North America, there's a middlebrow line on China that this kind of art is a just a very unreflective criticism of Chinese government and Chinese ways and Chinese impact on the world. There's there's a fear that motivates it. What does Ai Weiwei have to say to that kind of 21st century naïve Orientalism of fear? And what kind of rooted cosmopolitanism could we hope to cultivate in other contexts where, say, the dispossession of First Nations in North America is systematically effaced as part and parcel of tradition?

Aihwa Ong

Ai Weiwei spent part of his life in China, then in New York, and then he went back to China because his father was dying. Maybe I ran through "cosmopolitanism" too fast. It means many, many things. Cosmopolitanism with a big "C" is the Kantian cosmopolitanism, or world citizenship, a kind of weakening of one's particularized ties to a home country and expressing solidarity with people everywhere. You have a little bit of that in Ai because he has become a kind of global spokesman for human rights for people under repressive regimes. At the same time, there's a kind of commercial cosmopolitanism, cosmopolitanism with a small "c," which is about being at home crossing borders, managing different people's cultures and expectations of what the "immigrant" is and doing well in a financial sense. Bluntly: it's about buying property. That's the part that stirs up resentments and fears, especially in North America and maybe in England too, about these Chinese who have arrived from around the world and have begun buying up Louis Vuitton bags. Well, I'd like to have one too, but...

I'm trying to show how the embrace of the Chinese artist is in a sense ironic because he's made into, and makes himself into, the kind of "Chinaman we can live with." I can bring back Alcatraz in this context. Next to Alcatraz is Angel Island, where they incarcerated all the Chinese coming in to the Bay Area because there was a rule excluding people from China at the turn of the 20th century, unless you

had relatives already there. So there was the phenomenon of “paper sons,” where you pretended that your dad is actually in the San Francisco Chinatown, and you would have a paper to show it. But these people were incarcerated on Angel Island, sometimes for years, before they could present their case and be allowed onto the mainland. There’s a kind of complicated resonance there.

Matthew Battles

But you’re also suggesting this show on Alcatraz is the way for the dying liberal state to protect its natural resources, to get an injection of money.

Aihwa Ong

Yes. And fame for Ai. But it is also a kind of cosmopolitanism in that it shows a different feature of China to my undergraduates. That’s my main audience—the undergraduates who are smart but misinformed and afraid. This is something they can live with and be interested in, so they’re getting more cosmopolitan, too. The art market is also very interesting; my sister works in an art gallery in New York City, and her gallery has opened a branch in Beijing to buy Chinese art, even though their focus is on Impressionist paintings. Art galleries like hers are moving into Chinese art because there’s the mystique about them.

The other thing that I didn’t mention here is that the whole art market has shifted, and there is a sense among curators that contemporary art in the West is not that interesting. I mean, how many Jeffrey Koons can you bear to look? It doesn’t have the deep history of suffering and dislocation, or the weight of history and culture you see in these Chinese installations. Asian people are also collecting Chinese art now rather than just European art, even if they’re not necessarily collecting Ai Weiwei. This then raises the whole question of the critics. What kind of role can Western art critics play with this kind of shifting landscape of collecting original pieces? There’s a lot of anxiety around that.

Ann-Sophie Lehmann

Thank you, Aihwa, for giving us a brilliant example of the enormous complexity of this issue. I only have a few comments. I think it’s so easy to criticize somebody like Ai Weiwei, through our either still-colonial or post-colonial gazes. He plays with these lenses very shamelessly sometimes, but he’s also very smart. With the sunflower seed project, which was funded by Unilever at the Tate Gallery, he re-

vived the porcelain manufacturing industry at Jingdezhen by providing people with salaries for over five years for painting sunflower seeds, which was a political comment on Maoism. But of course, the criticism is obvious: those people earn money for five years and then Ai Weiwei moves out, all the sunflower seeds move out, and the money is gone again. So, what's happening here?

At the same time, he played an enormously important role in Chinese youth culture and the criticism of Internet control by the government when he posted his “leg-gun” on Twitter. The image became viral within hours all through China and internationally. He also published a book with Ai Weiwei-isms, which are so bad that you cannot even quote them—example include things like, “The Internet will free us all,” or “arts and crafts are really important.” In a sense, it's wonderful that there is a Chinese artist at center stage to begin with, and that he has moved art history out of a very, very specialized field where only people who have been studying Asian art for years and specific domains of the museum were allowed to talk about it at all. So that is a good thing.

Finally, I would like to address how, currently, there are museums being built by the dozens in China, and Chinese collectors come to Europe or come to America to buy collections and fill these museums very quickly. There is this opposite movement as well—maybe Dagmar knows a bit more about this.

Dagmar Schäfer

I actually have a student who is researching this growth of museums in China—mostly science museums, or actually science exhibition halls, according to the American model: there is natural history, and then there's science in history, and then there's modern sciences—and then there is also modern art. It is a really total reshaping of the museums. Just consider that within about five years they built two hundred science museums, and I think one of these museums is probably the size of the Berlin Museum, so it's tremendous. And they're not empty.

Ann-Sophie Lehmann

And this is true for art museums as well. So, what kind of rooted globalism or cosmopolitanism is this then, compared to Ai Weiwei being on center stage in the West?

Aihwa Ong

I want to stress that I'm bringing a critical view on Ai Wewei, but I'm not saying

he's a good or bad guy. It's not an issue of morality. I'm trying to break up the binary frameworks that we use in that context. I wouldn't call him post-colonial either, nor an entirely *avant garde* artist. I'm just trying to show the confluence of influences that went into shaping a figure like him. One way to show this is to bring a critical perspective. But that doesn't mean he hasn't done a lot of good things.

Regarding museums, the West used to collect all our stuff, and now maybe it's our turn to collect their stuff. If you look at how Americans and Europeans collected stuff from all over the world... When I first came to Europe, for example, I arrived in Amsterdam, and I was shocked at all the stuff I saw in the buildings that I could trace back to Indonesia. Perhaps the fear and the prominence surrounding Ai Weiwei all have to do with the reemergence of Asia onto the world. This is very unsettling on multiple registers; unsettling, primarily, of the Western notion of a unitary history, that powerfully enacts novel forms of popular agency in shaping possible futures. Against this, there's this aura of return. Cai Guo-Qiang's whole Marco Polo thing is about Marco Polo returning to Europe with medicine instead of gunpowder. Here you have, in a sense, the return of Asia onto the global stage, with all these possibilities of wealth, artistic capability, showmanship, capacities for manipulating Western perspectives of this and that. Asia is retuning to the world in various guises. These artists are going to play a role in the reimagining of the stakes of our very multiple and yet shared futures. So, you know, it's not so much a question of this individual, but the kind of phenomenon surrounding that individual. I'm less concerned with whether he's a nice guy or not.

Ann-Sophie Lehmann

Simon called what we're experiencing right now the "mirror stage" of the West. I think that's very apt, somehow.

Aihwa Ong

That's right! Yes, the "mirror stage."

Simon Schaffer

I want to be a little clearer about the set of histories to which your analysis, which I think is very powerful, wants to belong. For these reasons: first, one of the most powerful things in the last thirty-five years of history writing in Europe and North America (Dagmar is one of the experts here) has been to point out the enormous

centrality of Asian social and economic systems in world history for a very, very long time indeed. And connoisseurship Venice and in London, hundreds of years, organized around elite taste in the works of Chinese artists. So I'm very puzzled by what the language of return is doing here. In 1700 in London, to be elegant was to fill your house, exactly as you say, with material from Goa and from Gujarat and Canton. Mainly to eat and drink it, obviously, but also to wear it. It was recognized as such, and people knew where it was from. It was named after the places where it came from. It was "calico," for example. So I just want to be clear on where the gap occurs, after which the return is made? This is exactly Geoff's question. Is this a post-1949 PRC gap? Is this the Opium War gap? Is this, God help us, the Great Divergence gap? I actually wonder what gap it was.

So on the one hand there is this longstanding notion that everything civilized and good comes from China. At the same time, and for a very long time, European markets were completely obsessed with another great principles, which is also false. And that's the idea that, and I will quote from an Englishman visiting Canton in China in 1743, "the Chinese are a very ingenious and industrious people, but their principal excellency seems to be imitation... They now make in Canton just as well as anything made in London, and at one third of the expense, all those ingenious pieces which we used to send to China in vast quantities from England." That is from 1743. That is absolutely Winnie Wong's story, in her book about the industry of reproducing European masterpieces.

So again, my puzzlement is that the Europeans have these two views. They have this view that the Chinese are brilliant at copying, and they also think that every European art already existed in China. So the second great challenge to the notion of "returning" to the world stage is that Europeans had somehow to reconcile the idea that everything Europeans do comes from there, but all the Chinese can do is copy. No eighteenth-century *philosophe* actually worked out how those two thoughts could be true simultaneously. How can all these people invent everything and yet they can't invent anything at all? I also want to get a handle on whether you and Winnie, who have both given us these absolutely brilliant and refreshing re-readings of this material, want us to think differently about the great European-Orientalist dilemma, which is that the Chinese have invented everything and we know that; and yet they can't invent anything at all.

Ruth Padel

There is that saying, "for all the tea in China." The things you're talking about penetrate the vernacular consciousness just as much as that of the connoisseurs.

Aihwa Ong

As a result of the Opium War, China was shoved off the world stage by British gun boats in order to open up the market for opium. They feel that they went into a spiral of profound decline down from “Masters of Asia,” if not the world. Then in the interim, the Europeans arrived and made use of cheap Chinese labor. But here we’ve got to go back to the story of the Willow pattern, right? There was an earlier Chinese Willow pattern, used on dishes the Dutch and British loved. And eventually the Chinese copied the European copy to sell it to the Europeans. So they were very good with trade, and part of that capacity with manipulating trade networks involved the capacity to mobilize labor cheaply and effectively, and to produce (and copy) desirable goods. Nevertheless, they went into political decline, and as the Chinese love to tell me, they endured a hundred years of humiliation. Even though they worked very hard, and even after the market reformed and they displaced London as the workshop of the world, they still felt and still do feel humiliated. They’ve got a chip on their shoulder.

John Tresch

Do you have anything you want to add to this question of the paradox of, on the one hand, China’s being attributed an absolute foundational originality, and on the other hand, being seen as having the ability only to copy?

Aihwa Ong

Copying and creation constitute a very interesting dynamic, because in the Chinese art tradition you in fact copy the masters. The whole point is not to strive for originality, but to strive to achieve the kind of high status established by former masters. You have that in medicine just as you have it in art. But I want to move away from talking about the Chinese only. I think that in many cultural traditions copying is part of learning and training. In fact, it’s the basis of creativity. Why do they copy all these things? Because, well, this is what the world wants. The world wants those dishes and fake paintings.

So the “return” is in part an economic and political return. With that, there is a cultural return as well, and the government doesn’t want that cultural return to be represented by Ai Weiwei. They want to be represented by some glorious Chinese thing, like the Olympics. That’s the kind of cultural image they want you to see. Perhaps our Western audiences are happier with someone like Ai Weiwei because

he speaks to them. He understands Western traditions; he is a cosmopolitan in that sense of actually embracing what I call a “weak universal,” which is human rights. It’s weak because it’s contingent—you don’t have to be clear *what* human rights are. He’s playing this game.

John Tresch

That’s exactly the kind of figure that the Europeans are willing to recognize as the return.

Aihwa Ong

Because he’s less scary! He is such a cute guy!

Geoffrey Bowker

I’ve become very interested in these acts of erasure of the recent past in order to achieve continuity with the distant past. That’s something that’s going on in Iraq, for example. As a schoolchild in Iraq you do not currently learn about the Saddam Hussein regime—you learn about traditional Iraqi history and what happened after the American occupation. It’s like the period between those two never happened. I just think that’s a very general and interesting phenomenon.

I also wanted to pick up on one of your comments, Luca. When I saw that picture of Weiwei towering over the island of Alcatraz, I was thinking of Christo—I don’t even know what he looks like, but I mean, his cult of personality. When we’re talking cosmo-capitalism, in your term, the product seems to be as much Weiwei as the cultural figure as it is the art. In a sense the art becomes somewhat irrelevant; his money, his value comes from himself and his personality.

Stéphane Van Damme

I have some difficulties with the notion of the rooted cosmopolitan applied to Ai Weiwei. I don’t think he is either rooted or cosmopolitan. For me it’s beautiful example of pop art. His parodic dimension is really strong and powerful. He completely mastered the iconographic grammar of contemporary art, of course, but I can’t fully understand why there is no reception for him in China.

Aihwa Ong

Because he's alien to them.

Stéphane Van Damme

Exactly. For me, the reuse of stereotypes, for instance, about Chinese or China, doesn't make him rooted. Another impression I have is connected to the work of an anthropologist of India, Denis Vidal, working on current contemporary art in India. He proposed to read this contemporary art through the category of post-primitivism, in fact; I don't know if that's just another problematic category. Or if you take the exhibition, *Magiciens de la Terre*, you have this tension between something which is really a kind of global curiosity about other arts, which is something which is clearly revisiting our own tradition—our own primitivism, for instance, the early 20th century surrealist interest in African art, in Asiatica. So I was wondering if we can contrast on the aesthetic scene several different possible strategies to deal with rooted cosmopolitanism, and what—because it's a political theory— what do you do with that?

Luca Massimo Barbero

I want to bring back the theme of materiality. I don't know if we should distinguish between a cup, a dish, or a print or a painting. Don't you think that it's kind of a history repeating itself, with this flowing and circulating of objects, with all these Chinese contemporary artists sending all these objects—I'm using that word in order to be physical and materialist—to the Venice Biennale, to the Whitney, to the United States markets without stopping, with American being so up and immediately open to that arrival? They were just received as international Chinese contemporary art. And then finally, when the Western market accepted and validated them, now they're going to go back to China. It's this circularity: appealing to the Western market in order to be recognized by the Chinese market. And the second question is, maybe you can help me: do we have a register, a database, or, I don't know, an association that is registering important Chinese objects of art, which leave Western collections and go back to China? Do we record that somehow?

Aihwa Ong

The affluent Chinese are buying Western art; they are also buying Oriental objects at many times their value, to repatriate them to China.

Luca Massimo Barbero

Is anyone controlling or monitoring that?

Ann-Sophie Lehmann

Simon asked where we can locate the “return.” One very important element that Dagmar reminded us of is that there is authorship now. Works in libraries, Dagmar said, used to be ordered by title, not by author. All these objects were authorless. And now there is one name that we all know. It’s a big brand, a very powerful name of a single person. That, I think, is really a shift towards a global use of what the art market does everywhere. Also, I don’t think we can say Ai Weiwei is not of interest in the whole of China. There is a very lively art production market that’s very cool and young and hip. There are people who, in general, are traditional, so they maybe will not put Ai Weiwei in their museum. But there must be others with an interest in him, just as they are interested in other international contemporary artists.

Geoffrey Bowker

On Lucas’ point about circulation: there’s a classic article called “How to Become a Dominant French Philosopher” by Michèle Lamont, where the argument is that you have to go outside of France after your reputation dips there.¹¹ You get a market in America, and then you’re reintroduced into France as the great philosopher—Derrida is the case study of this article.

Ruth Padel

Maybe this is the one area where nobody knows what to know. How noble is what he’s doing, and how noble, or proper are our reactions, and other people’s reactions?

John Tresch

Let’s get a sense of some of the topics that we want Aihwa to try to respond to. We’ve got, in no particular order: the historical caesura that you skip in order to connect to a history that’s further back; Ai Weiwei’s personality cult, selling himself and not an art object; in what sense is he really a rooted cosmopolitan, and how does one make use of that term; if it makes sense to relate this work to a kind of

post-primitivism; what is the status of the body of the work in comparing it with the history of other Chinese commodities that have circulated in the past; if there is there a database counting how many Chinese works are moving back from Europe to China; how much does authorship change things; and, finally, how do you become a dominant French philosopher?

Aihwa Ong

All right. I don't think they are deliberately erasing the Mao era. There's an incredible historical memory of every bad thing that happened. The government does try to blot things out, but it doesn't mean that individuals, the ordinary people don't remember. One thought, within this framework of Orientalism, and linking up with the West, I remember when I was a graduate student, my colleagues, my peers were in love with Chinese socialism, in a period of the Cultural Revolution. They had no idea what was going on in China, but they loved it. And many of them later on felt that they ruined their careers, because they chose the wrong team. So I don't think it's an issue of wiping away bits of history.

But, but for these artists—and I'm not defending them, I'm just studying the social phenomenon—when they come into the global circuit, they are actually articulating Western desires about China. There's always already that framework of Orientalism. There is a sense of “OK, we have given up on the Chinese socialist experiment, it was a disaster, eighty million people died during that period, so let's move on to this older, more interesting aesthetic tradition,” and so on. But then at the same time there's this figure who emerges that is not an old socialist hack, but is in fact someone to promote human rights in China. And that's enormously appealing.

So I don't think that this is a case where anyone's deliberately pulling the wool over our eyes about Chinese history. The government is doing that, of course, and there it's just like what Geof says about Iraq: in school-books they do not teach the period of disaster surrounding the Cultural Revolution, just like the Japanese schoolbooks do not cover the period of the Second World War and what they did to the rest of us in Asia. So there are many different scales of operation, so you cannot think about these characters as tools of the government. They are not! They're actually pretty autonomous individuals operating with quite a bit of finesse on a global stage. For the other questions... There's definitely a buying back of Chinese artifacts—on a very, very big scale.

John Tresch

There was also the question of authorship, and the cult of personality. And I was also very curious about the artwork you briefly showed, coated with characters, bringing out their weight and their meaningless materiality. How these invented ideograms interact with the role of books, and the critique of writing in the new moment of art. But that's another question.

Aihwa Ong

In that artwork, Xiu Ping is in a sense saying that in this new China that he's trying to intervene in, these characters, this literate, calligraphic tradition is defunct. It's useless. It represents futile oppression. So he prefers this kind of icon, these global brands. Which is kind of amazing. The worshipful Orientalist approach towards Chinese traditions is fast fading in China. And we feel the loss here because we love them, right? I mean, I love them. I go to the Metropolitan just to look at the East Asian wing. But these Chinese artists are tired of that stuff. It's the kind of loss that comes with the end of the ancient regime, which has been in decline but is finally on its last legs.

I feel that whenever I give a talk on China in any setting, I'm always forced into a position of defending the totality of it. When what I'm trying to do is provide a complex, multi-angled view. It may still be that we don't know enough on either side to have, either a fruitful or more satisfying discussion.

John Tresch

Thanks to Aihwa, for pointing us to zones that we need to know more about.

NOTES

1. Ong, Aihwa, "“What Marco Polo Forgot”: Contemporary Chinese Art Reconfigures the Global." *Current Anthropology* 53, no. 4 (2012): 471-483.
2. Whyte, Murray, "Ai Weiwei Merges Art and Politics in AGO Show: Review," *The Star*, August 14, 2013, https://www.thestar.com/entertainment/visualarts/2013/08/14/ai_weiwei_merges_art_and_politics_in_ago_show_review.html.
3. Won Yin Wong, Winnie, *Van Gogh on Demand: China and the Readymade*. Chicago: University of Chicago Press, 2013.

4. The Metropolitan Museum of Art, "Exhibition Overview," <http://www.metmuseum.org/exhibitions/listings/2013/ink-art>.
5. See Dagmar Schäffer's essay above, where the transliteration "shan shui" is employed.
6. For a discussion of the "global assemblage" concept, see Collier, Stephen J. and Aihwa Ong, "Global Assemblages, Anthropological Problems," in *Global Assemblages*, ed. Aihwa Ong and Stephen J. Collier. Malden, MA: Blackwell, 2005, 1-21.
7. See Aihwa Ong, "What Marco Polo Forgot: Asian Art Negotiates the Global," *Current Anthropology* 53, no. 4 (August 2012), 1-24.
8. Hal Foster, *The Return of the Real: The Avant-Garde at the End of the Century*. Cambridge MA: MIT Press, 1996, 196-200.
9. Ong, "What Marco Polo Forgot," 1-24.
10. @Large: Ai Weiwei on Alcatraz, For-Site Foundation, April 26, 2015, <http://www.for-site.org/project/ai-weiwei-alcatraz/>.
11. Lamont, Michèle. "How to Become a Dominant French Philosopher: The Case of Jacques Derrida." *American Journal of Sociology*, 93 (3) 1987: 584-622.

PART III

ACCESS TO ARCHIVAL MATTERS

Digitization Does Not Equal Access: Challenges in Putting Cultural Materials On Line

Murtha Baca

The myth that the World Wide Web provides “universal access to all knowledge”¹ and that English is now a worldwide *lingua franca* are pervasive, but not persuasive. In reality, simply digitizing library, archival, and museum collections and related resources does not provide easy access to, or understanding of, those materials. To truly make web resources universally accessible—meaning that they are both obtainable and understandable—significant technical, cultural, and especially linguistic barriers must be overcome. In this brief contribution to our dialogue, I will present some of the challenges to and propose some potential solutions for providing more inclusive, more meaningful, and more democratic access to the resources of memory institutions in the age of the Internet.

The World Wide Web is neither a library, nor a democracy. The web is not a library, because for the most part, it is not organized; most of the resources on the web are not catalogued according to established data standards, classification systems, or so-called controlled vocabularies.² And, contrary to what many people believe about the thoroughness and ubiquity of resources like Google Books and Google Scholar, free, unfettered access to the full texts of digitized library materials is far from a reality. Anyone who uses resources such as Google Books even on an occasional basis is all too familiar with the disappointment sustained after having found a text only to discover that it is either unavailable on line, or is only available in enticing snippets that necessitate its acquisition via interlibrary loan, or purchase from a commercial site. Like texts, visual materials are equally difficult to access on

line due to commercial barriers (i.e., obtaining an image from a resource like Artstor requires a paid subscription) or technical barriers (e.g., many institutions with image repositories require an IP address associated with that particular institution for access). On technological, socioeconomic, and pedagogical levels, impediments to access proliferate across the web.

The web is not a democracy because—again, contrary to a popular truism—it is not available to everyone. It is only available to those who have access to computers or other devices either because they own them or can use them, for example, at a public library. For those who do not own a computer and modem, have electrical power in their home, or have access to a library or other facility that provides free use of computers, the Internet is inaccessible.³ Even for those who do have access to the Internet via their own device or by using a computer at a library or other public place, there remain significant barriers to access.

Information literacy, defined by the American Library Association as “a set of abilities requiring individuals to recognize when information is needed and [to] have the ability to locate, evaluate, and use effectively the needed information,”⁴ is essential for effective navigation and implementation of information technologies and technology in general. Hence, information *il*-literacy is a major impediment to access; if a person using a computer in a library does not know what an online library catalogue or a web search engine or the Internet Archive is, or does know of the existence of such resources but is unfamiliar with how to use them, he or she cannot take advantage of the many resources on the web that provide access to complete digital copies of works that formerly could only be accessed in a brick-and-mortar library. The socioeconomic and pedagogical disparities between those who have online access and those who don’t, and between those who understand how to navigate the infrastructure of digitized information and those who don’t, are often called the “digital divide.”⁵ Simply put, the digital divide reifies social inequities that existed before the age of the Internet: for example, between rural and urban and affluent and disenfranchised communities.

Individuals situated on the side of the digital divide with access to information technologies and search methods are at an advantage. They are more likely to be capable of using digital networks and resources. For example, information literacy should include knowledge about the existence of the difference between the “Visible Web” and the “Deep Web.” While a tremendous amount of information is available on the Visible Web via commercial search engines such as Google, there is also a great deal of information that is hidden in the Deep Web. Because pages on the Deep Web are not indexed by Google and other search engines (which essentially copy every word that appears on every web page of these “exposed” resources

to create an index from which search results are then pulled) these “hidden” pages are dynamically generated and thus they are not indexed. Furthermore, users must access Deep Web information resources from particular, lesser-known search applications, not from Google. This is significant because most online library catalogues, as well as many museum and historical collection databases, are hidden in the Deep Web and therefore must be accessed from their own search pages. For users unaware of this difference, all of these resources remain inaccessible.

Another myth about the web is that everything on it is free of charge. Of course, this is not the case; there are, in fact, significant economic barriers to access, such as subscription fees and access prices.⁶ To name just one example from the world of art and cultural heritage, Artstor, a huge repository of high-resolution images of works of art and architecture and other cultural objects, is a fee-based resource.⁷ If a user is not a member of a university or other institution that has paid for a subscription to this collection, he or she is not one of the “elite” who can avail themselves of this world-class resource. I repeat, the web is not open to all. It is not an equally shared public good. Its principles of organization and accessibility are not those of a democracy.

Beyond the technical barriers and (socio)economic obstacles to access, the *plenum* myth (“everything is available on line”) is just that. Not everything is available, first of all because not everything has been digitized. This is true not only for works in general library collections and museums, but also—and especially—for the kinds of materials that are preserved in so-called special or historic collections. For example, my own institution, the Getty Research Institute (GRI), has digitized a substantial number of the more than one million books and journals in its general library collection, and continues to do so apace as the GRI acquires more sophisticated and efficient scanning equipment and hires additional skilled scanner operators.

Yet, as of this writing—and despite consistent efforts—the GRI has only digitized a tiny fraction of the many and varied works in its vast special collections. This is due to an assortment of technical, cataloguing, and labor-related issues related to the variety of materials in those collections which, like those in many other special collections of rare and unique primary source materials, range from small bound objects such as Man Ray’s day planners (Fig. 7.1) to huge prints and foldout maps; from complex three-dimensional Fluxus objects from the famous Jean Brown collection (Fig. 7.2) to one of the world’s finest collections of artist’s books, which vary widely in form (Fig. 7.3).



Figure 7.1. Materials from the Man Ray Collection, Getty Research Institute.

A box of smile / Y.O.
Ono, Yoko.
New York? : Fluxus?, 1971.

● Available at Special Collections SPECIAL COLLECTIONS - CONTACT REFERENCE (890164 (bx.205))

Request Details Virtual Shelf

Actions

Title: A box of smile / Y.O.
Author/Creator: Ono, Yoko.
Publisher Info.: New York? : Fluxus?, 1971.
Physical Desc.: 1 box ; 5.4 x 5.4 x 5.5 cm..
Language: English
Notes: Clear plastic box with "A box of smile Y.O. 71" incised into the lid and bottom in gold. Ono produced many versions of this work, some of which were made by George Maciunas for her.
Forms part of: Brown, Jean, 1911-1994. Jean Brown papers, 1815-1995 (bulk 1916-1985). (Special Collections, accn. no. 890164)
Indexed by: Fluxus etc., 1981, no. 350
Collection: Jean Brown Collection
Subjects: Fluxus (Group of artists)
ID/Acc. No.: 1406-183
890164 (bx.205)
Persistent Link: http://primo.getty.edu/GRI:GETTY_ALMA21120636300001551

Links
> [Persistent Link for this Record](#)

Figure 7.2. Entry for Yoko Ono, *A Box of Smile*, from Jean Brown Collection, Getty Research Institute.



Figure 7.3. *Hildegardis Circulus Sapientiae* (Circle of Wisdom by Hildegard von Bingen), Claire Van Vliet, 2001, Getty Research Institute.

Needless to say, digitization of materials such as these cannot be done in a “conveyor-belt” fashion; not only does it require sophisticated scanning equipment, it also frequently necessitates the work of skilled photographers who are also experts in digital technology.

Perhaps the most significant, and most often overlooked, barrier to access is that of language. Even if users have access to a computer that is connected to the Internet and are aware of the existence of search engines as well as applications like online library catalogues or special collections databases, it is still not guaranteed that they will find what they seek if they do not search with the exact words that have been used to describe the various resources. These may be keywords embedded in web pages or words that appear explicitly on those same pages (which are, for the most part, what Google and other search engines use to compile their huge indexes), or they may be more detailed catalogue records (also known as “descriptive metadata”) created by trained cataloguers, archivists, and the documentation professionals.

Keyword searching is notoriously unreliable. Because search engines do not routinely use controlled vocabularies, searches are conducted simply on the characters entered by the user, not on the actual meaning that is semantically and implicitly conveyed by the word or words. So, if a user happens to use a “non-expert” term, a term in another language, a term that is incorrect but often used to describe a particular object or concept, or simply a word that does not happen to be contained on a particular web page or in a catalogue record, he or she will not find all of the materials that are relevant. This is why a Google search on “Mars” retrieves resources related to the planet Mars, the Roman god of war Mars, and the chocolate bar that bears this same name. This phenomenon has ramifications beyond simply providing a user with images of candy bars instead of planets; it obfuscates information vital for scholars, researchers, and the public alike, privileging some terms over others arbitrarily—or according to the “most clicked” results or the user’s past search history. To give an example from the world of cultural heritage, if a French user searches on the term “landier” or a Spanish user searches on “morillos,” they will not retrieve images of objects that are catalogued or otherwise described as “firedogs” (Fig. 7.4). Not only that, but two different English language speakers might search on the terms “andiron” and “fire-dogs,” respectively, only to be met with incomplete results similar to those of their foreign counterparts.



Figure 7.4. “*Landiers*”, “*Morillos*”, “Firedogs”.

To further complicate matters, the meaning of terms also changes depending upon chronology and geographic location. For example, the Italian term *maestà* is usually employed in art-historical literature to denote a specific type of work that depicts the Virgin Mary and Christ Child enthroned and surrounded by saints and angels. Perhaps the most famous *maestà* is the one by the 14th-century Siennese artist Duccio di Buoninsegna. Prior to Duccio's masterpiece, in the Middle Ages, very early statue-reliquaries depicting the Virgin Mary enthroned were also referred to by this term (Fig. 7.5). Discrepancies and redundancies in historical terminology such as this are not accounted for by search engines such as Google or by most Deep Web resources.



Figure 7.5. A *Maèsta*: Our Lady of Notre-Dame d'Orcival.

One way to resolve this problem is to use semantically structured multilingual thesauri, which would distinguish the Italian *maestà* from the Medieval one, and

the god Mars from the planet and the candy bar. Truly, unless a multilingual thesaurus that links together all terms for the same object is built into the cataloguing utility on the back end, or the search engine on the front end—or both—terms will remain disparate and unconnected for users. Another relatively new solution currently being nurtured in the information science community is the so-called “Semantic Web,” where—purportedly—search engines will be able to search on what a particular term or name means, rather than simply matching the characters entered by the user into a search box.⁸ As always, however, there is no magic bullet. Any eventual success of the Semantic Web will rely on the existence of a critical mass of information expressed as Linked Open Data (LOD), which involves a tremendous amount of analysis and effort.⁹ To spearhead this movement, my own institution has invested substantial resources over the last few years in making our huge electronic thesauri (the *Art & Architecture Thesaurus* or AAT®, the *Union List of Artist Names* or ULAN®, and the *Getty Thesaurus of Geographic Names* or TGN®) available as Linked Open Data. This data is completely open in the sense that it can be used, incorporated into a variety of applications, and modified by any person or organization with the technical skills to capture and use data expressed in the LOD format, free of charge and with no legal limitations.¹⁰

But what happens when the terminologies themselves are encoded with implicit biases? Indeed, the terminology that is used to describe cultural objects is sometimes a manifestation of what at best could be called a “cultural disconnect” and at worst a form of cultural imperialism. Take, for example, the term *famille rose*, which refers to a style of porcelain made in China that reached its height of production in the 18th century. Western museums, including the British Museum, use the French expression *famille rose* to describe ceramic objects of this type (Fig. 7.6).



Figure 7.6. Porcelaine vase, *famille rose* or *fencai* (粉彩) style.

Because of this, if a Chinese user and/or an expert user searched on the more specific term *fencai* (transliterated from the Chinese 粉彩),¹¹ he or she would not retrieve objects that had been described as *famille rose*, the Western European term that has historically been “imposed” on these ceramic objects. Once again, the use of a thesaurus in which equivalent and broader and narrower terms¹² are meaningfully linked would enable users to retrieve relevant objects regardless of whether they use the French term, the original Chinese-language term, or the Chinese term transliterated into the Roman alphabet. So far, however, these thesauri have been largely neglected. Consequently, users inevitably miss relevant search results simply because they are not using the specific term designated by a particular museum.

All this is to say that if the web is to become truly inclusive and its materials are to become democratically accessible, cultural institutions must employ multilingual vocabularies that provide a variety of linguistic and cultural access points. New ways of expressing data in machine-readable form, such as Linked Open Data, may potentially provide online researchers with more—and more relevant—paths of

investigation. But the intellectual content of the structured and linked vocabularies must exist in the first place, and this must largely be created by human beings with subject expertise (in, for example, both art history and information science) before it can be exploited by computer programs.

Thus, my contribution to this dialogue on *Bibliotechnica* is a plea for cultural institutions to provide access to their collections through multilingual, multicultural terminology created and applied by trained professionals with appropriate subject expertise—and not to let technology *per se* drive the agenda. Information technology is only as good as the information that is made available for it to process, and is only as enlightening as its audience is broad. When even “in the most advanced economies, only certain segments of the population are benefitting from ICTs... and many are left behind because of their age, limited digital literacy, lack of access, or remoteness,” information technology and the vast resources it houses are left untapped, and worse, used only by the elite.¹³ Of course related issues also could be raised concerning “big data,” whose potential for either ameliorating or exacerbating the digital divide in the world of cultural institutions and beyond depends on yet further demands of information literacy.¹⁴ As Tim Berners-Lee, sometimes credited as the inventor of the World Wide Web, said, “the power of the Web is in its universality;”¹⁵ it is paramount to recognize the role that cultural heritage institutions and researchers at large have in ensuring that this ideal(istic) universality moves from myth to reality.

To effect this transformation, cultural heritage institutions must cultivate awareness of the gaps in digital knowledge; employ thorough, ethical protocols when mining data; release information and collection resources as open content; and implement multilingual and multicultural thesauri when readying those resources for release. It is my hope that the Cini Foundation, as arbiters of cultural heritage and information technologies, can make these concerns a focus of dialogue—and of their own information practices—in the future.

DEBATE

John Tresch

You said you also wanted to share some examples from your work at the Getty in making manuscripts accessible online.

Murtha Baca

Yes, let's consider one. Here is a report about Cortez's visit to Mexico.¹⁶ It's a researcher's dream—to be able to browse through this whole object and download it so that you now own this rare book on your machine. You can study it any time you want. There was also the problem of rare books held by multiple libraries, should we not ingest metadata on multiple versions of the same book? The rare books are all unique, because they have different annotations on them. So we take everything we can get to allow users to see the annotations.

The system also makes it possible to view the whole book in thumbnail. Let's say I want to show you the map from this book: I can go look at the digital facsimile, I can see the whole book, and then once I find the thing I want, I can grab that page, download it, and incorporate it into my Powerpoint presentation. Also, when you make your metadata harvestable or ingestible, you can push it out to many different places, such as the Internet Archive, so users have a better chance of finding it. The reason why the GRI built the Getty Research Portal, however, is to have an authoritative place for it, which also has a defined scope. It's not just putting up everything like in Google Books. Google Books isn't really everything either, but it's just whatever they can get in digital form.

Gregory Crane

This book is in Latin. The set of people who can actually read a book that size in early or modern Latin is not big. If it was just a bunch of pictures that'd fine, but of course as a philologist, I'm pushing back to ask, how do people read it? It's not enough just to go extract the pretty pictures.

Murtha Baca

The audience, the user for this, is an expert—or at least somebody who can read Latin. It goes back to an earlier point that was discussed. What's cool about this, and I didn't think it was controversial when Geoff said “the digital is better than the original”, in this case, the digital is better than the original because I can now own this book without having to get on an airplane, fly to Los Angeles, sit in a special collections reading room, and quickly try to take a few pictures with my digital camera. I can now own a digital facsimile of this book.

Gregory Crane

May I ask a pedantic question? In the title, *Romanorum* and *Espanarum* are actually not properly transcribed in the second line.

Murtha Baca

That is another huge cataloguing issue. If you don't have cataloguers who are qualified, they transcribe as best they can, but they might not have the subject expertise. This is a major issue in the days of budget cuts; in recent years the Getty has laid off twenty-five people, including two rare books cataloguers. It was insane. We do have a so-called 'CJK' cataloguer (Chinese, Japanese, Korean) who has that expertise, but they laid off the rare books cataloguers because they said 'we can digitize everything.'

Ann-Sophie Lehmann

Do you have a participatory function for scholars to suggest corrections? If so, how does that work?

Murtha Baca

That's a *desideratum* for the future. But all of this takes labor. Our technical team is working on all these other projects, so they don't have time to build that. Another reason why we decided to make some of our digitized materials available to the Internet Archive is because they do the transformation into these different formats for us, so we don't have to do that work. We have quite a good partnership with the Internet Archive—they actually paid for us to get a couple of machines and sent a couple of expert scanner operators to the Getty Research Institute. They worked for months at a time scanning many materials. It's a very laborious process. Since OCR (Optical Character Recognition) was run on many of the books you can search inside of them.

But OCR is very problematic; the outputs can be quite incorrect if the letters look odd and the OCR reader doesn't know how to interpret them. To have perfect OCR, the ideal, it would go through the machine once, and then you need to have a human being correct certain things, and then the machine learns more. It's a very labor-intensive process.

Geoffrey Bowker

OCR is really difficult, especially with these old manuscripts.

Matthew Battles

Perhaps you could have students cleaning up the OCR.

Murtha Baca

This is something where you need skill. But we could definitely use skilled student labor.

Matthew Battles

Something between the crowdsourced and the expert.

Murtha Baca

Expert crowdsourcing.

Geoffrey Bowker

It reminds me of the Bentham Project, for example, which crowdsourced the transcription of all of Bentham's writings—this project which was fantastic and successful.¹⁷

Dagmar Schäfer

Just thinking in terms of the dirtiness of the process is a very good reminder that it is not perfect.

Gregory Crane

A lot of work's being done on exactly this level of OCR, this kind of book. The best is by Ulrich Reffle in Munich. The DFG German Science Foundation is also making early modern books its next focus. But it's a matter of what the books actually look like: this Cortez book is beautifully printed, and will go in very well.

There's not going to be a problem getting ninety, ninety-nine percent out of this. But that won't be true for every book. Handwritten manuscripts are the thing we won't get from just having a computer run OCR on a scan.

Murtha Baca

Johanna Drucker, a colleague of mine in information science at UCLA, has been carving out this area of digital humanities. She founded the first digital humanities undergraduate program at UCLA, and wrote an article in the *Chronicle of Higher Education* where she said that the design of digital tools for scholarship is an intellectual responsibility, not a technical task.¹⁸ What she meant is that I can't just go to a technical guy and say, "Build me something to let me do this" and then walk away from him, come back six months later, and expect him to give me something that does what I need it to do. The scholars have to work very closely with the technical team. At the Getty, we have a technical team that supports these kinds of projects, but some of them have worked with us for twenty years; they understand our data, and they sit by us, we have meetings and show them what we need to do.

Geoffrey Bowker

You've mentioned the importance of aggregating metadata for these objects. Are these metadata all in a single format, or are you aggregating multiple kinds of metadata?

Murtha Baca

We have a series of formats that we will accept: MARC is the classic cataloguing method, Unimarc in Europe. We also take Dublin Core records. It is a challenge because our director says 'Okay, let's just go and harvest everybody's metadata.' There are new jobs in the library called "metadata specialists," whose job is to take the records sent by contributors and map them into a common schema so these records can be ingested. We can't just push a button and get everybody's records; it's just not that simple.

Geoffrey Bowker

One of the issues for me is that you still make a distinction between the scholarly dynamics on the one side, and the technical expert on the other. I think what's

happening certainly in some scientific fields right now is dissolving that distinction. We want the technical people to really understand the text.

Murtha Baca

Art history is very slow at this kind of stuff, and there is a huge communication gap. One of the things that I do in my spare time is translate books, but I also act as translator or interpreter between art curators and the technical people, because art curators don't even know what an HTML page is, so they can't even have the dialogue with the technical staff. And some of them say "I don't want to know, don't tell me." In art history and in the humanities it's more difficult, but that is the advantage of having technical staff with the requisite humanities background. At Getty, the head of our information systems department has an MA in Art History and a Master of Library and Information Science, so he's almost an ideal person to be working with us.

Back to the topic of building thesauri and getting the search terms to agree. Our philosophy at the Getty, is not to force our users to use a particular word. We want to link all those words together, so that the user will find what they're looking for, no matter what they search for it.

Let me give you some examples. A project I worked on many years ago with the ICCD Cataloguing Institute in Rome, the Canadian Heritage Information Network, and the Getty, involved making a multilingual thesaurus of religious objects. A lot of the work consisted of sitting in a room like this, debating what is this object, what do you call it. In that working group we found that an object and its functions change over time. This *croix de tempérance* (or temperance cross) is only something that exists in Canada, in Canadian French; it is a very specific object associated during the temperance movement in the province of Quebec. And then, to give a French-French example, there's the *cire de deuil*, or mourning candle which is particular to the French Pyrenees. And then, because we're in Italy, there's also a particular kind of statue—usually smallish—in which relics are placed, called statue reliquary, or *statua reliquiario*. These words have a different meaning depending on what time period the object is coming from.

Dagmar Schäfer

So ideally, what terms do you use?

Murtha Baca

We have produced four big electronic thesauri at the Getty. We've been working on them for more than twenty years. One is called the Union List of Artist Names, which is a bit of a misnomer, because it's names of people and groups of people, so it's not just artists, it's patrons and so forth. The second one is the Art and Architecture Thesaurus, the third is the Thesaurus of Geographic Names, and the fourth, which we launched only recently, is called the Cultural Objects Name Authority. It doesn't have a critical mass of things in it yet, but it is a vocabulary of all the different ways you can call works of art.

Take Google as the example because Google is where everybody searches. If I search for Thebes, Google is just looking for "t-h-e-b-e-s". It's looking for any webpage that is exposed, that can be indexed, that has those characters on it. It doesn't know if I'm talking about Thebes, Greece. But the way it's distinguished in our thesaurus we can see that it's part of the department of Boeotia, which is part of this region, which is part of Greece. Then there's another Thebes in Egypt, which is actually a deserted settlement, and that is distinguished again because it lives again in a different place in the geographic hierarchy.

Geoffrey Bowker

I think that's part of information literacy, because you can do that with a Google search; you can say 'exclude this, exclude that, and exclude the other.'

Murtha Baca

But you already have to know that you can do that. This thesaurus helps the user even if they don't know it. We are trying to make our vocabularies more multicultural. Up to now, because of the kinds of collections that we have and our expertise, they've been very Western oriented. The only way we can make them less Western oriented is to work with other partners from other cultures. We have a very close relationship with the Academia Sinica with whom Dagmar also works. So here's an example along those lines. This painter, Giuseppe Castiglione, was an Italian. He went to Portugal for a while, but he ended up spending most of his career in the court in China. They have examples of works by Giuseppe Castiglione in the National Palace Museum in Taipei. But our approach is that we cluster together all the different ways to say his name so that if the user searches on 'Castiglione, Giuseppe' or 'Castiglione, Joseph' or 'Lang-Shining' with a hyphen, or in the Chinese

characters, they will still find the relevant documents or webpages about this artist.

Let me show you another search in our artist database—again, it’s something of a misnomer because it doesn’t just have artists and architects but patron and other associates. Here is the record for Ai Weiwei, who Aihwa discussed yesterday.¹⁹ It’s a little short note on him, with different ways of expressing his name, his nationality. This is all encoded in structured data. And we’re linked to his birthplace, and if I click on this it takes me to the geographic thesaurus where I have the whole record for Beijing. So now we’re in the geographic thesaurus.

The other thing I wanted to show you is that every single name-form in the backend database, every single piece of data, has to have at least one citation on it. It has to have a source. Sometimes the sources are contributors, like the Avery Library at Columbia University. For Ai Weiwei, we looked it up in the Deutsche Nationalbibliothek online (we do allow online reference, but not to Wikipedia). The other thing I wanted to show you that is encoded in the data is we have related people, he is the spouse of Lu Qing, so we have kind of a skimpy record for her, but it links us to the record for that artist.

Dagmar Schäfer

I just wanted to say something about your data. We constantly talk about replacement, but what you do in these data is replicate, or duplicate, and multiply data that is kind of misleading. For instance, in Ai Weiwei, when you look at Beijing, it doesn’t make a lot of sense, you get a complete data set of what Beijing actually, through history was. But that is not relevant to Ai Weiwei. That can also be quite misleading as you could also just leave it with ‘he lives in Beijing.’ If I wanted to know more about Beijing, I’d go to another source.

Murtha Baca

That’s a really good point. Remember in the early days in the web, the main way people did anything was they created hyperlinks. I have a lot of arguments with my colleagues about this because there’s a big community and institutional push to express our data as linked open data, but sometimes, the links take you somewhere that doesn’t really help your research. Too many times in working with technology, we do something because it’s possible to do it, and we don’t say, does it really help the researcher?

Glenn Most

Do you have an open API?

Murtha Baca

An API stands for ‘application programming interface,’ which means a place on the web where other people can come and get our data and do whatever they want with it. They can take it, or change it, or download it. With linked open data, eventually APIs will go away, we think.

I have a few more examples. This was an example that I showed in Dresden on Monday where I said that the object is called *Famille rose* by the British Museum, and Feng Hai by the National Palace Museum.²⁰ And if those forms aren’t linked, then the user will never find them. It’s easy; just link them in a thesaurus. But I also said it’s an example of linguistic imperialism, or at least a disconnect in the sense that the Western academy is imposing its word on a non-western object. The work that goes on at the Academia Sinica in Taipei is just unbelievable. I just can’t say enough about how hard they work and how smart they are. They’re taking the local thesaurus at the National Palace Museum and mapping it to our art and architecture thesaurus, and they’re inserting new ‘concepts.’ A ‘concept’ can be represented by any number of terms, so of course there are many, many concepts and objects that we don’t have now in the art and architecture thesaurus because it’s so Western-oriented, so working with our collaborators we can make it richer and get these new terms and concepts.

When we first started working with the Academia Sinica, there was no word in Chinese for ‘landscape painting’ in the sense of something that looks like this. This is by a Chinese artist, but it’s in the Western tradition.²¹ So, that’s kind of a neologism, it’s a fairly recent term that was coined to describe this kind of landscape, whereas in Chinese there’s *Shan Shui*, which can represent different things. This is actually a portrait of somebody, and up in that inscription in the upper right it says it’s a portrait of some important philosopher or scholar. It’s a portrait in the form of a landscape. I also want to make a point about the importance of color. The Chinese porcelain tends to be classified by its color or by the kiln that it was made in, which is not the Western way of doing it. But again, there are ways of mapping things so that users can find them without imposing one tradition on the other.

But with linked open data. I am skeptical about this. It is this promise that we will not just be searching on characters when we search on the web, we’ll be searching on the meaning of characters. If I search on ‘Rembrandt’ and I want Rembrandt Van Rijn, I won’t get Rembrandt toothpaste. Right now you do get all

of that. But there are a lot of issues, including technical issues. A lot of the links could lead the user to someplace where they don't want to go.

VIAF, the Virtual International Authority File, is an initiative founded by the Library of Congress, the Bibliothèque Nationale de France, and the German National Library and now many other libraries have joined. An Authority File was part of the traditional library system: it would say 'you must call this person 's-c-h-a-a-f-f-e-r comma simon' and if you spell it any other way, you're never going to find all the books he wrote.' Even if maybe he had a different name in the past, or you've written under a pseudonym or there are common misspellings of your name. First of all, this was telling the cataloguers to catalogue him in this way—this is the 'right way' to catalogue him. But it was also saying 'this is the authoritative name, and you must search on this name if you're going to find everything.' And that is now changing. I call our thesauri that we produced at the Getty "non-authoritarian" authority files, because we say 'we don't care what you call this thing, as long as we have all the forms linked together, you can call it anything you want.'

The idea of the Virtual International Authority File is to link together all these authority files, these controlled vocabularies. It's now freely available on the web, though the user interface is pretty horrible. That's also a very typical thing of digital projects: you can have great data, you've done great research, and then the user interface is so bad that no one can use it. Because we've dropped the ball and neglected to do enough usability testing.

Geoffrey Bowker

A question about the amount of labor that's involved in this: in botany, there's still massive disagreements about synonymy. And it's a huge task to actually work out what is one thing being a synonym with another. So for me, aggregating the authority files in itself must be a Herculean task.

Simon Schaffer

Just to add to that, two things, both of which come from the museological anthropology communities. The whole enterprise is premised on the idea that there are no problems of any serious kind and certainly no serious moral or political problems around giving access to bits and pieces of knowledge. But in anthropology museums there is an enormous importance to controlling access to names, to narratives, as well as to the artifacts themselves. Think about the Ghost Shirt controversy, or the current war at the National Museum of Australia, not just about access to spiritually powerful objects, but to the names of those objects.

Murtha Baca

Yes. That's a good point too, because often there are objectionable names for things like 'Hottentot' or something like that.

Simon Schaffer

One example very much on my mind at the moment is discussions at the Cambridge Anthropology Museum and the Met and some other New York collections about whether to keep, or drop, or change, or mark the name 'Cannibal fork' for a group of objects of great value and extreme significance that come from Western Papua and from Fiji. As you might anticipate, the phrase 'Cannibal Fork' begins as a missionary name, but let's not go there. It then became a name for a trade good; they became fantastically valuable collectibles. And now of course there's a huge political debate about whether the word should stay.

Murtha Baca

I have very strong feelings about that. Our philosophy when we built our vocabularies was that you can't erase the past. But the former name gets demoted, and it says so, in the Hottentot example: we now say Khoikhoi, but you can't get rid of that word Hottentot, because if you're using these vocabularies as search assistants, there's going to be a lot of literature that says 'Hottentot.'

Simon Schaffer

Just to back up Geoff's point, and to underline how profound the implications of these authority files are, the association by the Getty Institute (a very, very powerful institution) of a term, however qualified, and however marked, with the word "authoritative," is a matter of political struggle.

Murtha Baca

No! We do not say that the term is authoritative. We pick the "preferred term". We don't say 'Hottentot' is authoritative; it gets demoted. We picked the "display term" or "preferred term," which is "Khoikhoi."

Stéphane Van Damme

I'm very interested in the discussion about the process of fixing norms and standards; from a history of science point of view, these negotiations about norms and standards look really weird. For instance, we are in a digital project with the Bibliothèque Nationale in Paris, and the British Library, where we hoped for these kind of standards. But if that project failed, we would come back to another set of standards. So in the digital realm, this process of fixing norms and standards seems very flexible.

Murtha Baca

It has to be, you're absolutely right. Even in the olden days, OCLC or any big bibliographic utility would just say "We only take records in the Machine Readable Cataloguing format (MARC)." Already, for our portal, we take MARC, Dublin Core, and also completely non-standard formats. Some of our metadata specialists take non-standard records and massage them into something standard enough that it can be ingested.

The project that I'm leading is studying a manuscript with no pictures, of a kind of crazy poem written in 1681 about a Roman collection.²² It's very interesting because we have the legal inventory of the same collection from 1680 to compare to the poem and ask, "Why did he write this document?" He says it's the *pubae quadri* in the collection of this minor Roman noble called Mellini. We wanted to give the users an idea of the materiality of the poem, as well as what it referred to—we're thinking about the kinds of objects that are in special collections and treasures.

We did two things. One was traditional: I wrote a short essay about the physical object, one of ten or twelve short, topical essays here, because I am trying to reach a broader audience than just the experts in seventeenth century Rome and the baroque. My essay just explained the kind of paper it's on, how it was tied together, that it was extracted from a larger archive which is now in Palma de Mallorca. My colleague Nuria Rodríguez Ortega wrote an essay on how this thing travelled around and how it ended up in Los Angeles.

Ann-Sophie Lehmann

We were talking earlier about how this kind of scholarship does not get enough appreciation or platforms, and I think what you've done here is brilliant. I now know of three projects where this is happening where you have an object beau-

tifully digitized, and all the contributors write short essays, which are at a high academic level and come together with the object. I think that we should do even more things like this.

Murtha Baca

It's all stuff that's easily in reach. Another part of this site we call the Scholars' Workspace: the research team can all make annotations and then we keep them, so if you say it's by Botticelli and I say it's by somebody who had lunch with Botticelli once, then we can capture that discussion. I also wrote little things that I called 'pop-ups': in the essay I noted that it was written in iron gall ink, and you can press a button and a little window comes up and tells you what iron gall ink is—again, trying to reach a broader audience than just experts. We also shot a short video of turning the pages of the manuscript so that users can get a sense of how big it is, the texture, etc. I have tons of slides on the Scholars' Workspace that show us annotating both images and words. Questions do arise, such as, "Is this a publication? Is it authoritative? Is it as valid as if I wrote a book on the topic?" As I mentioned, it gets an ISBN number, it gets catalogued, and it gets contributed to WorldCat. We also include how to cite this publication with these things called 'handles,' which are like a URL: a fixed place on the internet that is not going to go away.

Glenn Most

I wanted to draw attention to two terms you were using: one was 'massaging' and the other which came up over and over again which was 'ingesting'.

Murtha Baca

It's technical jargon; I could have said something else.

Glenn Most

I'm curious about what those metaphors tell us. Are they designed to disguise the incorporeality to make it look more bodily than it is, to make it look more primitive? What do you have in mind when you use those terms?

Murtha Baca

I'm just repeating terms that my technical team uses. What do they have in mind? Maybe they think it sounds more amusing or cooler. I think also, actually, it is a way to create their own separate vocabulary. It is a big challenge because when our head of information systems gives a report to the senior staff, they can't understand a lot of the words he says because he uses all these words like 'ingesting'. But I understand that you're questioning the symbolic or metaphorical aspects. We also use the term 'harvesting' for going out and getting metadata.

Glenn Most

You use the term 'ingesting,' you don't use the term 'excreting.'

Murtha Baca

No. I don't. I guess I would say 'disseminate' instead of 'excrete.' Which isn't necessarily much nicer. I don't know; I've never thought about it that way. I don't know how to answer it—this is the jargon we use.

Ann-Sophie Lehmann

First of all, thank you for these insights, this inside information, I should say. My question is about the collaborative working tool for scholars, the Scholars' Workspace. While developing it, are you looking at comparable commercial applications that have been popping up, like Scrivener or Evernote? Because I know that these projects are often kicked off, and then all these new things happen—do you time to integrate these other developments, these apps?

Murtha Baca

There are some commercial tools that do a lot of this stuff. There are many other projects, such as a digital scrapbook Dagmar was mentioning at the Max Planck. These are things that scholars would like to have to facilitate their work. There are several reasons why we didn't go with something that was already commercially produced. One is because we plan to make it available as open source, so we don't want to buy something from a vendor. And the other thing: why are we doing it? Why aren't we working with somebody else who's already doing it? There is the

institutional ‘ego’ where we want to put our brand on it: it’s the Getty Research Portal, we put our name on it, to be able to say we created this thing, and now we’re giving it as open source to the scholarly community. So there are good and evil reasons behind it.

Dagmar Schäfer

I think there is probably also one other reason you need something like a Scholars Workspace or a digital scrapbook. There are sources you own, or somebody else owns, someone with whom you research, and you cannot just openly put them up on the web. So you need a specific platform and you cannot take it from proprietors, because they will ask about your licensing, so there are all kinds of legal restrictions, that really make it difficult to cooperate. In these cases it’s much easier to say ‘Getty’s doing something.’ It doesn’t work because of legal issues.

Murtha Baca

The Scholars’ Workspace is a password protected environment. Then you get to the moment where you say we’re going to freeze the project and now create a digital publication—we will now “excrete” a digital publication, if you prefer. And it goes through all the regular publication process of fact checking, copy editing, and so forth. Legal issues do come up because there may be certain things that we shared in the Scholars’ Workspace that we cannot put in the free publication on the web. We actually had to pay for some of the images. We had to pay for an image from Bridgeman Art Library and a couple from Artstor; it’s unfortunate but that’s the way it is.

Geoffrey Bowker

A couple of points. First, building on Glenn’s discomfort with ingestion, which I absolutely have, I think you are right, Murtha, about the specialized vocabularies that we like to have to differentiate ourselves, but these metaphors are important in shaping how we think about what we’re doing. Mark Stefik has a problematic book called *Internet Dreams: Archetypes, Myths, and Metaphors* where he talks about the shaping roles of metaphors that we use, such as ‘surfing’ the internet, ‘the internet super highway;’ those all put you into various imaginaries, technically, about where you should be going.²³ So I don’t think we should just see these as tokens; they are actually performative in some real sense. The second point, I think you’re sympa-

thetic with. I do want to rush to the aid of Wikipedia because it's been slammed a bit in the last couple of days. It's been a marvelous source when going back to the originals. I find their reference system is fantastic and where it's a problematic area, there will be debate. And you can track the debate.

Ann-Sophie Lehmann

Just to add to that, for instance, in research into media software issues, for example, the Wikipedia entry will be the most authoritative entry. In many cases it can be the first source to go to.

Glenn Most

Just to jump to Wikipedia's defense as well, one other crucial and fascinating part of Wikipedia, is that it shows the history or genealogy of the debate: you've got version control, you've got the talk page, you've got the log, you can view the history of the page.

Murtha Baca

The people at Wikipedia are smart, let's face it—they're also millionaires. If now, at the end of Wikipedia entries as I was mentioning, though not on every single one, down at the bottom it says "authority control"; they're even using the library science jargon, which is forbidding and people hate it. But Wikipedia includes it. It links you to the WorldCat record, it links you the Virtual International Authority File record, et cetera, et cetera. It allows for links to more traditionally authoritative sources, which is a really good development.

Ruth Padel

That links to something that I worry about in Google's empire. Aristotle's definition of 'metaphor' is about carrying a home thing to a foreign place, or carrying something foreign home. And whichever way you carry it, you also carry the associations. I'm more worried about associations, because if the links are already made for me, where is my individual associativeness going? You're doing wonderful things, but you also suggest that language can 'lead' the research in a particular direction, and something in me says "Damn it, I'm not going there! I want to go where I feel I want to go." Linkage is a way of pre-associating for other people.

When you've got a child, you don't want to lead them to things, you want them to pick things up; there's an individuality about it. I don't think that anybody can answer that.

NOTES

1. "Google's mission is to organize the world's information and make it universally accessible and useful." Company overview. Google Company. <http://www.google.com/about/company/>.
2. "A controlled vocabulary is an organized arrangement of words and phrases used to index content and/or to retrieve content through browsing or searching. It typically includes preferred and variant terms and has a defined scope or describes a specific domain." Patricia Harping. *Introduction to Controlled Vocabularies: Terminology for Art, Architecture, and Other Cultural Works*. Los Angeles: The Getty Research Institute Publications Program, 2010. http://www.getty.edu/research/publications/electronic_publications/intro_controlled_vocab/what.html.
3. According to a Pew Research poll, "... 32% of non-internet users said the internet was too difficult to use, including 8% of this group who said they were 'too old to learn.'" Additionally, "cost was also a barrier for some adults who were offline—19% cited the expense of internet service or owning a computer." Monica Anderson and Andrew Perrin. "15% of Americans don't use the internet. Who are they?" <http://www.pewresearch.org/fact-tank/2015/07/28/15-of-americans-dont-use-the-internet-who-are-they/>.
4. *Information Literacy Competency Standards for Higher Education*. Chicago: The Association of College and Research Libraries, 2000. <http://www.ala.org/acrl/sites/ala.org.acrl/files/content/standards/standards.pdf>.
5. See "Mapping the Digital Divide." *Council of Economic Advisers Issue Brief*. (July 2015). https://www.whitehouse.gov/sites/default/files/wh_digital_divide_issue_brief.pdf.
6. "It is estimated that 40% of the world's population has less than US\$20 per year available to spend on information and communications technology (ICT)." Martin Hilbert. "When is Cheap, Cheap Enough to Bridge the Digital Divide? Modeling Income Related Structural Challenges of Technology Diffusion in Latin America." *World Development*. Volume 38, Issue 5. May 2010. Pages 756-770.
7. "Artstor Digital Library." Artstor. <http://www.artstor.org/content/artstor-digital-library-features-benefits>.
8. Tim Berners-Lee. "Semantic Web Road Map." W3, Oct. 1998. <https://www.w3.org/DesignIssues/Semantic.html>.
9. "Linked Data." <http://linkeddata.org/>.
10. See "Getty Vocabularies as Linked Open Data," The Getty Research Institute, <http://www.getty.edu/research/tools/vocabularies/lod/>.

11. http://www.britishmuseum.org/research/collection_online/collection_object_details.aspx?objectId=259609&partId=1.
12. In information science and the context of thesauri and information hierarchies, broader terms are the parents under which narrower terms fall (i.e., an Eames chair is a type of armchair). In this scenario, the armchair is the broader term, while Eames chair is the narrower.
13. Espen Barth Eide. [u/research/tools/vocabularies/lod/ World Economic Forum and INSEAD. Geneva. 2015. http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf](http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf).
14. See Frédéric Kaplan, *Frontiers in Digital Humanities*. <http://journal.frontiersin.org/article/10.3389/fdigh.2015.00001/full>.
15. <https://www.w3.org/standards/webdesign/accessibility>.
16. <https://archive.org/stream/praeclaraferdind00cort#page/n115/mode/2up>.
17. <http://www.ucl.ac.uk/bentham-project>.
18. Johanna Drucker, "Blind Spots: Humanists Must Plan Their Digital Future," in *Chronicle of Higher Education*, 55 (30) 2009: B6.
19. http://www.getty.edu/vow/ULANFullDisplay?find=Ai+Weiwei&role=&narion=&prev_page=1&subjectid=500125586.
20. http://www.britishmuseum.org/research/collection_online/collection_object_details.aspx?objectId=259609&partId=1.
21. <http://www.getty.edu/research/mellini/>.
22. <http://www.getty.edu/research/mellini/>.
23. Stefik, Mark. *Internet Dreams: Archetypes, Myths, and Metaphors*. Cambridge, MA: MIT Press, 1997.

Two Digits: Digital Materials against Dystopias of Replacement and Utopias of Participation

Ann-Sophie Lehmann

Disciplines such as philology [...] and art history [...] have deployed elaborate material apparatuses and highly skilled disciplines, employing multiple sensory modalities, to reconstruct lost and distant worlds.

(From the introductory note to the *Bibliotechnica* Dialogue)

The dystopian and utopian scenarios noted in the subtitle of this essay frame the rather simple point I want to make: that digital technologies have neither replaced nor revolutionized materials (e.g. paper), objects (e.g. books), and places of knowledge (e.g. libraries), but instead, they are now simply a part of and exist in digital networks, in addition to the complex material and social networks in which they already existed. This is notwithstanding the critiques made by new media scholars in diverse fields that form two extreme poles in the discussion surrounding the relation between digital media, art, and knowledge—those who claim that the digital has utterly replaced or transformed what preceded it, and those who deny such claims. Material, social, and digital networks are not neatly stacked or layered; they are inextricably intertwined. If we want to contribute to, profit from, and at the same time critically monitor those networks, we need tools to understand them.

From the beginning, digital media and tools have been engulfed in generalized fears of replacement and erasure. However, rather than replacing pre-existing objects and practices, digital media have altered them, adding new aspects to our material environment. Even things pronounced dead—like LPs, tapes, hand-written

letters, and printed books—have survived, entered new and unforeseen relations with the digital, or are enjoying a renaissance, like polaroid photographs, for example, which are now cherished for their restricted ability to capture one ephemeral moment, instead of twenty moments from which one has to choose.

In the domain of the visual arts, digitalization often makes visible that which may not easily be accessed, but this does not diminish desire for the original—on the contrary. Despite resources like Google Image Search and the Google Art Project, which enable us to view myriads of great artworks in high resolution and with deep zoom from anywhere, these images—either provided by the institutions themselves or by the many users who upload them to all kinds of digital platforms, such as Twitter, Facebook, Flickr, or Instagram—only seem to have enhanced people’s desire for the real thing, the material thing. Thus, art lovers travel to see the original, immediately capturing their personal “auratic” moment using their omnipresent camera phones, often perched atop a selfie stick. So rather than immaterializing a painting in a museum by taking its digital record, as predicted by early hypotheses about the effect of digital objects on our daily lives, digital and non-digital things and materials *live together*, closely intertwined in new practices of engagement, which neither replace nor render superfluous their precursors, but instead add new layers to a complex network that comprises both. In fact, the thicker this network becomes, the more we experience its materiality; the seeming separation of physical and virtual worlds diminishes as “digital physicality” reifies.



Figure 8.1. *Taking Pictures in the Louvre*, photograph: author.

Picture-taking in museums is an exemplar for the kind of conflicts that arise from “digital physicality.” For example, the National Gallery in London lifted its ban on photographing, as guards found it increasingly difficult to distinguish between people looking up information on the apps specifically designed for that purpose by the museum, and people who were taking pictures. The Van Gogh Museum in Amsterdam also lifted its ban in 2013 only to reintroduce it a year later because there simply was not enough space in front of the paintings to take pictures *of* these paintings, selfies *with* these paintings, to look up information *about* the paintings, and to actually look *at* the paintings all at once. I suspect museums will soon offer visitors the “opportunity” to free themselves of their phones temporarily at the entrance, promising a “unique unmediated experience” of art.

Another example of the intricate merging of digital and non-digital technologies in the experience of artworks involves the *Ghent Altarpiece*, completed by Jan and Hubert van Eyck in 1432, and currently exhibited in the St. Bavo’s Cathedral in Ghent. In 2010, the Getty Foundation funded an extensive conservation campaign that included photographic documentation of the monument, under the condition that the resulting images would be made available to the public online. Thus, the “Closer to Van Eyck” platform, on which macro photographs and zoom-in functions afford a far better and closer look at the paintings than one would ever be able to get in front of the original, was born.¹ Users of the platform are able to

see the subtleness of the painted beards of the figures: a close-up of Christ's face clearly shows the proverbial stubbles of beard that were already admired by 15th and 16th century viewers [Fig. 8.2]. Despite the digital reproduction "outsmarting" the original in its current setting, which is rather inadequate due to its display in a small, dark side-chapel of the church in a thick-walled glass case, the chapel is now even more crowded than it was prior to the campaign: the marvelous reproductions have enhanced the altarpieces' ability to draw onlookers as sweet figs draws bees—a metaphor coined by an admirer of the painting in the 16th century.²

Therefore, digital reproductions of all kinds should not be seen as replacements, but rather as part of an ever-extending web, in the middle of which sits the original like a spider, or a sweet fig, for that matter. And not only do digital reproductions form part of this web, but so do all copies of an artwork that have been made over the course of time, regardless of their medium. Still, the objects in this web are located in very different kinds of spaces, all of them with different archival topographies. Some of these topographies are rigid: the postcard stand next to the chapel, which is filled every day with postcards; or the "Closer to Van Eyck" website, which is a stable digital environment that allows for the creation of links to any detail of the altarpiece. But there are also less organized, more unstable platforms like the selfies that are secretly taken in and snuck out of the chapel—where taking photographs is strictly forbidden—and then shared on Facebook or Twitter. If the original is altered in any way, this entire surrounding network is affected. For example, the restoration of the outer wings of the Ghent altarpiece exposed far more massive overpainting than was expected: in the niche behind the portrait of the male donor, Joos Vijd, a painted spider web was uncovered beneath a layer of paint. The long and expensive process of taking macro photographs and infrared-reflectographies had to be repeated after the restoration, and all the high-resolution photographs had to be uploaded anew while old macro-photographs still swarm the internet.

What becomes apparent here is an interconnection between the meticulous work on the original by the restorers, involving solvents and fine brushes, and the work of reproduction, which, through mechanics, bears traces of human expertise and dexterity as well. In his article on Adam Lowe's elaborate to-scale, three-dimensionally printed reproduction of Veronese's *Marriage at Cana*, which hung on the island of San Giorgio in the refectory of the cloister before Napoleon's troops stole it for the Louvre, Simon Schaffer has called this interaction between the hand and the digital the "two digits": human fingers and computer technology working together.³ Apart from illustrating the complicated relationship between digital and non-digital image making practices, the notion of "two-digit" image production also offers a different perspective on the popular idea that we suffer from an information overload, a notion regularly employed to describe the impact of the digital

on our non-digital environment. With regard to visual culture in particular, an “image-overload” or “flood of images” was an expression evoked by the Czech philosopher Vilém Flusser as early as the late 1980s.⁴ It has remained a popular metaphor to denote the apparently ever-increasing amount of images, which over the past decade has mainly been ascribed to the rise of visual social media. The image deluge is an important trope in discourses about image production, migration, and archiving, and has also inspired new works of art.



Figure 8.2. Jan & Hubert van Eyck, *The Ghent Altarpiece*, 1432, Oil on Panel, St. Bavo Cathedral, Ghent. Detail of Christ in the Upper Central Panel. This detail: <http://clostrovaneck.kikirpa.be/#viewer/sync=3&view=1&id1=13&scale1=0.02704¢erX1=1536.1035521249996¢erY1=2239.975177125>

The Dutch artist Eric Kessel, for instance, has collected photos taken on a single, given day, made them available on the Internet, and printed them out, filling a whole gallery space and allowing viewers to literally “drown” themselves in the mass of printed pictures (Fig. 8.3).⁵ New digital methods like big data analysis, distant reading, and cultural analytics, which suggest that a numerical analysis of billions of images can generate new insights about cultural production and image makers and image users alike, are certainly exciting.⁶ Still, what precisely these insights will be, apart from findings such as “the amount of photos of late artworks uploaded to social networks increases during the morning on the West coast of North America,”

still remains to be seen. Just as digital images have not and do not replace non-digital images, big and visual data analysis should not replace deep and close readings of single images, nor the critical appraisal of the algorithmic tools and visualization software that generate and interpret that data.

So, the question is this: does the quickly evolving network of digital and material objects and spaces enhance knowledge, and if so, how does it do so? And this brings me finally to the utopian scenario(s) in my subtitle. In discourses on knowledge acquisition and digital media, the combined notion of *collectivity* and *participation* has become common place. It resurges every so often, in educational reforms for instance, which often involve cutting budgets for face-to-face teaching; it's connected to the belief that because all information is fed into the Internet, the Internet enables everyone to acquire all that information and turn it into meaningful knowledge. Underlying this rhetoric is the biological notion of a "world brain" or collective intelligence that we can all tap into. The French philosopher Pierre Lévy was the first to develop this idea with regard to the Internet, introducing the notion of a collective cyber-intelligence in the mid-1990s. Recently, this idea has been picked up and used by Michel Serres in his book *Thumbelina: The Culture and Technology of Millennials* (London 2015), in which the miniature girl from the fairy tale by Hans Christian Andersen becomes the allegory for today's social media generation, an ode of Michel Serres to his grandchildren. The premise is essentially that *Thumbelina* has this world literally under her thumb on her touchscreen, and she interacts with it so naturally that she eventually revolutionizes the educational system. She no longer needs universities because she can acquire all the knowledge she needs from the Internet; she will shape her own knowledge world.

The Thumbelinas and Tom Thumbs I encounter in my classes—and I have directed a master's program on new media and digital culture for more than ten years—are, however, not so sure of the world of knowledge they supposedly have under their thumb. Naturally, and rightfully so, they take the Internet for granted. But just as earlier generations took cars for granted (and still do), this generation does not necessarily know how the Internet runs or what to do when it breaks down. Precisely because the information comes to them at the push of a button or the click of a link, they are lost in this Library of Babel—because its underlying structure is invisible. Moreover, the Internet does not preselect or sort information according to academic criteria, and the ability to Google anything is not accompanied by an ability to turn information and text into knowledge—in other words, to sort, dissect, analyze, and reflect. As a result, I know many Tom Thumbs and Thumbelinas who do not want to be told that "all the knowledge is out there."

Instead, they long for lectures and face-to-face classroom interactions with their teachers, in which they see and learn how information transmogrifies into knowl-

edge. They do not want to be thrown the directive, “here is the Internet, just sort it out.” So, in order to engender sensitivity towards the complexity of digital materiality in the classroom, I have my students do little exercises, like tracing an article they read for class that is made available to them via a link in their electronic learning environment back to where it came from: which digital repository provides access to it? Is it available if you are not logged in through your institution? How does this institution choose its subscriptions to repositories? Are there elements in a link to an article that betrays its origin? What is a DOI (Digital Object Identifier), and how is it linked to citation indexes, which are made available in Google Scholar?



Figure 8.3. Erik Kessels, *24 Hours in Photos*, Installation, FOAM Amsterdam, 2011.
Photograph: author.

Using questions like these, I try to visualize and (re)materialize the digital network. Somewhat surprisingly, this rather dry technical analysis can actually sensitize us to the paradoxes of digitized reading materials—paradoxes like the note that “this book is under no circumstances to be taken from the building” stuck in a 19th-century painter’s manual from the New York Public Library that was included in its Google Books version, which now allows the book to be “taken from the building” in ways unimaginable to the person who once posted the notice (Fig. 8.4). An artefact like this also points towards the economic and political aspects

of digitization. Especially in the early days of Google Books, digitization was done by scanners and human beings together, the latter mostly women in faraway places who were paid very little. Sometimes, the scanners accidentally captured one of their hands in the action of turning and flattening out a page.

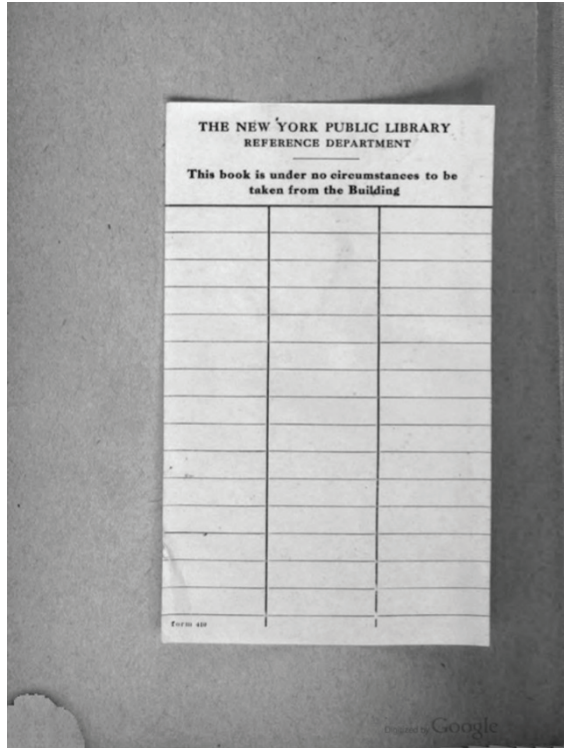


Figure 8.4. *Library Notice in a Digitized Book*, Google Books, 2013.

The artist Benjamin Shaykin collected such glitches and gathered them into beautiful book projects, where the accident comes to center stage.⁷ The palpability of the digitizing process forces us to reconsider the trust we put into the infrastructure that maintains the Internet. Like any other industrial and commercial enterprise, the Internet relies on energy, people, and materials—it costs, it pollutes, and it has its own ecology, which we have only just started to study.⁸ The anthropologist Timothy Ingold urges scholars of all disciplines to acquaint themselves with the role that materials play in all realms of culture and nature—simply by “following materials.” Following materials allows us to make a pathway through the complex relationships between texts, objects, people, and the environment.⁹ It thus helps us to better understand the complexities of material entanglement if we cannot grasp the whole picture at once.

So if you just pick one little thread of material and start pulling and following it, this movement along materials will generally lead to insight and understanding—certainly not a complete understanding, but at least one that is aware of its own incompleteness. Art history is a discipline with a deep history in following materials—from their “raw” state as paint, marble, software, earth, etc. to their “cooked” state and back again. We may, for instance, follow the gold mosaic tiles that adorn Heinz Mack’s “The Sky Over Nine Columns,” placed for the 2014 Venice Biennale on the Isola di San Giorgio Maggiore, and which I have been watching every day during my stay at the Cini Foundation, admiring how the gold reflects and reinforces the stunning Venetian summer light. These thousands of golden tiles reference and actually stem from the centuries-old skill of precious glassmaking in Venice and Murano; the staggering effect of a material that seems to become light itself when it reflects light has a strong aesthetic lure, which has combined ambivalent connotations of earthly materiality and heavenly immateriality for centuries. Coupled with the tiles’ underlying economic value, this ambivalent confluence of meaning has fed a long-standing political iconography of power: if one enters the church designed by Palladio, which rises behind Mack’s columns, one finds a larger-than-life portrait of the twenty-fifth Venetian doge Memmo, set against a background of those golden tiles.

If one follows the materials further, however, the exciting fusion of Venetian tradition and German conceptual art that art critics consider in their discussions of Mack’s work appears to have yet another, more covert dimension. Originally, the artist wanted to cast the columns in bronze, but the sheer weight would have threatened the island’s stability. Having to realize the project using different materials, Mack enlisted a German company that specialized in light plastics with a production site in Dubai. In order to be fixed to the column’s surface, the golden mosaic tiles were shipped to Dubai and then back again as part of the finished columns. Production costs and costs of human labor thus dictated a different flow of materials, which call up the shipping and trading of costly substances between Europe and the Near East, in which Venice had a key role during the early modern period. Following the materials of Mack’s columns reveals an aspect of their narrative that is important to the ways in which contemporary art production, like any production, depends on intricate networks of globalized markets, value of labor, and value of resources. Artists—such as Ai Weiwei, for example—may choose to situate such paths at the center of their works’ meaning, while others may choose not to draw attention to them at all. Mack’s “The Sky Over Nine Columns” is an extremely visible and palpable object that may require less probing and searching in order to pull a thread and follow the materials. But the principle is the same for the digital material networks I have been trying to describe, which are less

obviously “material:” we need to start pulling threads that incidentally stick out and, by doing so, unravel and discover how they hold together. So, what does this approach do? What can it achieve? It may achieve what could be termed *material literacy*, a term first used in archival studies.¹⁰ But rather than denoting a particular set of skills, such as reading and writing, I see this literacy as being grounded in a general sensitivity to the world that surrounds us, and an attentiveness to the fact that materials are inherently noteworthy. From this foundation, learning with and about materials, and understanding that they are everywhere, would already be a wonderful achievement: to consider the materials of a digital photograph or those that constitute the DOI of an article as just as relevant and meaningful as those that constitute a golden mosaic tile in a Biennale landmark.

Learning about, with, and through materials is not new. It has, in fact, quite a long tradition in the history of education. Consider a teaching concept developed in the early 19th century: The English minister and teacher Charles Mayo had spent three years at Pestalozzi’s school at Yverdon to study the great reformers’ innovative *Anschaunungsunterricht*. However, he found the teaching practice there rather chaotic. Back in England in 1822, he developed a systematic approach to object-based learning together with his sister. In 1830 Elizabeth Mayo published *Lessons on Objects*, a book containing one hundred lessons on everyday things and materials including precise instructions on how to carry them out. She also produced the accompanying *Object Lesson Boxes* that contained the very things and materials to be used in teaching. The things in the box were to be passed around, touched, smelled and even destroyed, if this enhanced the understanding of particular material properties, for instance the inflammability of Indian rubber. Only a handful of these boxes survived the intensive teaching method, for instance in the Museum of Childhood (Victoria & Albert Museum, London), the University Museum at Leeds or the Museum of Things, Berlin.¹¹ Contemporary material archives and libraries, such as the materials library in the *Institute of Making* (University College London) or the Swiss *Material-Archiv* combine a collection of actual, touchable samples with digital databases and form the legacy to the didactic combination of words and things.



Figure 8.5. *Object Lesson Box*, Werkbund Archive – Museum of Things, ca. 1850.
Photograph: Armin Hermann.

Material studies in fact form a substantial yet little-studied aspect of education. The famous children's story "Eyes and No Eyes: On the Art of Seeing," by John Aiken and Anna Barbauld, is a prime example.¹² In it, schoolmaster A. has sent two of his pupils, Robert and William, on a walk in the countryside. Robert returns quickly, and when the schoolmaster asks where William is, Robert replies that he

did not want to wait for him, because he took forever, stopping at every stone and sight ('what a boring guy'). But then William returns and relates everything he has experienced, all his encounters and observations of people, animals, birds, plants, stones, clouds—in short, the entire world: "I hardly took a step that did not delight me, and I brought home my handkerchief full of curiosities." The moral of the story of course is that William has eyes, and Robert needs to learn how to use his. When I read it, I found myself in a very similar position to that of the schoolmaster A. I would like to have my students develop eyes for their material environments, to be curious about seemingly mundane, simple, boring things, about their natural habitat: their physical-digital environments. Ideally, their encounters would not all be delightful, and they would develop critical eyes and not only gather curiosities, but also bring home the dirt. Above all, however, they would be curious. Material libraries in which physical and digital objects are not kept separately and in which the close relation between the two digits is emphasized rather than covered up would be just the place for them to start training with the two digits.

DEBATE

Glenn Most

I wanted to ask you about material literacy. It's a fascinating concept, but there's one regard at least in which it's very different from the kinds of literacy that I work on, in that it depends upon samples. A material archive, such as the one in Switzerland, or the objects stored in the Victoria and Albert, depends upon the notion that you can take something which is representative of all the things of that sort. I'm curious about this concept of samples, specimens, which underlies this material literacy, its limits, its defects, and so forth.

Geoffrey Bowker

Early in your presentation you talked about how we can rediscover old things by re-photographing them. I'd like you to talk a little bit about the economics of that. In tracking botany for example, if you something switches genus or switches species, I would guess it takes fifty to one hundred years to properly make the adjustment, because it's so expensive to change all the labels, to rewrite the text books, to do new editions. I imagine it's the same expense that's built into re-photographing and re-propagating the digital copies. That's now an automatic process—and I

don't think you're saying it is—but could you speak a little more about the temporality and economics of it?

Ruth Padel

I have an educational worry, it's about curiosity, which is just where you were heading. It's what Darwin had as a child: at age eight, he wanted to know the provenance of every single pebble in his father's gravel drive. *Eyes and No Eyes*: it's the curiosity. But those pebbles were things he could bend over and touch, pick up, feel with his hand. This is our natural inclination, and its central to curiosity: to put our hand in. Yet the illusion of the digital goes in the opposite direction, because "digits" should be about fingering. Some use this wonderful world 'haptics' to keep the "two digits" separate." Although with the electronic digital, you do press buttons, it's impossible to actually touch the object, so there is no curiosity-generating way of interacting with the object. These screens only say 'talk to us, talk to us' because they want something from us. It seems to me like this presents a huge educational worry.

Ann-Sophie Lehmann

To collect all materials is a never-ending enterprise at the Material Archive; this is also what the curators themselves experience. The archive is not sponsored by any private institution. If one collects one material only, it quickly becomes apparent that there is no such thing as 'one' material. Take wax for instance. It has been developed in so many ways since industrialization that it is really difficult to say what exactly 'wax' is. Yet I think it's exactly this unending enterprise that makes my point: the material world has no limits, there is no end to following, understanding; any collection and compartmentalization of materials makes that clear. You cannot categorize the whole material world. It's simply impossible, which makes it such an exciting thing to do because it points back at itself all the time. That's what you're learning while doing it. But at the same time, it does raise awareness. It's not about "oh, you know, we speak about the materiality of something, and we're done, because we've raised the topic," but it actually continuously opens up again. So a material like wax changes; Ursula Klein has called this the historical ontology of materials. It does not remain the same. There is a paradox there. But that is what makes it so interesting of course, and we have to study that.

Geoffrey asked about temporality and economics. I chose the Ghent Altarpiece because it's such a massive, old, gigantic, important artefact, that the problem of changing its documentation becomes very clear. But it's also here with the Veronese painting which Adam Lowe and Factum Arte copied. Pasquale pointed out to us

that Christ's face was probably a 19th century intervention, but that the Louvre did not want to know this. Maybe one day, different curators will want to know, and then the whole amazing 3D print hanging here in the refectory, which costs millions, may either have to be reprinted, or maybe they could reprint just a section for the face. Temporality is especially interesting for digital-born materials. Something like the hands in the Google Books images, collected by Benjamin Shaykin—I think turning these images into a book was somehow a bit too easy. It's very beautiful to look at it because you see the hands on the hands, but somehow, actually to have it as an online repository where people can add for instance their own finds in Google Books—I think that would reflect what is going on better. The Closer to van Eyck project should have a new high res image of the spider webs so I could have shown it to you!

As for curiosity, in a way, finding the Mayo box and doing research about it now is also a form of self-criticism because I realized, 'Hey, what am I trying to do here? What is the history of this form of education?' Is it really OK to tell students that they have to go "out there", or else they won't see anything? In *Eyes and No Eyes*, Robert 'sees' in the wrong way. He's going to remain stupid all his life and arrogant, and William is the nice guy. Can this really be a way of educating today? It seems to me we really lack when it comes to digital material is vocabulary. That's an area where a lot of work needs to be done—and that is something you can do with students really well. For instance thinking about the names for the actions you carry out on the screen of your smart phone: *swipe*, *pinch*, *scroll*—can we move beyond these descriptions? Is it always a question of remediation, using the terms of an old technology to describe a new one? "Slide to unlock" for instance is an action completely unrelated to any kind of unlocking, except in the digital domain. How can we find words for such new material actions?

Gregory Crane

We in the philological gallery, on our bad days, tend to get lost in the words; we forget to bring in the materiality of culture. But I think there's a real change here. When I was young and trying to view antiquity in its entirety, I discovered that it was impossible to study art history with books. Everybody had boxes of pictures, or they had their own secret stash, and this had a really bad effect upon the culture. My experience is that the art historians were really mean, very proprietary of their little collections. One of the great joys was to have a hundred and fifty pictures of a Greek vase; you could see the knees, you could see the eyes clearly. Of course that by itself does not convey knowledge, but it is a necessary if not sufficient condition, because if you can't see details, you cannot do the connoisseurship.

One of the things that I'm interested in is this shift of connoisseurship from 'I know it all and I'm superior to you' and its authority, derived from exclusive access to the objects, to the new mode we're seeing, where it's: 'I'm going to put these pieces together and make a compelling story out of these fragments. I could show you the Berlin painters—ten knees by the Berlin painter, ten knees by somebody else—and you will see the pattern that I'm looking at.' Which awakens the eyes. I'm excited about the prospects of people with no eyes acquiring eyes, being able to take the walk in the woods and interrogate the plants and the stones which they see.

John Tresch

One of the many admirable things in your talk was your rediscovery of Mayo. It goes along with what I think a lot of people who study the eighteenth and nineteenth centuries are starting to see now. This period wasn't about the transition to pure abstraction, disembodiment, print culture, objectivity, that the late twentieth century often described it as. There are worlds of material practices, part of knowledge practices, all of which were public and visible. We now have to go retrieve those; they're not that hard to find once you start looking for them. The Mayo box is a wonderful case of this other modernity, this non-abstracted modernity, this eighteenth and nineteenth century materiality which historians have sometimes ignored entirely in trying to denounce the enlightenment and what followed it. So I see your contribution to getting us past that assumption about modern "abstraction" as in line with what a lot of other people are doing by saying "let's look at materiality and let's look at objects." But then I want also to point out that this return to objects still can be very flat. We end up with objects in boxes as the example of materiality; as you say, we need to develop a language for how people get those objects out of boxes, how they use them; these interactions, the haptic, are the key to those historical forms of curiosity. To get a vocabulary for that haptic interaction, the shifting of terms such as swipe and pinch is part of it.

But I'm also thinking back to Dagmar's talk, with the map which was not a map, which was not of any space, but instead a diagram of points of ritual stabilization for an entire cosmology, including the objects that make up that cosmology. The map was a guide to ritual, to rituals which hold that world together. So another source for this haptic language is anthropology, which has an incredibly rich vocabulary about folk practices and rituals. And this returns me to Filippo's point from the first day, that training is not just about providing information; it takes a lot of time. These rituals—of training, and learning, too—take time; we have to change our bodies and our minds through certain kinds of practices and repetitions. So in addition to the materials in boxes we need to think about how we access those ma-

terials in the boxes, and begin to think about some kind of vocabulary for taking those things out of boxes and doing so in standard, repeatable, and subject-producing and transforming ways. Ritual may be one of the sources for that.

Simon Schaffer

I would want to start where John's comment began: the reason for the Pestalozzian revolution, which the Mayo box inherits, was the crisis of the dematerialization of the lower middle class. How weird, it might seem, that in the early eighteenth-hundreds it had suddenly become necessary in Great Britain to train anybody to engage with things. The reason for that was not, it seems to me, a passionate investment in materiality, but the exact opposite. Young Roberts and Williams are no longer working with matter; they'll be clerks and accountants and administrators. So they have to be surrounded by these artifices which have the form of commodities. You buy the boxes along with the books. So you're absolutely right; I think this is a brilliantly perceptive way of reclaiming some optimism from digital pessimism. Why? Not so much because of material literacy, but because it reminds us of the complete opposite, literal materiality: precisely the work that Glenn Most was talking about—in his work with Grafton and others—that insists on the constant materiality of precisely the most literate, most apparently abstract, most apparently cerebral, most apparently disembodied work.

So alongside the need for a much richer vocabulary of material engagement in digital worlds, I would also want, to put it bluntly, a better class analysis of what that world is; that it's a world in which there is a material archive in Switzerland, and the matter is manipulated in Dubai, and it's not manipulated in Dubai by Gulf Arabs, but by Bangladeshi and people from Karachi. What was remarkable about your intervention was the way it wanted us somehow to hold simultaneously the denial that the world is flat, which is just the characteristic abstraction of the ruling class, and an insistence on the necessity to work out ways in which literal materiality as well as material literacy can be brought to presence, all the time. What is the cost of that? Extremely slowed down digital work. All of a sudden, the speed of swipe and pinch gets glacially slow. Thank God; I would quite like that.

Ann-Sophie Lehmann

Greg mentions these nasty art historians who kept their pictures: that has certainly changed. There is a very palpable change here, in a move towards research methods from the natural sciences, for instance the whole restoration campaign of the Ghent Altarpiece, which has been made available in open access to the public

online, with both images and scientific publications. This is something that art history has never done before; it's a very slow field to react to innovations in the humanities. So that has been a very good and important push.

You've also pointed out performativity and rituals of interaction. The Victoria and Albert also has a copy of the Mayo book, but the box and the book are not linked in the catalogue—which repeats exactly what Dagmar pointed out yesterday, how objects and texts get separated by the classification. So here digital affordances could make that interaction visible again. John pointed out that we should be looking at the boxes as they're used, in along with the books. But even in the original uses, there were restrictions on access: the boxes were quite expensive, though they were sold in different places in London. Only four hundred and five educational institutions actually got them. There was a lot of educational material, but it was a question of money. Biographers of the Mayos described how their teaching methods were watered down; teachers stopped using the boxes and only went through the book quickly—in other words, material education became bad and boring. But the way the book was written, you would not need the box.

Actually it describes many materials not in the box. For instance: milk. Mayo couldn't put milk in the box, it would go bad, but presumably she and Charles thought that teachers could take milk into school. So there if we start looking at the interaction of texts and objects, we arrive precisely at the actions you were referring to, the getting up and the handling, and; the improvisation that may have been going on, "if it's not in the box, what do I do?"; that is what interests me. And I hope that this sort of slowing down will occur by following materials and the political, social, and economic questions that arise almost by themselves if you do. I came across the production of Mack's columns in Dubai because I wanted to know about these links, and that information is not on the text boards next to the columns. Of course it's not. But thanks to the Internet and a brilliantly illustrated making-of feature in Frieze Magazine, it's available.

Filippomaria Pontani

I think that one issue that should be put in focus is memory, because one of the problems we have—at least in teaching—with the new technologies, is that people do not memorize things. The more things are dematerialized, the less students tend to remember them. To remember not only the way to access them, but also to remember the very features they are supposed to become familiar with. In this sense, I think there are two aspects that you have highlighted. First, when you have a selection of dematerialized works of art that are put together online and totally out of context, one of the risks is precisely being trapped into the idea of the flatness

of the page. On the other hand, you have the history of more common objects like this Mayo box: there you do not have art, you have everyday objects. In Berlin a couple of years ago I went to the Museum der Dinge. It's an interesting experience, quite unique in its genre, not only because it represents a museum context—not the Wunderkammer, which is the obvious reference for the box—but a collection of everyday objects on exhibit not so much for their artistic value, but because they represent history. In that sense, they can contribute to the memory of a generation, of the German people in that case. I wonder if this idea of materializing things, even low-brow stuff, can produce some impact in enhancing an increasingly lost memory, both in learning and in awareness of one's past.

Geoffrey Bowker

I actually think we're dealing with new memory configurations. I just don't know how they're going to work out in the end. I'm very happy that people don't have to do lots of rote learning like we used to in the past. But we obviously do need familiarity with material. I was feeling a bit contrary when you said “swipe to unlock” is not a haptic gesture—it is. Shutters for windows, latches on windows, you slide to unlock those.

There's a wonderful concept that William Wimsatt has: generative entrenchment. An example is the QWERTY keyboard. We still have the QWERTY keyboard, though there's no need for it. Similarly, there was a digital imaginary that was created (I guess five to ten years ago now, but I don't think anyone remembers it), of a completely new way of putting stuff into your cell phone, where you wouldn't type, you would swoosh. You would just kind of move your finger around it and it would capture the movements. But that haptic gesture was not something that we could take in because we were so used to typing, whether it be with our thumbs or our fingers; we wanted that pressing of the keyboard. I really think we need a new vocabulary for the digital imaginary, to recognize it and develop it, and recognize that entrenching that digital imaginary is going to be long, slow, and expensive.

Stéphane Van Damme

My question is about the culture of attention. I am struck today that there are many denunciations about digital culture in terms of a lack of attention, and in terms of ecological effects. What you clearly demonstrated in your paper is that we are also returning to an aesthetic of details. I like this counterintuitive interpretation. My second comment is about material literacy. It goes back to Simon's remarks about the nineteenth century. I think this teaching of material literacy

in the nineteenth century, though you can also find it in eighteenth century, was linked to a conception of an art of making, *l'art de faire*. Today this link is probably lost. In trying to write a book for French cuisine with my wife, we're thinking about changes from the digital culture also—which gets really interesting if you reconnect it with *les arts de faire*. If you think about the *L'Encyclopédie*, with its plates of practices, obviously the so-called process of abstraction is purely an ideological view of modernity. In a new encyclopedia the Bangladeshi artisan will be there.

Aihwa Ong

There's a kind of nostalgia for objects in boxes; you remind me of the Pitt Rivers Museum, which I love. You pull out random drawers and you find buttons and bowls. But the thing is, these objects are themselves representations of other materialities, just as you suggested when you talked about gold. I think there's a danger here, that we over-determine the concreteness of material objects because there's a range of them in different permutations of objects, across vast distances. The objects in those boxes in the Pitt Rivers Museum represent material objects in the world, in the colonies, for the British. They are standing in for these other things and relationships of production, in their different permutations across time and space. Though of course for the people they were taken from they're part of very different relations, different materialities.

But you are also suggesting that there is another shift in the different qualities of tactility of the human and digitalization—you use your hands and in a sense conjure up and elicit different kinds of realities. Despite a kind of shift from the tactile, the sensual, the physical towards the visual, the abstract, or the linguistic, it seems to me that fundamentally you are interested in understanding the affects of objects: how objects affect us, how objects are part of an affective architecture for the understanding of relationships. I think they are different apprehensions of materiality that shape different modes of reality, which all can bleed into one another. For example, my students are constantly playing on their stupid digital gadgets, but they are also doing very physical things. And there is a relationship between those things.

Ann-Sophie Lehmann

Yes to all, to everyone! I did not want to come across as arguing for going back to old fashioned objects because “oh no, they're disappearing!” No. What I'm arguing for is that the digital does not make anything disappear. I think we're still inside those paradigms I've sketched. That's my whole point. We need to jump out of them, or get jump-started. And this is exactly what you are pointing out, Aihwa. I'm

not saying we can only get at this by the route of the actual or of the touchable—the digital is touchable already—but just by simply saying, “let’s follow those practices and let’s not make this distinction, is it on the iPhone, or is it a fifteenth century artwork?” Let’s just take them together and look at them as one network. For instance, the people in the National Gallery taking the pictures and looking up stuff, and wanting to see the original, and in doing so they irritate one another: What’s happening at that moment, and how does that explain the network that’s emerging?

Glenn Most

To return to what Simon said about slowing down the digital. Nietzsche defines a philologist as someone who reads slowly, and there aren’t many better definitions of a philologist than that. And he opposes it to newspapers and superficiality and mass media and so forth. What is underlying a lot of the discussions that you’re referring to is something similar, and it’s there already in *Eyes or No Eyes*: it’s a notion that the danger is being trapped within yourself, and you can only be saved by something that comes from outside. The selfie, the digitalization, the child who walks through and doesn’t see anything—these are people locked in their heads. What can save you is something material, something authentic, the real painting, the real experience, the real object that you have to see, and it helps you in yourself as well. That’s something which is common to a lot of the discourses that you are talking about. There’s something religious about it, something of a notion of epiphany, of salvation from something transcendent and outside, however secularized it is now.

Matthew Battles

Experience of epiphany is also, after all, an individual experience. At least a kind of bipolar experience, since transcendence takes you out of community. Even though it puts you into communion, that’s a different community. I’m just thinking about what you began with, the kind of pedagogical example of walking through the materiality of a journal article, and thinking about it as unpacking this box. That’s an opportunity to attend to the economic relations, not merely the kind of sacral associations with objects, but precisely their embeddedness in the way that the gold tile is embedded in a network of relations. It is so important to create these occasions, these guided tours of reality, which are ultimately ritual occasions, they are occasions of communion and community between a teacher and student, and ultimately, one hopes, among all of us as members of communities participating in the digital realm. Because these experiences are commodified now.

I think of commodities as traders do: not as consumable goods, but as a fungible

heap of stuff, molar stuff, raw material, which is I think how we are being socialized to experience stuff in the digital realm. We're being taught that the world is in fact a bunch of objects, a bunch of figured things that people have made, and that they're connected to other things that are made. What we are doing with ourselves with those selfies is turning ourselves into commodities, into flowable, fungible material. The kind of ritualized itinerary that you describe may be one way of grounding that stuff in object-making practices. In that way the reading that you give those digital objects would not only eventuate in practical understanding of how to find and cite information, but also in an introduction to meditating on the making of community around, and understanding about the political economies of those digital commodities which are objects.

Ruth Padel

A lot people use the language of theology to talk about the real presence of being in front of the real object, which is what everybody wants to do when they're in front of the Mona Lisa. George Steiner, in *Real Presences*, says this is actually like drawing a check on a bank, because we, because most of the world no longer believes in that theology. So we are using, as it were, a bankrupt theological metaphor. We all think that new vocabularies are wonderful, but I also think that there's something absolutely wonderful about the theme that "this is not replaceable." A box is a jolly good idea. If we didn't have the concept of the box, if we didn't have boxes in the world, we'd be lost! And only if you know what a box is, and perhaps have opened one, can you think out of the box; only if you have some assumptions that you make in your experience of the world can you then take apart the things you take for granted. You've got to have some squares on the floor before you start to think what a square isn't, or how you can think round. This conference is about different knowledge worlds. And perhaps it's an obvious thing, but what's clear from these discussions is that we live in a meta-knowledge world. This is something crucial for kids to know. I love the way you begin by showing them what the Internet is taking for granted, and I think much more could be made of taking a smartphone apart and saying 'look, the aluminum comes from a mountain in a reserve, and because of this thousands of people are being displaced, because of the mining that is happening to make your mobile phone,' or, again, the Bangladeshis in Dubai. There are so many other ways of knowing worlds, and these need to be part of the knowing.

Gregory Crane

I find that it's really hard to get students to learn verbs. They've had really bad training, at least in American schools, and don't see the significance of having these in your head. Why the hell do I have to do this? What is the benefit? Now Plato, as we all know, started by saying "When you have writing, your brain rots.". So this memory loss both starts with writing and is an essential thing we accept in order to have the society we have.. I think the space in which we are having this discussion is a beautiful metaphor for this—we're in the library. I see the scientific heroes Ptolemy, Euclid, Hippocrates, the poet Orpheus, and I see the Church Fathers. Those are just the names I can make out. This is externalized knowledge. Then here, in the center of the room, you'll find the lone monk, or the priest, a Benedictine monk: all this stuff has only value in so far as it leads to the salvation of those souls. That's internalized knowledge. Now we don't have that salvation metaphor, people don't want to believe in it, but even so, there's something that happens inside the head. What is it? What is it that we want to have happen? What transformation within the heart and mind of our people? There are different cultural conceptions. What does it mean to be Chinese in a modern world? What does it mean to be visual? What does it mean to walk around? But the common thread is that we need a model of what people should internalize. That's the case we have to make to the people who are fifteen. Or six. Or two. That's our role as scholars and as researchers and I think Ann-Sophie's talk was very sensitive to this, as well as to the visual, tactile world.. This is a question I pose for all of us, and for me at least it's a unifying question across all these topics.

Simon Schaffer

The reason in *Eyes and No Eyes* why Robert is so hopeless is because he is only interested in humans. He says it would have been better if they'd gone on the turnpike road because then we would have met some people. There is something actually quite interesting for us to think with there: what we might be saying is that the way to get folk interested in stuff is to show them the humans in the stuff. That's what happens when you try to make them see the materiality of a mobile phone—you show the humans there. That's also called 'fetishism.' Fetishism has a very, very long, seductive, interesting history and it is obviously associated with the mode of commodity production, among other things. So is that the recipe?

Ann-Sophie Lehmann

So it all comes down to fetishism and religion.

John Tresch

Probably. A while ago, people started to realize that in the natural sciences a shift had taken place such that fifty or sixty or seventy percent of the budgets of the natural sciences all go to computing: to programming, to data storage, processing, maintenance. To be an expert in any field means also to be an expert in the computing skills that make it possible. Now we're starting to see what happens when that shift occurs in the humanities. But of course in the humanities, it has also traditionally been part of the job to ask what it all means, what it's for. Greg said as scholars and as researchers, we have to be thinking about the kinds of humans that we are aiming towards and modeling. That's not news to anyone here, but at the same time, that's not something that we usually include in our research proposals and justifications. In the current regimes of academic evaluation, it feels somewhat perverse to say that we have to be thinking, not just about our basic topics, and also about the novelty of our methods (and we get access to colossal resources if those methods are digital), but, in addition, that we have to be thinking about pedagogy, in a really classical sense. How do we interact with students? What techniques do we use, and what is the ideal student we want to help construct? Again, I think those are questions all of us here are always asking. I just want to point out that making them *explicit* goes against much of the current tendency for how we describe and justify research and scholarship—which is about units of knowledge produced and conveyed, or the average salaries of our students on graduation.

Ann-Sophie Lehmann

Thank you all, especially for pointing towards ritual. There is a religious undertone here we have to come to terms with, or make explicit. I would also want to go on discussing the notion of fetishism. In the story, Robert is not interested in William, and he is not interested in the work he sees with the horses, it's only certain people he's interested in; I think you're right, we need to know which kinds of human work capture his interest. John, I'm not quite sure, but do you mean that it is perverse that we're losing this aspect of education, that it should be part of what we are doing anyhow, that it's perverse that we now have to discuss it to become aware of it?

John Tresch

Exactly. It's part of our everyday life—how we communicate to students and how we're shaping humans and knowers and citizens—but this is very rarely part of our explicit justification of what we do as researchers. Maybe the novelty of the digital is an occasion for returning to this very classical concern.

Ann-Sophie Lehmann

I agree.

NOTES

1. <http://clostertovaneyck.kikirpa.be/>.
2. Karel van Mander, *Het Schilder-Boek*. Haarlem 1604, f. 201 r.
3. Simon Schaffer in Gagliardi, Pasquale, Bruno Latour, and Pedro Memelsdorff. *Coping with the Past: Creative Perspectives on Conservation and Restoration*. Firenze: Leo S. Olschki, 2010. See also Bruno Latour, Adam Lowe, "The Migration of the Aura or How to Explore the Original through its Facsimiles", in Thomas Bartscherer (editor), *Switching Codes*, University of Chicago Press (2010).
4. Vilém Flusser, "The City as Wave-Trough in the Image-Flood", trans. Phil Gochenour, *Critical Inquiry* 31/2 (Winter 2005): 320-328.
5. <http://www.kesselskramer.com/exhibitions/24-hrs-of-photos>.
6. Lev Manovich, "Data Science and Digital Art History," *Digital Art History* 1 (2015): 12-37. <http://nbn-resolving.de/urn:nbn:de:bsz:16-dah-216313>.
7. See for instance here, Benjamin Shaykin, "Special Collection 2009-". In: *Printed Web* Nr. 1, Winter 2014: 58-63. <http://d1v8u1ev1s9e4n.cloudfront.net/54b448b35ccacf-259deee77f>.
8. See for instance Paul Feigelfeld, "Media Archaeology out of Nature. An Interview with Jussi Parrikka", *e-flux Journal* 2015. <http://www.e-flux.com/journal/media-archaeology-out-of-nature-an-interview-with-jussi-parikka/>.
9. See for example Tim Ingold, "Towards an Ecology of Materials", *Annual Review of Anthropology* 41/2012: 427-442.
10. Ala Recrut, 'Material Literacy: Reading Records as Material Culture', *Archivaria* 60: 11-36; see also Ann-Sophie Lehmann, "Material Literacy", *Bauhaus Zeitschrift* 9 (2017), 20-27.
11. Ann-Sophie Lehmann, 'Objektstunden: Vom Materialwissen zur Materialbildung'. In: Herbert Kalthoff, Torsten Cress, Tobias Röhl (eds). *Materialität. Herausforderungen für die Sozial—und Kulturwissenschaften*, Paderborn 2016, pp. 71-94; Lehmann, Ann-Sophie; Volkers, Imke, 'Object Lessons. Material begreifen in 8 Lektionen. Eine

Ausstellung im Museum der Dinge, Berlin', *Museumsjournal* 6/2016, pp. 54-55.

12. This story appeared in Aikin, John and Anna Barbauld, *Evenings at Home, or The Juvenile Budget Opened*. New York: Harpers & Brothers, 1855, first print 1796-99.

CHAPTER 9

The Provisional Library Machine

Matthew Battles

Ruth's Padel's poem, "The Letter to the Portuguese Cosmologist," which John Tresch quoted in this book's introduction, is an evocative and rigorous articulation of some of the strands I'm going to be fraying in the course of this chapter. Cosmology or, more simply, our place in the universe, will make an appearance—however briefly, however poorly handled. But I also want to return to Borges and his library: for the story that we heard performed on our opening night has exerted an influence on me for many, many years—as it has many of us, I am willing to guess. It's a story that has kept giving to me over time. It was particularly delightful to hear it in Italian a language over which I don't have any real control: I knew the story well enough to follow it, which is an altogether different thing from reading it. And that uncanny inter-linguistic space opened up some room for me to think afresh the Library of Babel, and to entertain the notion of making thought experiment with it, which is going to comprise the first of three movements here—three movements and a sort of reprise, and we'll be with Borges throughout.

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Figure 9.1. A page of text generated according to rules set forth in *The Library of Babel* by Jorge Luis Borges, realized via software accessible at libraryofbabel.info. Page laid out by the author.

We’ve seen many charismatic and esoteric objects over the course of the last three days, and yet there seemed to be more kind of puzzlement over this thing that I’ve put on the screen than we had come across previously. This is a “page” from a book in the Library of Babel, produced according to the rules that Borges sets forth there, produced at a web site, which has been online for quite a few years, that allows you to generate pages of the Library of Babel. The entertainment value of this

quickly grows thin, I must tell you, but this is what such pages look like; this is the text with which Borges' librarian contends.

We might think about the ways in which such a text would be experienced, and to think about the library in which it is found with its severe appointments. And finally to ask: could it be so severe, in fact? So austere and free of accoutrements? Look at this library in which we find ourselves, by contrast: it's full of all kinds of tools—tools for thinking with, tools for reading and writing with, tools for dreaming with, tools for falling asleep with...

What kind of tools would have emerged over the life of the Library for dealing with its relentless plenty? What ways of tracing patterns in these texts; of tracking, identifying, and shepherding along arguments from reading to reading?



Figure 9.2. Over time, even the austere Library of Babel becomes a jumble of labels, boxes, metadata. Photo by author.

So it was that, gradually, as if by magic, new machines appeared: new structures beyond the doors and stairways; beyond the compendium; beyond even the ragged quills—harvested, with cunning patience, from the pigeons forever fluttering through the piling hexagons—with which the pious librarians marked auspicious or haunting passages. But necessity demanded changes not only to the books, but to the furnishings of the hexagons themselves. And soon, the books were being captured whole by these new tools: perhaps not legibly or comprehensively always—indeed the effects of such remediation could be disturbing—but gradually they begin to coalesce into something approaching legibility or comprehension. The new tools were forming textual matter into new wholes, into new kinds of corpora, ever more abstracted from the severe compendia on the shelves, cohering into worlds with strangely consistent and even new, resonant, strangely familiar memes and forces at work.

And let's imagine tools not only to organize those symbols, but the space itself. New tools appearing—new signs, new symbols—that could interact with other tools to chart not only the arrangement of the letters on the pages, but their positions within the spaces of the hexagons. Tools to track not only the arrangement of those books and letters in those spaces, but the activities of librarians, as they traveled from place to place. So the hexagons start to be mapped in many ways, by different schools or sects, with increasing complexity. New patterns, baroque and expressive, emerge for understanding how these spaces are arranged and interact with each other. Soon, patterns are expressed: relations frozen in figures that transcend the levels of the library (Figs. 9.5, 9.6, 9.7). And by this slow evolution, “data” are born in the Library of Babel. The pages no longer contain texts, but data. And soon the chant drifting through the hexagons was data, data, data.

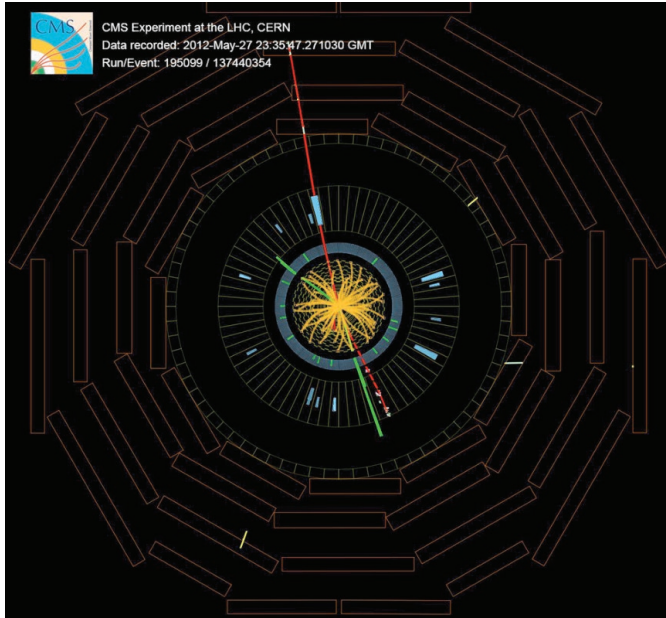


Figure 9.5. The hexagons start to be mapped in many ways, by different schools or sects, with increasing complexity. (CMS Higgs Search in 2011 and 2012 data: candidate ZZ event (8 TeV) with two electrons and two muons: 3D perspective, r-phi and r-z views. © 2012 CERN, for the benefit of the CMS Collaboration. Used here under license: CC-BY-SA-4.0.).

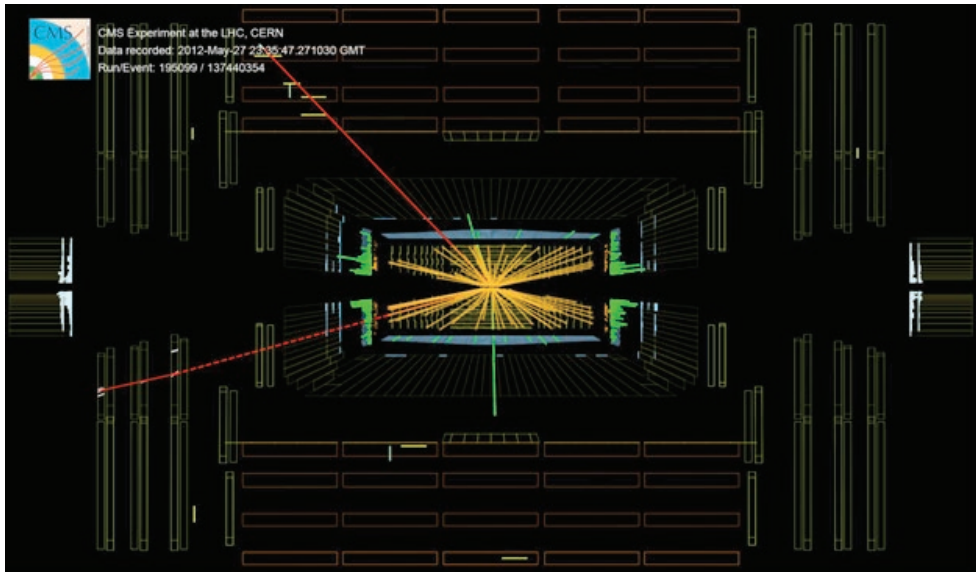


Figure 9.6. New patterns, baroque and expressive, emerge for understanding how these spaces are arranged and interact with each other. (CMS Higgs Search in 2011 and 2012 data: candidate ZZ event (8 TeV) with two electrons and two muons: 3D

perspective, r-phi and r-z views. © 2012 CERN, for the benefit of the CMS Collaboration. Used here under license: CC-BY-SA-4.0.).

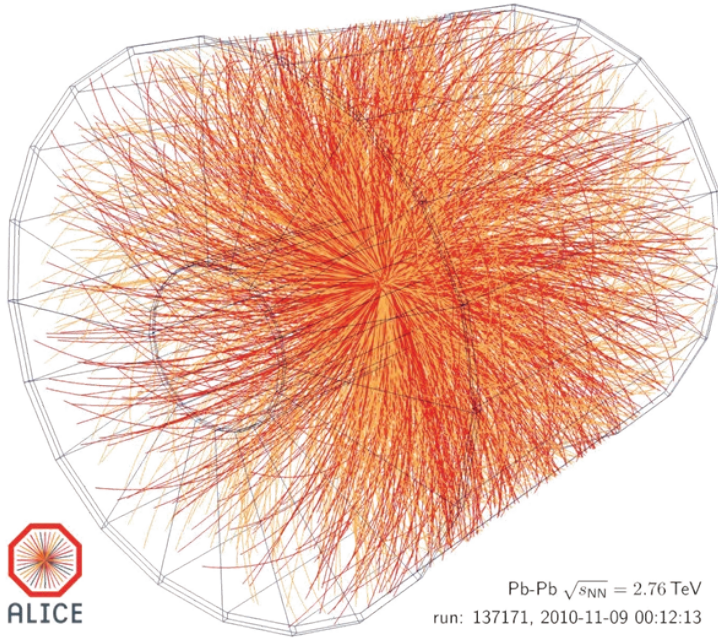


Figure 9.7. Soon, patterns are expressed: relations frozen in figures that transcend the levels of the library. And soon the chant drifting through the hexagons becomes data, data, data. (ALICE event display of a Pb-Pb collision at 2.76A TeV. © 2015 CERN, for the benefit of the ALICE Collaboration. Used here under license: CC-BY-4.0.).

I'm doing a bit of a sleight of hand here with these last three images in particular, which clearly were taken from sources other than Borges's Library of Babel. The last three images in particular are data visualizations from the Large Hadron Collider, which I've lately begun to imagine having some kinship with the Library of Babel. I've been interested, in a very naive and tentative way, in how the uses of this device (which is a massive machine for thinking with and for encountering, creating, ingesting, and excreting data) might compare to the ways in which we've used libraries to think.

I'm not going to recite the kind of catalogue of mechanical complexity of the Large Hadron Collider here, mostly because I don't have control over those details. It is a massively complex mechanism, not hexagonal but octagonal in section. The chant at the end of my thought experiment above—data, data, data—was sung by a physics postdoc interviewed in a film called Particle Fever about the building of the Large Hadron Collider. This chant—data, data, data—is one we also hear all

the time among digital humanists, arising from all kinds of disciplinary corners: from librarians, archivists, and scholars. And the emergent category of data keeps getting ever more baroque and interesting. What kind of habits of mind come with this term, ‘data’? How do they apply across the disciplines?

Leaving Borges’s librarian building and designing amidst his hexagons, I want to turn my attention to the little figure lost in the Large Hadron Collider’s vast enjambment of gadgetry and proportion—a figure reminiscent of other attempts to take man as the measure of all things (Fig. 9.8).

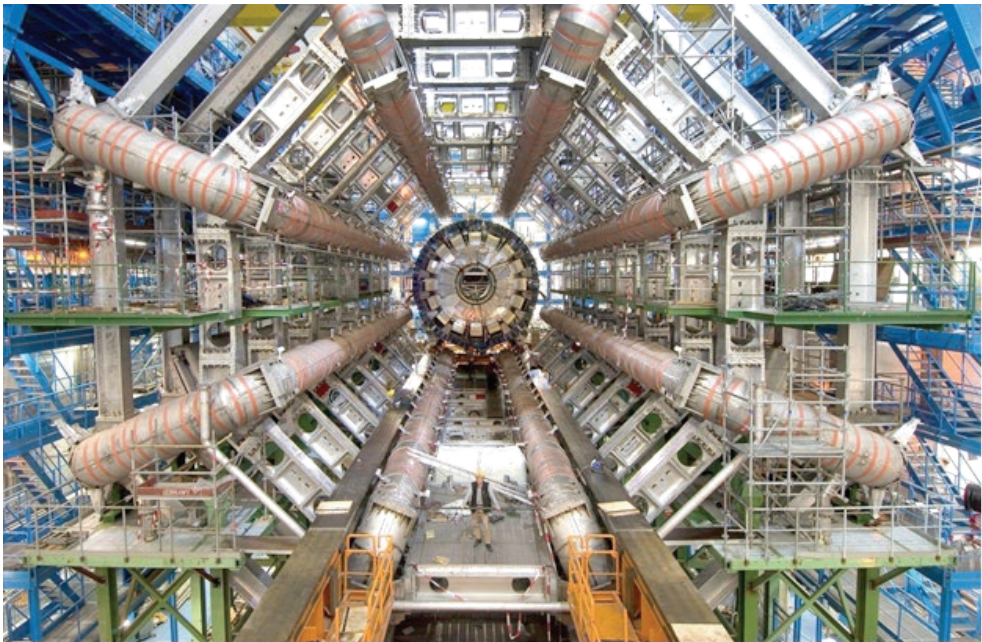


Figure 9.8. Installing the ATLAS calorimeter. Central view of ATLAS detector with its eight toroid magnets surrounding the calorimeter before its installation in the middle of the detector. © 2005-2018 CERN. Used here under license: CC-BY-4.0.

The tiny figure in the midst of the machine reminds me of the figures on the Pioneer Plaque (Fig. 9.9), an artifact sent on the spacecraft, Pioneers Ten and Eleven, as a “message to the stars,” a message composed chiefly by cosmologists Carl Sagan and Frank Drake. I won’t go into the iconography here, except to say that it was intended to scan as “universal.” Of course, as any of you from your various disciplinary perspectives would no doubt argue, there’s a great deal of parochial complexity to this message. Looking at these figures, I think of Leonardo’s Vitruvian Man, who lives across the canal from us here in Venice (Fig. 9.10).

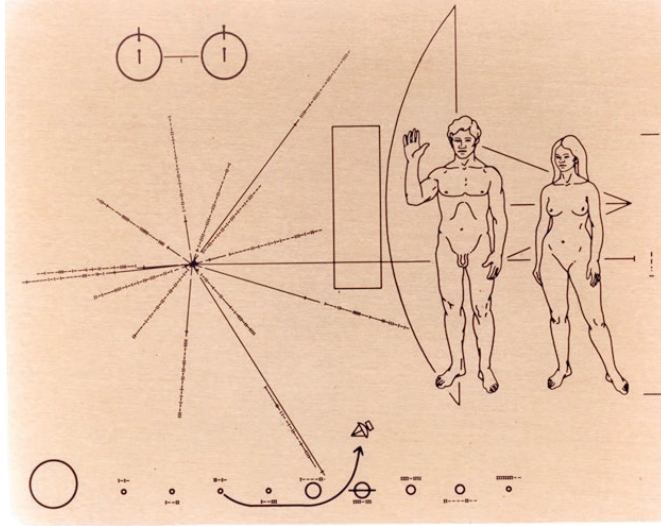


Figure 9.9. Pioneer Plaque, 1972. Designed by Carl Sagan and Frank Drake; artwork prepared by Linda Salzman Sagan. Photograph by NASA Ames Research Center (NASA-ARC). NASA images are in the public domain.

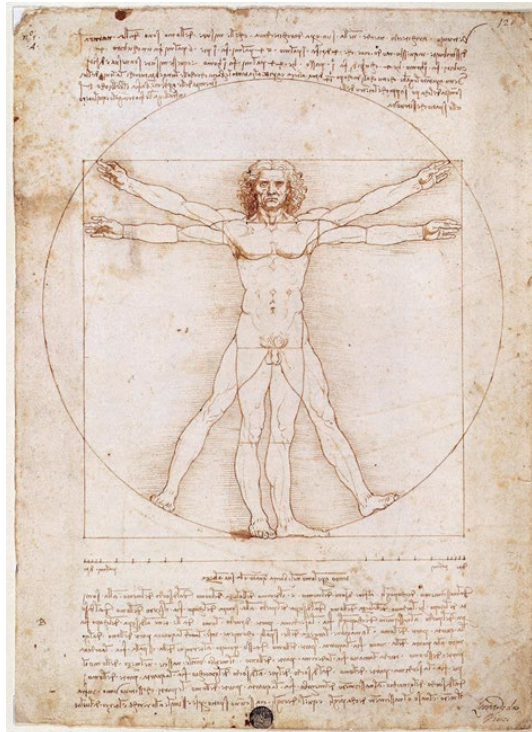


Figure 9.10. Leonardo da Vinci (1452–1519), *L'uomo Vitruviano*, 1492. Pen, ink, watercolour and metalpoint on paper. Height: 343 mm (13.50 in); Width: 245 mm (9.64 in). Original in Venice, Gallerie dell'Accademia, Gabinetto dei disegni e stampe, reference 228.

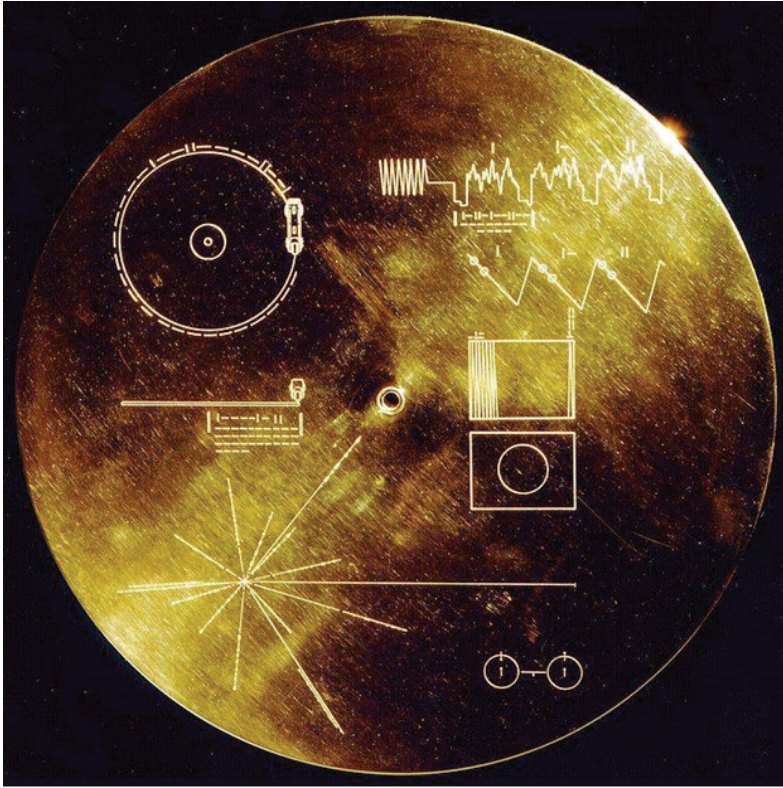


Figure 9.11. Cover plate, Voyager Golden Record (Sounds of Earth), 1977. The human figures are absent. NASA/Jet Propulsion Lab, image in public domain.

It's interesting to note that in the next version of the Pioneer plaque, the so-called "Golden Record" that went aloft with the Voyager probes, the man and woman had disappeared altogether (Fig. 9.11). Some of the imagery remains the same, though much was changed, including the addition of instructions (in a binary code) on how to play the phonograph record that's behind this plate. But the man and woman have disappeared, in part because there was some controversy, with a public program like space exploration, that there would be a nude man and woman on the plaque. And so it was thought, better not to continue controversy as the Voyager probes left the solar system. There's a curious and important movement that's taking place in the diminishing role of the human figure here, however—a move indicated also in popular imagery by the proliferation of the 'you are here' meme that appears on tee-shirts (Fig. 9.12). The funny thing about this image, and one instance of something I love about the Web, is that this image has proliferated as a celebration of rational empiricism as popular ideology, and yet the empiricism's

gone completely fuzzy: every galaxy is different, and every address in that galaxy is different, from one version to the next.

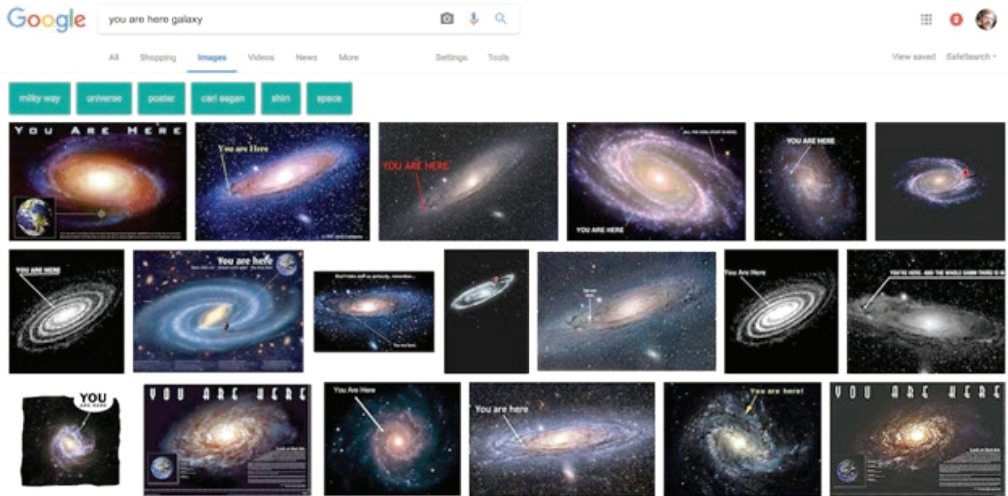


Figure 9.12. Screenshot of Google search page for “you are here galaxy,” made by author. Google and the Google logo are registered trademarks of Google Inc., used with permission.

Where is Borges’s librarian—where is the human being, the body—in this movement that runs from Vitruvian man to the Large Hadron Collider? How do patterns of text, of reading, of matter and energy in motion, imprint themselves in some of the habits of mind that come with network culture in the twenty-first century? And I know this is kind of a crazy notion, but I just want to play it out a little bit. In the age of particle physics, we’re learning to see ourselves as particulate, as quanta, loosely and provisionally arranged congeries of particles shaped by forces beyond our immediate sensorium, phenomena which can be rendered meaningful by statistical operations. I wonder the ways in which how we manage certain kinds of salient things (data, energies, arguments, information, knowledge, wisdom) might or might not be in dialogue with this machine and the practices and habits of mind that it represents. I’m speaking here of the emergence of “big data,” which is a very leaky term. I’m not going to try to offer a systematic critique of big data; what I’m doing right now is very kind of scattershot and expressive. In the first part of my talk, big data began oozing out of the librarians’ and Borges’ hexagons. We imagine that the ever-so tiny movements of those timorous and zealous wanderers in the library could be tracked in their meaning-yielding patterns. The readers become readable; they become textualized. And yet the kind of textuality that splashes on us all manages at the same time to remain veiled and elusive.

Now this is kind of crazy, this kind of connection that I'm trying to make perhaps. There is a discrete set of connections between these things, though—by “these things” I mean particle physics on the one hand and the web on the other. I mean after all, the primary technology for the web—Hyper Text Transfer Protocol, or HTTP—was developed by Tim Burners Lee at CERN, the home of the Large Hadron Collider. It's not the only technology involved, and in fact this technology was already itself a sort of pastiche or orchestration of existing technologies. But it was made possible, and motivated, by CERN's status as a preeminent network data centre. So there's a connection that's more than merely resonant or poetic or harmonic here, I think.

We begin to see this visual imagination of our sociality as natural phenomenon, as physics, in data visualization. It's expressed well in this image; for those of you who don't recognize it, it's a visualization of the first five thousand tweets that emerged after the Kony 2012 debacle—I don't know if you remember that event or not, but it was a viral effort to remove an African warlord from the Earth. It was an extraordinary event in social media, and this visualization of these tweets revealed an interesting pattern: a lot of tweets are emerging from or cohering at geographical centers where networks of friends on Twitter are associated with evangelical Christian communities. And these served as fertile hothouses for the rapid growth and development of the energy that exploded in this massive viral event. It was not an event that had an obvious tie to evangelical Christianity in the first instance, and yet it found peculiar resonance with these communities. And it showed at once the kind of strangely global forces and effects that are possible on Twitter and at the same time, the embeddedness and local nature of these phenomena, how they emerge from places and are about places at the same time that they seem to want to be about placelessness.

And so with that, we'll go on to the third movement, in which we get to a library, finally (Fig. 9.13). And so this is the library, one quite different from the one we're in now. And in fact you could say it's only a part of a library, a vast compound library. This is an elevation view of the Harvard Depository, the off-site dense storage facility of the Harvard Library system. I'm picking on the Harvard Depository not because it's the best or the preeminent such facility in the world (which it is not, although you might hear that around Cambridge). It's neither the most advanced technologically nor the kind of most expensive.

My research group, MetaLAB at Harvard, has been working this past year on an interactive documentary about the Depository. My own relationship with the Depository, however, goes back to the end of the twentieth century. My first job at the library at Harvard was to send some five hundred thousand books from the Widener Library to the Depository. (This didn't make me the most popular person at

the beginning of my career at Harvard.) The Widener stacks were being renovated and room was needed for new systems. That refrain “we need more room” is an ancient hymn in the library, of course. And equally, it’s always true.

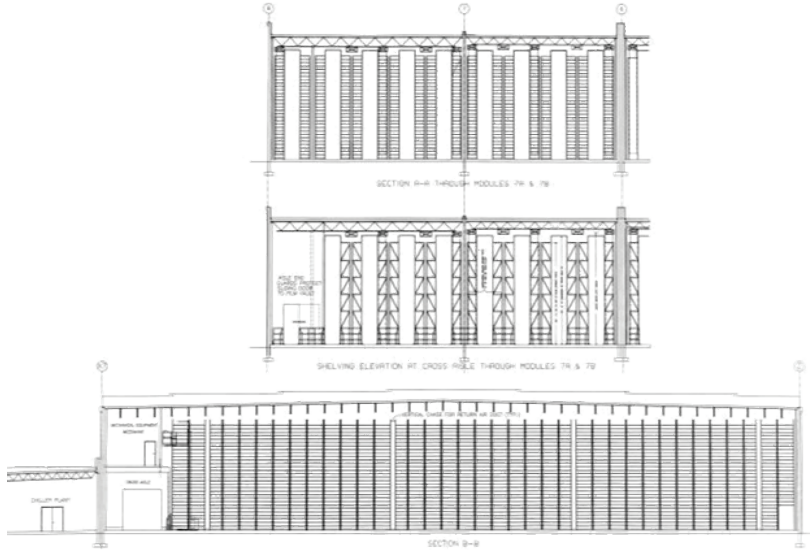


Figure 9.13. Harvard Depository, elevation views. From unaccessioned working documents of the Harvard Depository. Used by permission.

Now as you’ll see here (Fig. 9.14), this library is articulated so when you read it from right to left, the kind of L-shaped piece of this kind of Tetris game is the first of these seven bays. So that was the one that was built. About the time that I started worked, the next two from right to left, which are much more rectangular, had been added. The others had been added since then. This is not a library that is really scaled to the human body; rather, it’s scaled to operate with certain machines which humans use to make the library work as a machine.



Figure 9.14. Harvard Depository, Southborough, MA, USA. Aerial photograph by metaLAB (at) Harvard, used by permission.

What's really fascinating to me and amazing about the Harvard Depository is that its parameters are set—the temperature in the stack is fifty degrees Fahrenheit—and the humidity is quite low, too. I mean, it's refrigerated. And that of course is for preservation purposes. And the parameters of those preservation protocols are set to ensure the collection's preservation over five hundred years. The material the building is made out of however, is expected to last only seventy-five years. Unlike the library in which we're now convened which one might expect to be at least as durable as the books and archives it contains, if not more durable—the design of which conveys a message of durability, an armor around the ephemeral contents it preserves. At the Depository, it's the contents that are long-lived; the Depository itself is like a husk to be sloughed off over time. Eventually that first bay will fall apart. It's falling apart now. There are regularly leaks in the roof; there are these wonderful kits for catching those leaks deposited all over the place. As new bays are built and the old ones obsolesce, the Depository will slowly caterpillar across the landscape over the decades and centuries. Another bay will built at the far end, and I don't know if it will circle around and come back to eats its tail like the Orobouros of legend, but it's a library on the move in any case.

At metaLAB, we've been working on this documentary and I should say about the documentary that it's coming out of a kind of multi-pronged process that in-

volved a studio course at the School of Design, in which design students and students in Harvard College were working with us to explore this space and create media ethnographies of the space. Some of the students did sound work, some of them did interactive mapping of the space; some of them were working on infrastructure, others on the practices of the people who run around in the place and get the books. Much of that student work is getting incorporated into a set of media to accompany the film, collection of media that the students devised that with the documentary will comprise an interactive exploration of the Harvard Depository.

It's a place that's very difficult to understand as a user of the library at Harvard. Institutionally as well as architecturally, it's invisible. The university doesn't really want library patrons to be thinking much about the Harvard Depository—in fact, just last year, the library started a new initiative called Harvard Direct, which is just a branding of interlibrary loan and the provision of scanned documents and the Depository. You see, in the library's online catalogue, Harvard Depository is indicated by the letters 'HD'; and now, Harvard Direct is 'HD'; the hope is that 'HD,' qua the Depository will kind of dissolve into this broader cloud of possibility and folks won't think too much about how many books exist just forty miles outside of Cambridge at this facility. Somehow there's something still impolite about mentioning how many books exist physically outside the library, whereas the idea of a diffuse, immaterial cloud of books is quite acceptable.

The Depository is organized in a really fascinating way: like patrician libraries of old, the books are arrayed by size. Arriving constantly, they're arranged by size into trays that fit together puzzle-like on the shelves.

Our film is an extended pastiche of Alain Resnais's 1954 film *Toute la Mémoire du Monde* about the Bibliothèque Nationale de France—a fascinating film, a film on which Agnes Varda and Chris Marker also worked. It's about twenty minutes long, it's available on Youtube via the Criterion Collection. And it's great fun.

In *Toute la Mémoire du Monde* the narrator likens the library to a cathedral. The film concludes by describing it as a place where the disciplines ultimately come together to be rectified, the world made whole, all the enigmas solved. Whatever is at work in the Depository, by contrast, it is clearly not about the rectification of names. The Depository is about a much different kind of experience. It is, I would say, a library of provisionality, a place where the kind of total mystery value or quotient of the universe is irreducible. And however problematic the stories we tell about the Harvard Depository are, I kind of just want to celebrate it as a particularly strange, particularly useful kind of library machine. One that I think supports a kind of scholarship that might be worth cultivating, a scholarship in light of provisionality of forms and media, at once attentive to their preservation and respectful of the modes of their transformation as well as transmission over time. I think it's

the kind of scholarship that many of you have been talking about from many different perspectives.

I want to finish with reference to a project that to my mind, shows how digital “data” can be used in ways that aren’t just about making it “big.” This is not work that I’ve done, but work that was done by my colleague Yanni Loukissas, now at the School of Literature Communications and Media at Georgia Tech. Together with David Mindell, historian of technology and author of the book *Digital Apollo*, Yanni created a visualization of data associated with the last three minutes of the landing sequence of the Apollo 11 lunar lander. The visualization combines a scale of distance from the Earth to the surface of the moon with the distance of the lander from the lunar surface, and maps the communications between astronauts and mission control in time and space. Some communication goes back and forth between lander and Houston, some goes back between the lander and the command module, which is a more intimate space between the two astronauts and the lander and the one in the module. And then the most intimate ones happen in the lunar lander itself. What Yanni created is a playable visualization, which you can stop and start to look at what’s happening at any point. The three minutes of the landing sequence occupies the last half of David Mindell’s book, and it’s a brilliant tracing out of a whole host of material relations and fascinating stuff. (So many aspects of the Apollo program recounted there are fascinating to me: for instance, the Apollo guidance computer used “core rope memory” a data storage system that is actually woven of metal fibres, with the programs written by a programmer and transmitted on paper as notations to textile mill workers in Lawrence, Massachusetts who then weave the programs into “ropes”—cables, essentially—that are about an inch thick. In order to be debugged, these programs have to be rewoven. So the materiality of this is just astounding.)

I’m mentioning Yanni’s visualization because it gives us a provisional arrangement of very disparate kinds of data—data that don’t reduce easily, are not fungible, are not interoperable with each other, except through the kind of grounded interposition of design and argument. It’s unfinished and extensible as more data emerges—as more data are wheeled into the Depository, shall we say—they can be added to this visualization. Now obviously you reach a point where you can’t add any more data, but that’s a design problem, not necessarily a storage problem. It’s data that are as varied as books and books and books of machine code which look like probably the books in the Library of Babel, as well as magnetic tape and wire and audio tape and textual narrative. So here is one gesture towards, I think, a fairly compelling way to do a kind of scholarship in light of provisionality, in light of the everlasting quotient of mystery—a kind of library that I think offers grounded riches distinct from but not supplanting those more kind of ethereal, abstract riches of the Library of Babel.

DEBATE

Gregory Crane

This was a wonderful talk. I love the visualization of the depository. I remember being shocked to learn, when I was a junior faculty member at Harvard, how fast the collection was growing, and that to accommodate it, Harvard had to sell off different bits of land and keep scaling it up.

I used to have a vision of the library where everything was there. In reality, most of it was checked out, but in theory, you could go get everything in person, you could walk through the links on foot. But once it was moved off site, that was over, forever. I used to measure my home by its distance from the entrance to the stacks at the library. For the traditional stuff I used to do, I would have to go there.

But now, on the other hand, the space of opportunity for things I can do without going to that library is infinite or inexhaustible. I made a calculation that I'm no longer dependent on print. Academic disciplines are Darwinian. And the shapes of new libraries are successful insofar as they draw talent and energy from the new generation. So the question is what is the fitness function of different intellectual practices, and how do you make the case for your library to people who are fifteen years old, who haven't established an attachment to a certain kind of repository, but are looking for a dynamic of intellectual life? I want to know what your thoughts are about this wonderful old library culture which I love, and what we have now, and where it goes.

Matthew Battles

I am entirely with you, it was a strange and challenging experience to be part of the transformations of the depository. In this project I'm holding up the depository as a kind of ideal, as an entity in the world, a grounded facility with people who are union employees and, and looking at the impacts that it's had on scholarship, the ways that scholarship have changed in light of it. But I share the experience that you describe, and I'm much more ambivalent. In fact, at MetaLab we're very interested in critiquing some of the habits of mind and the virtues associated with a naïve embrace of the digital. So, the concern that many faculty had when we went into the project to send lots of books out to the depository was a real one. And it's had real effects on scholarship, and the specs extend outside of scholarship as well.

I'm also very appreciative of your attention to the question of real estate. Ultimately this is a facility that works the way it does because it can be located far

enough outside the metropole that you can caterpillar over the centuries across a huge expanse of territory. The interesting thing about the depository is that it shares that wooded campus with the Harvard Primate Research Lab.

John Tresch

I feel a science fiction film coming on...

Matthew Battles

I know! There was a day we went out to do filming there, and passed the primate research lab. And on the loading dock there was a stack of Chiquita banana boxes. Really, guys? I mean... can't you be a little bit more inventive? And that's actually a very controversial site because of the treatment of animals there, and it's in a long slow diminishing fade-out as a research facility. Nonetheless, because of the attention of animal rights activists to that site, security at the depository is very high. It's very difficult to get in and out of there, not because of the books and archival materials contained in the depository, but because of the primates. So the depository is embedded in a network of economic, political, and scholarly dynamics that interact in very complicated and never ideal ways.

Ann-Sophie Lehmann

Just curious about the rest of the documentary. Is there anything in there about transport?

Matthew Battles

About transport of books back and forth? Yes; looking down to the ends of the stacks, to the left are the loading dock doors. Seeing vans come and go is part of the mechanism of the library that we are interested in grounding and exploring. There used to be—and this is a mechanism that has changed over time, another aspect of the kind of flexibility of the system—dedicated vans and a staff to drive them. And now the vans are a courier service. It's been outsourced, as it were. It's much faster now, though. You can order a book in the morning, and it'll be at the desk in the library in the afternoon. There are two runs made a day. It's not the same as popping out of your study and going to the shelves, by any means, but it is a pretty quick turnaround.

Geoffrey Bowker

I love this idea of preservation in the present tense, that we store the permanent thing in a temporary building. That's exactly the re-imprinting of the virtual material. It's exactly what we hope cloud storage is going to be. It's exactly what we hope about a future human heritage. Preservation now becomes not only a question of, let's store this thing in a permanent place, but let's find a storage now, which is a temporary storage, and have a faith that somehow we're going to be able to continue over time.

Simon Schaffer

Two possibly minor historical reflections on that very rich talk. One is that the Large Hadron Collider generates forty terabytes of, let's call it information, every second. Which is far more information not only than the physicists at CERN or anywhere else can use, but than all physicists who ever exist will ever use. One of the consequences of that, as is now very well-known, is that the storage system that CERN has decided to adopt is magnetic tape. Which is three generations ago. I mention this not just to invite the industrial sublime of CERN—which one should do at regular intervals— but to remind us of the importance of what David Edgerton calls 'the shock of the old': we should not be entirely neo-philic and entirely seduced by a future-oriented technology story about information management, since what's new might not even be the most important bit of the story. Second historical point: data. Until at least the middle of the seventeen hundreds, data meant what you take for granted, what you take as given. In other words, the opposite of what's on these screens. And now the term not only seems to have inverted from its original Euclidian sense, but the argument is actually that it's not that data are now what is taken as given; the really important point about data is that they're taken, not given. They're *sublata*, they're *capta*, as Deirdre McCloskey would say. And I wonder if that's not one of those metaphors away from which we should try to move—that data are somehow given, either by the axiomatic system, or by the world. So part of my query about the iconography is isn't it actually reinforcing the wrong model, the wrong aesthetic of data? It's not enough about capturing, there isn't enough that reminds us that it used to mean what was taken as given, and that what's really going on is that it's taken, or captured, not given. It that whole history being rather deliberately effaced by this aesthetic?

Ruth Padel

I was absolutely beguiled by the mechanism by which you enacted the aphorism that appearances are a sight to be unseen. What you're doing is making visible the electronic communications, but under the sign of David Bowie. The image you show of the women weaving, covering the material, rematerializing brings us right back to the origin of the computer because the Jacquard loom was originally the place where cards were placed to show how to make patterns in cloth. Then those punch cards were used in the factory, people clocking in to work. Both of these are the origin of the computer. And the third thing was this point about real estate, and needing more room: this is why the crematorium was invented, because they were running out of space to store dead bodies in the earth, and so people said, alright, let's burn them. Burn them? You can't burn them. But Queen Victoria said it was all right, so they made it. So there is this other model of storage in the earth, storage of ourselves.

Matthew Battles

That's a fantastic point. On Geoffrey's question about the dialogue between permanence and impermanence, and this also goes to Simon's points, I think that if I'm hymning the aesthetics of VLHC and data, I mean this in an ironic sense. In fact what I like so much about the depository is this dialogue of permanence and impermanence, and the way in which it is a thing of shreds and patches. It is not a state-of-the-art facility. You go out to the place and you see streaks of oxidation coming down from the ceiling, water spots all over the place, and plastic sheets hung up to protect things. It's a thing of shreds and patches. It's a machine made of technologies from that smear across these eras. There are far more automated systems that exist out there, and People are beginning to talk now about the robotic systems that are used by the large e-retailers like Amazon, Zappos, as systems for organizing books and material. So this is a dialogue that continues. What I like about the depository in the midst of this dialogue is its provisionality and the expressive way in which it merges and smears together palimpsestically but also quite practically technologies and practices of several different eras and superimposes them. In fact that's so often the case. This can even be seen in the Apollo missions, because of the massive nature of that enterprise, technologies that were used to get astronauts to the moon and back were already outmoded by the time the astronauts actually used these technologies. It was done without the microchip, which emerges right in the midst of the Apollo mission. So, maybe the Depository is my Apollo, with all of the steampunk glamour that I attach to that as well. As to the question of the

relationship to time, which is an interesting one, I meant to at least put a pin in that with the Pioneer plaque and the Voyager; I'm fascinated by these plaques.

Simon Schaffer

It would be interesting to compare the Harvard depository and its future projects, with the US Atomic Energy Authority projects for designing architectures which will warn civilizations between twenty-eight and forty-five thousand years from now that the stuff under the Nevada desert is really not good for you. The juxtapositions between the future of the Harvard book depository and the future of the plutonium underneath Nevada would be a very interesting comparison.

Matthew Battles

There's a documentary that was released about the finished site, by Peter Galison. It's fantastic. This thinking emerged at the same time as the Pioneer plaques and Sagan's attempts to communicate over vast distances of time, millions of years—not only a message to the alien Other—but one that was supposed to come back to Earth. There was a mission called the Legos Probe, essentially a Bronze-age artifact that was launched into space in 1971. It's a solid metal sphere about a meter in diameter, like a giant gold ball covered in little reflectors. It has no instrumentation on it, just a solid piece of metal—bronze and aluminum. You shoot a laser at it and you can measure perturbations in the Earth's gravitational field. It was meant to help cement the argument for plate tectonics. It took that material form because they wanted a super-stable orbit, so they need something really small and really dense. This ball will be in orbit for eight million years, that's the projected time of its orbital decay. And after eight million years it will come crashing back to Earth.

And Carl Sagan said, "Oh, we've got to put a plaque on this one so we can talk to whoever is here eight million years from now." And the plaque consists of three maps of three kind of global projections of the Earth. One is the present day, the continents as we know them now; one shows the continents eight million years ago; and then one shows them as they were projected to be, slightly spread apart, eight million years later. And the documentation says something like, "Showing the movement of important sites on the Earth like the Vandenberg Airforce Base." But in any case, California has made a slight move into the Pacific. It was meant to say, basically, here's where we were, here's how things have changed, here's what we think it's going to look like for you now. So it was also an attempt to give them a chance to verify our measurements. But the thought that eight million years from now something would exist on the planet that could make sense of this commu-

nication, it's mind-bendingly hubristic. This dialogue about deep time and what it has to say about the library, ultimately about archiving, is fascinating to me.

John Tresch

I hear that also as a response to Ruth's question about the crematorium.

Matthew Battles

Yes, that was a beautiful point. In Boston we live next to Forest Hills Cemetery, with a wonderful garden cemetery like Forest Hills in New York and Mount Auburn in Cambridge. A cemetery is like the Harvard Depository: it's off-site storage for Boston's deceased. Part of what became a vast necropolis in our neck of the woods in Boston, which is now a fully incorporated part of the city, but was the hinterlands in the early 19th century. And that's another rich source, rich loam, for thinking about what we do with memory and time. I think Robert Pogue Harrison's book on the dead is a great cultural historian's take on how we bury one another and where, and how we tell stories.

Glenn Most

First of all, if you look at the transcript of the Apollo, what is said is "Roger, we've got good data." That could be the title of this whole exercise. Secondly, for me the thing that was most unsettling in the images of the Harvard Depository was the human being—the guy going up there and reaching his hand out and taking these things. In Chicago, the whole thing is done robotically, and the difference in the technology is Amazon. . . It's all done by barcodes and laser readers. It's not designed for human beings to ever be there. That is not a healthy place for him and the other workers to be.

The third thing, is that we've been talking about classification schemes as a way of finding what you want in the mass of data. But there's another aspect which I think is even more important. And that is, they enable you to find things that are related to what you want, but which you didn't know that you wanted. My discovery when I was an undergraduate was that the book that I needed was next to the book that I wanted. I would go in and find a certain book, and I would look on the shelves and find what I really needed. There are certain places like the Warburg in London which work on exactly that principle, and any good library will do that for me. That's something that you lose with any depository library because—as

in Europe where you can't go to open stacks—what that destroys is serendipity. It destroys the chance to find something different from what you knew you wanted. And I think that good research and good science depend on the kinds of surprises that are only possible with direct access to not only what you want, but what you might need.

Ruth Padel

That's similar to the point I was raising at the end with Murtha: your own associations, and random, unexpected contiguities or juxtapositions are so valuable.

Murtha Baca

The Getty research library began to run out of space immediately when we moved into the new facility in 1999. And gradually some things got moved off-site, and then in the last couple of years, the Getty bought a big building about twenty-five miles north in a place called Valencia, which is now our storage facility. And you're absolutely right, one of the things that the librarians are most concerned about is the serendipity, or buried picking, where you find stuff you didn't know you wanted or you didn't know you were interested in, just because you were browsing the stacks. You inevitably lose that. There's some hope that the cataloguing in metadata will help with that, but probably not.

One of the big dramas for the research institute is that we have such huge archival collections now, like the two boatloads of Harald Szeemann's archive, and the Robert Mapplethorpe archive. A lot of the general library books are moved off-site because they're not unique materials. Some of them are available in full digital form, and the idea is to keep the original archival materials on-site, both so scholars can work with them, and also so the conservators can have access to them. We also have these huge architectural models, which Richard Meier didn't envision; he didn't really envision the Getty as a library, he envisioned it as a work of art. So the architectural models are out at this remote facility. And we have several digitization stations out there, too because we simply don't have enough room for all the scanning machines.

I would say that the reasons for what the Harvard Depository and the Getty Research Institute have done are practical because you're running out of space; you've got to find some place to put this stuff. You still want to serve the patrons. But they're striving to be mission-related, too, by providing access to this stuff that is supposed to be accessible in a library. But one of the losses is the serendipity, there's just no doubt about that.

Filippomaria Pontani

Problems with depositories are known to all of us, and Glenn and Murtha brilliantly pointed this out. I think there is a supplementary problem: the proximity between a catalogue and books. When you were mentioning that the classification is by size of the books, I wonder how this impacts on the very idea of ordering books and knowledge. I would like to remind everyone here of the obvious root metaphor of Borges's Library of Babel: he says that he gets into the catalogue room as if he was getting into a human brain. This is very important not only in relationship with the idea of having books far from the catalogue and thus completely devoid of any physical or mental link with the catalogue itself; but also for the handling of knowledge through the internet, and through virtual catalogues. How do we get to the functioning of the workings of the mind through these new means?

Dagmar Schäfer

I see points that are being made, but I do not agree, because I think in the digital world there's lots of what you call mistakes, displacements, all that serendipity, too. It definitely has another form. It happened to me, for instance, that once somebody at the Harvard Depository took out a book by mistake that I didn't want and I realized that it was really interesting; but I would not have looked for that book. It can happen to you on the internet too.

Two weeks ago, I wanted to look for *New Terms for New Ideas*, a book by Lackner, and Google made the mistake of having the first page of that book, followed by a study of the urban landscape of Athens. I learned a lot about what I wanted to know but it was just misplaced. So I think this is another form, but definitely it's having the same structures whether you go to a library and you find a misplaced book or the book nearby, or you do it in the digital world. I really don't see where the difference is except in the bodily experience.

Matthew Battles

This question of serendipity is terrifically important and fascinating. The role of serendipity as a virtue, as an ideal in the library is one with quite a rich history. And Walpole's definition is worth remembering: it's something that happens by accident and sagacity. You know, it's a wonderful collision of the merely fortuitous and the effect of training as well. I think Dagmar is absolutely right, I think you're both right that prospects for serendipity are lost, have been lost, but still exists; there is

a stack that's full of books. There are a lot of books at Wagner. They aren't all there, but off-site storage has been an issue in libraries for a long time. It's one that comes with the desire to have a library that is another kind of generation of the universal library, really. A model of rather than a model for the world. And when Archibald Cary Coolidge began to fill Wagner he wanted it filled with all of the stuff that people didn't think belonged in libraries before that.

Gregory Crane

People were complaining about Google or Amazon being too good at finding the books that you want to read. I agree that it's not that you lose it all; it's simply different, I think.

Matthew Battles

To continue with the discourse on serendipity in the digital versus in the stacks, there's a spectrum of possibilities and effects. The prospect of sagacity continues to exist in the digital. The experience of it has changed, and it's a quality that could stand to be cultivated. Sometimes designers and technologists try to be what designers like to call skeuomorphic—to make digital things that look like things in the material world, the analog world (analog is also an interesting word with an interesting history).

We were talking about the Internet Archive interface this morning. Why do they bother with that little page-turning animation? It just makes your eyes lose focus every time you need to turn. And an attempt was made to create an opportunity for skeuomorphic serendipity by some colleagues of mine at Harvard in the library innovation lab. They created this thing called 'Shelf Life,' which would take Harvard library data and create a visualization of the stuff on the shelf. And so you would see a little series of books on the shelf with a little bit of the metadata on them. An indication of their kind of relative size. It didn't really work. It was this kind of skeuomorphic attempt to create a virtual book shelf that didn't act anything like a real one, an embodied one.

And yet, there are indeed many ways that I think we can imagine, and indeed experience serendipity in the digital. For all of the many problems and disturbing aspects of an interface like Amazon, it is a place where you run into things eventually in the collision of accident and sagacity that that's something that we could stand to learn from. I think the designers and technologists need to be at this table and need to be part of this dialogue. Yanni, my colleague who created that visualization of the Apollo landing, is someone who is trained as an architect and an STS schol-

ar and a computer scientist. Those are rare, rare birds. But the meaning of those terms, the practices associated with those terms are changing. And they're continually changing. And Yanni became a computer scientist by virtue of programming languages and development environments that were not available a generation ago. Today the barriers to entry are much lower. As those barriers to entry change, the kind of palimpsestic complexity of the technology changes as well—layers upon layers upon layers, getting serendipity down several layers lower is a challenge to be sure.

John Tresch

We're also talking about how to do a hermeneutics of data. One of the ways to do that is to incorporate the material. Another is to bring in embodiment and movement and social structures. Another way that has been done is to relate it to its fields of origin. And frequently the fields of origin of data that people talk about as influencing the meaning of data have been biology, where it's so obviously an information-based science; and increasingly with neuroscience, where metaphors are updated into saying the way we map the mind structures the way we think about data.

What you have added, Matthew, is to ask the question which I think is closer to the source: how does tracing the technologies of big data back to the Large Hadron Collider and the cosmologies that are at stake in this large machine, how does that change the way we think about what data is? And especially bringing in the elements of chance, the elements of Heisenbergian uncertainty and the possibility of multiple branching worlds. These ideas are as present for the theorists of quantum mechanics as they were for Borges and for Leibniz, who also helped us map the superposed states of today's information science. Does that conceptual and technical genealogy affect the kind of subjects and the kind of objects that we are when we encounter big data?

Geoffrey Bowker

I'd like to beat the dead horse of serendipity again. It seems to me such an ironic defense of libraries, that what they can provide is not classification systems which get you where you want to go, but which get you where you don't want to go. And that's often the final point of defense of libraries. There is just something weird about that. I'd like to tell a particular serendipity story. I was at Queensland University of Technology in the 70's and I was looking for Foucault's *Archaeology of Knowledge*—it was misclassified with archaeology of ancient Egypt, archaeology of

Mesopotamia. Now, that is a serendipity I could really live with, because that took me out of my comfort zone. It surprised me. Rather than a contiguous serendipity.

But another point I really want to make on serendipity on the web is about reading practices. It's about how do you search. Everyone generally on Google will stop looking at results after two or three screens. I will typically go to screen twenty or screen thirty to see what the result is there, precisely because I want to be surprised, amazed, titillated, whatever it is. So it's not that serendipity goes away because Google is so accurate; it's that our reading practices have become controlled by Google in such a way that we don't seek out serendipity, which is actually out there and available in ways it was never available in the past.

Ann-Sophie Lehmann

I'm sure there could be great serendipity apps for library catalogues, in order to bump into things we don't know that we want to bump into. My question is: as the books are being pushed out of the library, what happens to the new 'free' space in the library, and to the people? At Utrecht the library has recently been rebuilt. The old storage facilities have been turned into new reading space because increasingly the students live further away because the real estate prices are going up in the city center. And now they come into the library so that they can study, not for the books, they don't use the books, but there's free wifi. So the library has become a space more for people than for books. It's such an interesting shift; the storage space goes to people, the books go further out of the city. What's happening to the library as the books go away?

Aihwa Ong

On the Berkeley campus we have a huge new storage facility for ancient East Asian materials. It's air conditioned, it's beautiful. But it's a tomb. And it's right there at the center of campus, and a lot of students who are not the least interested in Asia use it because of the sophistication of the facilities, the wireless and nice chairs. And it's very difficult to gain access. Scholars and students whose work is on more recent East Asian studies are not really using it. It's beautiful and it's like a tomb.

Gregory Crane

We should mention some of these other data points like the Hathi Trust, now

with ten, eleven million volumes, six million, five point nine million titles; that's crossing a line. Harvard Depository is a nineteen eighties, or really a nineteen fifties idea of technology. Alkaline paper might last a thousand years. When will those books be reprinted on alkaline paper?

Luca Massimo Barbero

Picking up what Murtha was saying about the Getty Research Institute and archives. What do you think about keeping in the central or the main buildings the archives and the originals, and storing books in the depository? Are we sure that we do need originals for unique documents, or are there books being stored in the closest building that are just like the originals?

Matthew Battles

These feel like great points to end on—and there are so many of them. We still are in dialogue with each other to be sure. The question of what gets stored and what gets kept is one that ought to be a collaborative decision, a decision grounded in different needs and different disciplinary and material localities, while remaining responsive to technological change. I think, Greg, that your point about alkaline paper and the preservation of these materials is what I'd like to try and figure out how to frame, with thoughts about nuclear waste and Voyager passing through the heliosheath: How are we thinking about the long, long, long future? Geoff's point is fantastic about the administration of serendipity, and how reading practices both facilitate and work against what's possible with the tools we have. What's interesting about these things, is the sense in which these regimes of ideals are in conflict with each other in a constant kind of zero-sum game. At the local level, bargains must be made; there's no doubt about that. Yet we continue to construct these agonistic experiences of one set of virtues and ideals and another. We sort many intermediate, richly grounded and provisional possibilities into one camp or the other.

And where it gets to your question about the genealogies of data, is that I'm really interested in comparing some of the ways we're thinking about our data and ourselves, and how they are in dialogue at least, or standing beside, the discourse of data that is signified by the LHC research program... I'd like to compare all of that to the ways in which in the so-called two cultures context of the end of the twentieth century, humanists began to want to talk about the world of meaning in terms of Heisenberg and the adoption of metaphors from quantum physics, from the hard sciences. How different is that set of moves is from the moves that have shown up in the digital humanities? It seems like they're different, but interestingly

in dialogue with that moment. And how this proliferation of co-emergent practices, experiences, habits of mind seem to eventuate in these people that we are, who exist in so many states at once in waves and particles, as different kinds of particles with different spins and different forces acting on them.

We're supremely sensitive to that as experience, without quite the vocabulary for it. I think that synthesis or congeries of forces is different from the one at the end of the twentieth century that was much more about metaphor. I think there's more at work now than metaphor, that there's much that has to do with practices and habits of mind.

EPILOGUE

Below is the Same as Above

Ruth Padel

I am—or used to be—a scholar, as well as another sort of writer. Everything I write, create, and meditate upon is about the question: “Where does knowledge come from—inside or outside?”



Figure 10.1. Amiens Labyrinth. Source: [https://commons.wikimedia.org/wiki/File:0_Amiens_-_Cath%C3%A9drale_Notre-Dame_\(5\).jpg](https://commons.wikimedia.org/wiki/File:0_Amiens_-_Cath%C3%A9drale_Notre-Dame_(5).jpg)

The image above is a prayer labyrinth. As you follow the winding pathway, you meditate on the rosary, until you reach the very center—which might represent enlightenment or truth. I consider this a metaphor for what I am going to share, inspired by and in connection with the themes addressed throughout the *Bibliotechnica* Dialogue.

First is a poem called *To Speak of Distance*, which calls up some pertinent themes.

To Speak of Distance

To speak of distance and the sanctuary lamp,
something you have to do or find
and a darkness to escape. Never mind
rumours of an immigration gate. Revamp
the passport. Speak of hope, that anchor bird
born on the site of loss, with a thousand
resistance strategies frosting her wings
like mica charms or ancient pilgrim songs
embossed in the Book of Psalms. The task
is to assimilate, to move between the languages—
in your case Arabic, Hebrew, Aramaic, Greek—

and map your journey to the shrine.
Every crossing is a pilgrimage. The hard thing
is to pass; harder still to fold those wings
and drop the mask. Just do it. Translate old words
into new. Through cliffs of fall
and fields of black basaltic lava, take
fresh bearings for the crossing-place.
This is the exodus. Here are the moon and sun
appearing upside down or double. Here are stars
in satellite positions never seen before
struggling for their music to be heard.

“To Speak of Distance,” from Ruth Padel, *Learning to Make an Oud in Nazareth*. London: Chatto & Windus, 2014, p. 47.

I read that poem in response to the phrase “the distant sound worlds,” which Pasquale Gagliardi used in reference to the titles of some movements in George Crumb’s avant-garde composition, *Black Angels*—titles that evoke things ancient or lost. I connect this to two other themes that I will explore in these following poems; I identify these themes as being: memory in different contexts, and learning from

the mysterious inside as well as the outside.

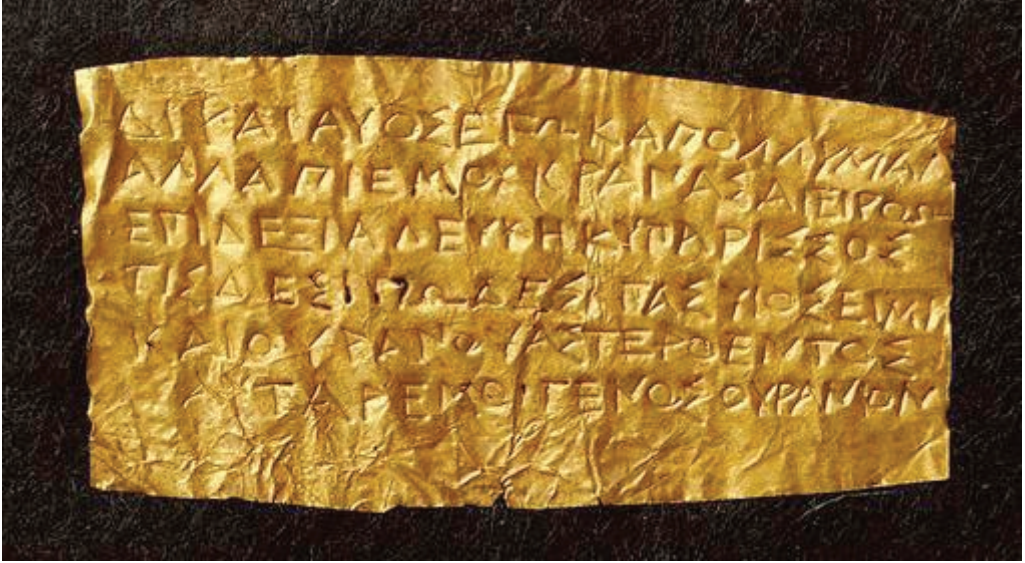


Figure 10.2. Lamella, Getty collection.

Fig. 10.2 shows a gold leaf *lamella*, held in the Getty Villa in Malibu, California. The following poem is a reflection upon this piece.

Prayer on an Orphic Gold Leaf

Don't be afraid. On your way you'll pass the rivers
 Mnemosyne and Lethe. Don't drink the water—
 you don't need any longer to remember or forget.
 You're a lily closing on its stamen, the zendrum
 of a heart in tremolo. You may hear music. Whip-rays
 of light converge by the bed on a Book of Psalms
 left by your last visitor. You are glass, annealing
 to that celestial temperature where molecules
 rearrange all inner stress to perfect surface tension
 in a new, fused, tough material. In the distance
 you'll see one pine-tree, needle-leaves
 clumped in three balls on a trunk like black bone
 twisted in wind. You'll know
 you are making, and coming, home.

“Prayer on an Orphic Gold Leaf” from Ruth Padel, *The Mara Crossing*. London: Chatto & Windus, 2012, p. 249.

From here, I will turn to consider the “tablets of the mind,” in relation to the “absolutism of stone,” of which Simon Schaffer has spoken in the course of our dialogue. I will consider three absolutes of this kind. The first is the Rosetta Stone (Fig. 10.3), on which three languages are inscribed. Next is the Phaistos Disk (Fig. 10.4) from Knossos, in Crete, on which at least one language is undecipherable.

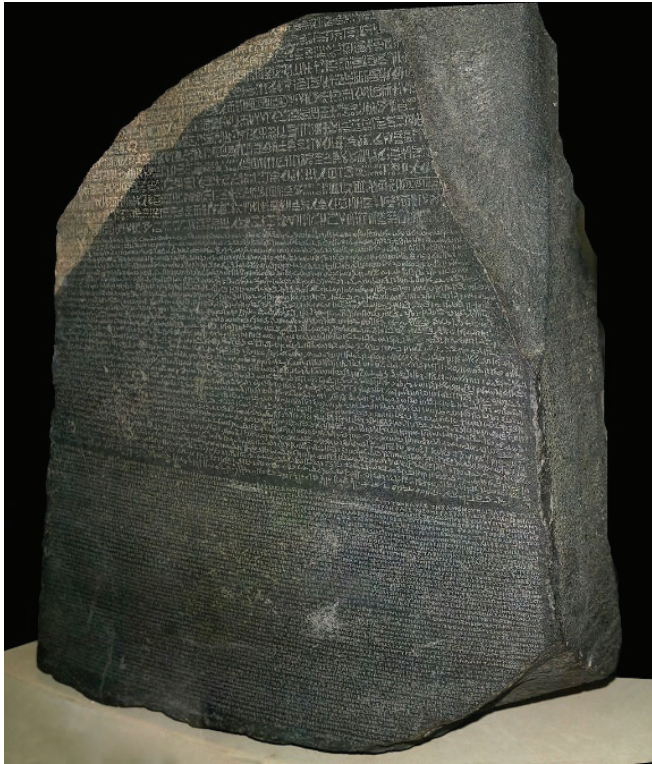


Figure 10.3. Rosetta Stone, British Museum. In 3-D online: <https://sketchfab.com/models/1e03509704a3490e99a173e53b93e282>



Figure 10.4. Phaistos Disk. Source: https://commons.wikimedia.org/wiki/Category:Phaistos_disk#/media/File:Disque_de_Phaistos_A.jpg

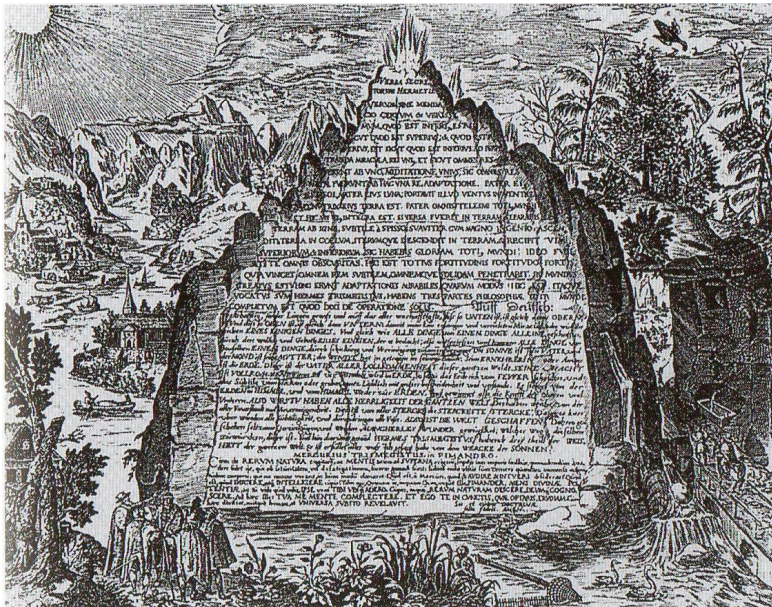


Figure 10.5. Image of Emerald Tablet from *Ambitheatrum sapientiae aeternae* by Heinrich Khunrath (1606).

Finally, I will address the Emerald Tablet (Fig. 10.5), which is purportedly the basis of alchemy, authored by Hermes Trismegistus.

There was a Renaissance idea that art comes from desiring fantasy. I don't think *knowledge* comes from desiring fantasy (while it may be a necessary, it is not a sufficient catalyst for generating it), but the poetic process and similar worlds are not far from assuming that idea. Indeed, Carl Jung once dreamed of a green table, identified it as the Emerald Tablet of Hermes Trismegistus, and equated it with the unconscious; we should remember the role of the unconscious not just in art, but in other forms of intellectual inquiry and process as well.

In Fig. 10.6 we see Darwin's famous "Tree of Life."

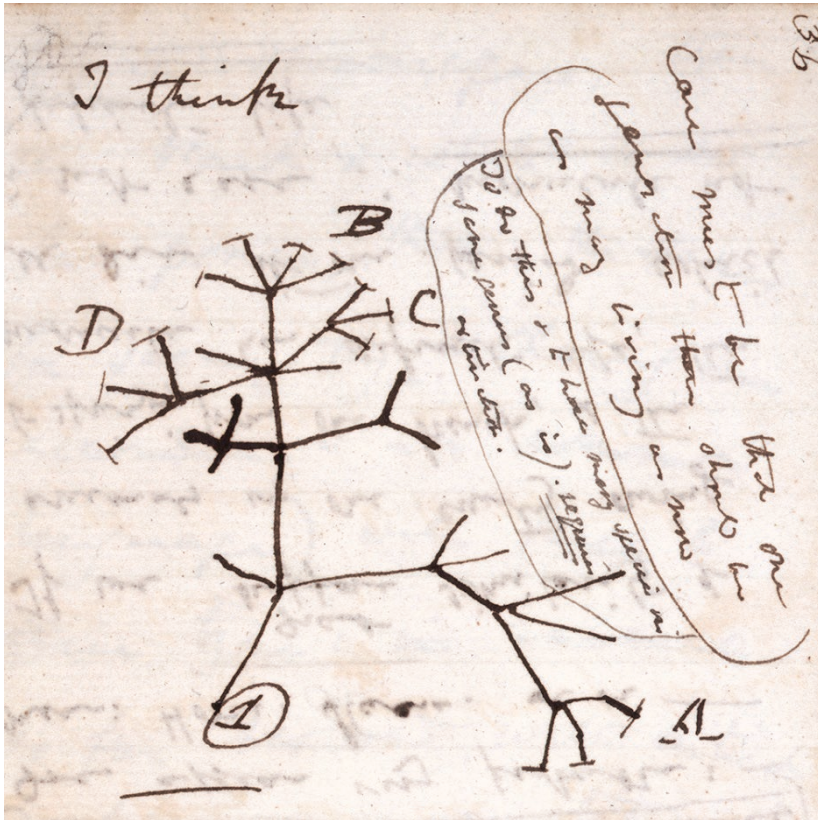


Figure 10.6. Darwin's Tree of Life, Cambridge University Library, from "B" Notebook
<https://www.darwinproject.ac.uk/file/ms-dar-00121-000-p36-tree-life.jpg>

This diagrammatic and biological exploration calls up the work of the poet Samuel Taylor Coleridge, who used the images of links and hooks to detail how words occur to a poet in the poetic process. In the imagination, he says, "impressions

are linked together.” Essentially, in each of us there are “clusters of associations” between words, ideas, and images: “ideas, by having been together, acquire a power of recalling each other.” In one letter, Coleridge speaks of “the hooks and eyes of memory.” This image is not confined only to the humanities. The mathematician Henri Poincaré used the same image (Fig. 10.9) to describe the inspiration of the mathematician; new insights and discoveries arise when different ideas combine in the mind and fuse “like the hooked atoms of Epicurus.” In other words, discovery depends on an unconscious combining of different things. Throughout these papers, the question “have we made a giant mistake? Has building up this library been a great mistake?” has been posed. The answer is no—as Matthew Battles said, “It’s about the *selection* of what you put in it: that is what is important.” Selection is vital to all of us, across disciplines and practices. Poets train themselves to listen to their unconscious, from which they select associations, and then curate them on the page.

In the figure above, you will see one of Darwin’s early letters, which illustrates a relationship between genius and the unknown, both internal and external. He had a wonderful time, this young man who went, in Elizabeth Bishop’s words, “giddily off into the unknown” five years before; as Darwin said, “the whole of my pleasure was derived from what passed in my mind while pacing the deck of the poor little *Beagle* at night.”

Another level to these intellectual processes is that of interaction—interaction in selection. This again is connected to the tension and interplay between the internal and the external. In Darwin’s case, his internal thought processes and his accrued knowledge interacted with the forests of Brazil.



Figure 10.7. Mining River in Colombia. Source: <https://www.aljazeera.com/indepth/inpictures/2017/03/green-land-emerald-mining-colombia-170306110821882.html#lg=1&slide=4>

In a dangerous area of north Bogotá lie the emerald mines of Muzo. The outside of the mine is dominated by a rushing stream. Inside, it's wet and damp, warm and filthy. Its history is filthy as well, marred by child labour.



Figure 10.8. <https://www.gettyimages.co.uk/event/emerald-mining-in-colombia148075900#boy-miner-searches-for-emeralds-in-the-mine-of-muzo-on-april-21-2006-picture-id147954483>

Emeralds mean riches, and riches in Colombia mean paramilitaries, exploitation, and violence. You go up into the mine, down into a shaft, and then you encounter a deafening roar—warm water in which you can find, if you're lucky, the treasured hexagonal bits of carbon.



Figure 10.9. <https://www.jansochor.com/photo-blog/emerald-mining-muzo-colombia>

Internally and intellectually, emeralds are what you find under the ground—and in the unconscious. They are what you are looking for. They are what you hope to unearth.

The following poem is about this image of emeralds. The first line comes from Jung's treatise on the Emerald Tablet, the words of the mysterious text of Hermes Trismegistus. The collection of essays resulting from the *Bibliotechnica* Dialogue—explorations of information, transformation, the alchemy of data into wisdom or knowledge, whatever knowledge is—reminded me of the Emerald Tablet.

Emerald

Below is the same as above, says the Emerald Tablet
 Jung saw in a dream. You've passed Security.
 You're entering the mine. You were looking for love:
 try the mysteries of earth. Put on the waterproof
 hard hat, rubber boots and gloves.
 You found it in the Vedas: Emeralds bring luck.

You're winched into the dark on a platform-cage
 through rushing floods. Can you trust the chains?
 The water's warm, the motor rattles, temperature
 hot enough to suffocate, stop Orpheus
 in his song. Forty metres. Forty more.
 At the bottom, a sauna labyrinth of carbon

formed by the tectonic shunt that made the Andes.
 Torchlight. Blackened faces. They don't get salaries,
 they're paid for what they find. Do you, an adept
 of *Theatrum Chemicum*, desire the formula,
 liquid and gas, chromium and vanadium
 crystallized to hexagon in boiling brine?

You slosh, crouching, through water.
 A hundred claw-points tease the roof,
 a pitch-black honeycomb of tunnels
 haunted by the glint-fire deep-frost ghost
 of absinthe, Nefertiti, Melusine.
 The call comes, Here! and everyone stampedes.

A thousand jackhammers, ten thousand ricochets
 from a raw rock-face of dazzle-green.
 Each pick-swing could make your fortune.
 You're surrounded, oxygen levels plummet
 and you don't care for this is jackpot, myth
 of all myths, the answered prayer.

Above, slow sunrise stipples emerald slopes
 of cloud-forest and sugar cane
 to rose. Children trawl abandoned shafts. Women
 search breast-deep in the river for a glimpse
 of the Enchanter. Streaked faces, wild eyes, a panda blur—
 that's all of us in our anonymities and hope.

Below is the same as above. Emerald is wire
 fencing, a guard with pump-action shotgun,
 the paramilitaries of Victor Carranza, cartel king,
 and a black mud dance of chaos. Children know
 you reach the Emerald City only on ruby slippers:
 emerald is blood. Somehow you make it back

to the market-place. La Candelaria looks
like any square: small lunch-bars; grey
traffic. The emeralds are invisible, carried in twists
of paper to open air. The only light dealers trust
to check for flux-grown polymers, synthetic glass
from labs in California, is the Incas' naked sun.

Emerald is heart of alchemy. Of ferny bubbles,
mystical imperfections, flaws that make each stone
unique, trapped in mineral as it forms
like fantasies embedded in the soul.
Emerald is spring, translating the underworld
to stony idioms of the brain,

a kingfisher reflected in the secret bowl
of ocean. Verdant but easily chipped, healing
but poison, colour of Venus, birthstone of May
but also the green-eyed monster. Double-edged.
Watch a dealer hold a facets to the sky. It's a risk,
renewing dreams. It's putting yourself through hell,

like Orpheus, not knowing what you'll lose.
In one small blazing stone—as green as grass,
as Acamar or Rastaban, the brightest stars—
you face what transformation means. Ask
the commissionista. This is the life
you'll pay for. Open his paper. Choose.

“Emerald,” published in the *Economist's* short-lived glossy magazine *Intelligent Life*, Nov-Dec 2014, in an article titled “Poetry Rocks,” and on line at <https://www.1843magazine.com/content/arts/poetry-rocks>. This poem later became the starting-point for Ruth Padel's whole poetry collection *Emerald*, Chatto & Windus, 2018.

Here I will return to a poem I wrote entitled *First Cell*, a cell that is also emerald colored. Blue-green algae cells (Fig. 10.10) most closely resemble the first cell on earth. Inside those minuscule units of information is more information still. There is a whole theater, a labyrinth, of delicately compartmented information inside a living cell.

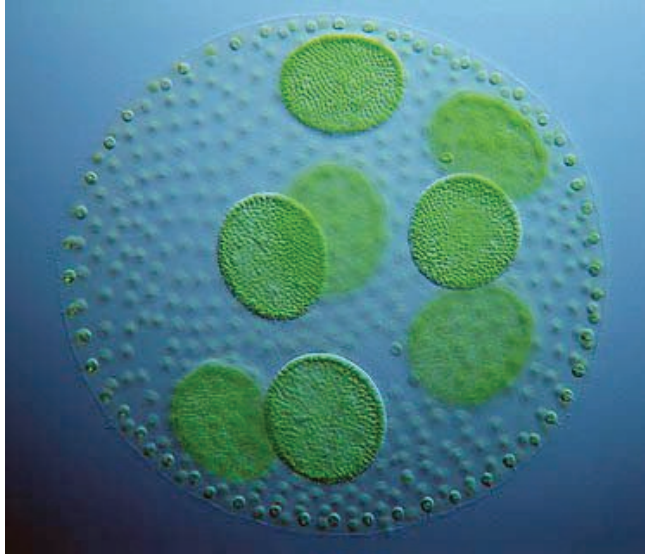


Figure 10.10. Microscopic photos of green algae courtesy of Microscopy-UK:
<https://agreenbeauty.com/edibles-1/blue-green-algae>

Here, I call back to the image of the prayer labyrinth at the beginning of this essay. Another aspect of the labyrinth, as the prayer labyrinth reminds us, is the journey. If you manage to find your way through the whole length of the Borges Labyrinth (made of his name twice over) made of box trees growing in the garden of San Giorgio, Venice, you will have walked three and a half kilometres.



Figure 10.11. The Borges Labyrinth, San Giorgio, Venice, Ruth Padel 2014.

The transformational journey depicted in Bruegel's small painting *Flight into Egypt* (Fig.10.12) is both picturesque and terrifying. On one side of the water is the city which The Holy Family have left, where the Massacre of the Innocents must be taking place at this very moment. On the other side is the place they are heading for: Egypt. But Bruegel, from the Low Countries, has transposed these desert landscapes into what he remembers from the Italian journey he took as a young man; he transformed memory—his factual Italian landscape becomes the Holy Land of his imagination.



Figure 10.12. *Flight into Egypt*. Peter Bruegel the Elder, 1563. Courtauld Institute.

The theme of transformation, of alchemy almost, has been rife in the essays in this collection. This calls up another famous transformation: the transformation of water into wine. The painting *The Wedding at Cana* (Fig. 10.13) comes to mind, in which Christ's face is particularly worth examining.



Figure 10.13. *The Wedding at Cana*, Paolo Veronese, 1563. The Louvre.

The idea of someone having sat for Christ's face in Veronese's painting is fascinating; here we see an image of someone who once looked at the painter, but the painter transformed this face into another sort of maker, a musician on the viola: a face seen sideways. In transformation, nothing is a given.

What I want to focus on in this painting though, is Mary. She's not an obvious character in the image, even though she's sitting beside Christ. In the digital age of information, perhaps technologies force us to confront how to relate relationships themselves. In *The Wedding at Cana*, his relation of Christ to his mother is one of the most problematic of all: what's going on in this interaction (Fig. 10.14)?



Figure 10.14. *The Wedding at Cana*, Paolo Veronese, 1563. Detail.

She says, “They’ve got no wine.” He replies, “Woman, what has this to do with me? Mine hour has not yet come.” What sort of an answer is that? But how well she knows him! She says to the servers, “Do whatever he tells you,” and Christ immediately turns the water into wine. It’s a very peculiar relationship, which poses a lot of riddles to outsiders, as many close relationships do.

So I’m going to share another poem from a sequence of poems I wrote on the Seven Last Words of Christ, about another passage derived from the relationship between Christ and Mary. The traditional sequence of the Seven Last Words is from Forgiveness, through Comfort, Relationship, Abandonment and Need, to Fulfilment and finally, Reunion. It resembles an arc that a psychoanalyst might hope a patient will tread in therapy—from displacing everything you feel and think onto other people, forgiving them, comforting them, and finally comes the “Word of Relationship.” For Christ, he eventually stops displacing pain onto others to feel his own: “Why have You abandoned me?” Only then does he accept his own need (“I thirst”), and only then is he able to achieve what he has come to do (“It is done”). You could say what he has achieved is acceptance of his own pain. He knows he needs the other and wants something from the other. Once he’s acknowledged that, he can achieve union with God.

Below is a poem entitled “Word of Relationship,” in which Christ addresses his mother the same way as at Cana. He says *mulier*—not “mother,” but “woman.” What does it mean for him to say “Woman, behold thy son! Son, behold thy mother?” My poem queries that, doing so from Mary’s perspective.

The Word of Relationship

That time he was sleepy as the moon,
and she carried him three hours to the priest

The chip of kingfisher lapis she tied round his wrist
to turn away the evil eye – where did that go?

He was shy in the playground.
Afraid of heights

of fire at night. Yesterdays glisten
like photos melting together in the rain.

Prints of small feet in wet sand.
His first step without holding her hand.

Keeping him quiet in siesta. Mending clothes
through those long mother afternoons

you think will never end. The first glint of a tooth.
The first pair of shoes. Whose days were those? Blink

and then they're gone. Is he most her son
not back then but now, when he disowns her

and gives her to his friend? She used to listen
as if everything he said was truth,

would turn to gold. But these words come to her
like rubble at ends of the earth. Does he think

he's looking after her? She's been dismissed.
He's done, it seems, with relationship. Like a lover

breaking a bond. As if bond did not exist.
Woman, behold thy son. Son, behold thy mother.

“The Word of Relationship,” from Ruth Padel, *Learning to Make an Oud in Nazareth*. London: Chatto & Windus, 2014, p. 24.



Figure 10.15. Photo 2014, Ruth Padel.

The image in Fig. 10.15 represents another sort of tablet of the mind: a photo that I took on the boat here, in which the subject is photographing Venice on his tablet. This desire to capture on your own “tablet of mind” that which so many other people have captured—Venice—is a yearning perhaps to make a permanent relationship with it in some way: some atavistic, archaic desire acting upon us, “a shape from another time,” as the Greek poet Seferis says in his 1946 masterpiece, *Thrush*. Here is an excerpt:

—‘The statues are in the museum.’

—‘No, they pursue you, why can’t you see it?
I mean with their broken limbs,
with their shape from another time, a shape you don’t recognize
yet know [...]

Really, those statues are not
the fragments. You yourself are the relic;
they haunt you with a strange virginity
at home, at the office, at receptions for the celebrated,
in the unconfessed terror of sleep;
they speak of things you wish didn’t exist
or would happen years after your death,
and that’s difficult because. . .’

—‘The statues are in the museum.
Good night.’

—‘. . . because the statues are no longer
fragments. We are. The statues bend lightly. . . Good night.’

Excerpted from George Seferis, ‘Thrush’ In *Collected Poems (George Seferis)*, translated, edited, and introduced by Edmund Keeley and Philip Sherrard. Princeton: Princeton University Press, 1995.

I would like now to join alchemy, fire, and what comes out of the earth—emeralds found in the earth and in knowledge, or the ability to recognize knowledge, either emanating from the unconscious or from the ether. So here is a poem about an artistic and ancient action that combines all these elements—the human and the elemental, the internal and the external, the creative act and the intellectual act.

Here is a poem about firing a pot.

Iridescent

In autumn said the potter
on Lang-Po mountain
looking at the slopes after firing

porcelain shapes green as these hills
appear from the kiln
like snakes after shedding their skin.

But when the storm has passed
 said Emperor Shi-Zong blue sky
shines through breaks in the cloud.

The potter walked away and made a miracle
porcelain no one has ever seen
 except Shi-Zong

because Secret means Reserved for Royalty
 and this you can bet
was beauty that only royalty could wish into being

a two-way
 photonic dance

of the spectrum
 a thin-film half-light colour

depending on who was looking
 yet there was only the Emperor

dream-blue
 or was it green

fragile as breath
 bright as a mirror
 resonant as a musical stone.

A musical stone. Wouldn't that be a miracle too?

“Iridescent,” from Ruth Padel, *Emerald*, London: Chatto and Windus, 2018.

My final poem begins with a meditation on Maggi Hambling’s monument to Benjamin Britten on the beach at Aldeburgh (Fig. 10.16). It’s also a poem about one of the oldest cities in the world, Damascus, also shown above. The poem is also about making itself—something that underlies everything at the Cini Foundation, from the beautiful *risottos* on which I’ve dined, to the carved statues in the library, to the collections in the treasury. The island of San Giorgio is a treasury of making.



Figure 10.16. The Scallop, Maggi Hambling, Aldeburgh. Wikimedia Commons. https://commons.wikimedia.org/wiki/File:The_Scallop,_Maggi_Hambling,_Aldeburgh.jpg

The gigantic scallop shell in Fig. 10.16 was made by Maggi Hambling, a sculptor who was born and lives on the east coast of Britain, in East Anglia, in Aldeburgh where the composer Benjamin Britten too was born and lived. Inspired to make a monument to him after his death, she played around with bits of scallop until she arrived at the form you see today, placing on the top of it a line from his sea-centered opera *Peter Grimes*: “I hear those voices that will not be drowned.” Punched out of the metal, the words appear to be written in sky.

Despite its striking beauty, the sculpture created controversy. Many people in Aldeburgh disliked the thought of Benjamin Britten; he was gay, and it’s a very conservative area. They felt that too many people came to the village because of him when he was alive, and they did not want their beautiful, bare beach defaced by modern art after his death. It took at least ten years for the battle to die down. Today, it is a sacred object. People get married under it.

My poem is preoccupied with the history of its making—and also by relationships. I saw *Scallop* just after the publication of a biography of Benjamin Britten claiming that he had died of syphilis given to him by his partner, Peter Pears. I attended a talk given by the biographer, which made me think about infidelity and relationships. Even in the work itself, Hambling used two scallops to memorialize both Britten and Pears. Most have heard Peter Pears’ voice. It’s fantastic, and the couples’ relationship was one of the great musical partnerships of all time. For a composer to write for a voice like that was a blessing. But, reputedly, Pears was unfaithful to Britten—so there was a sort of disconnect between them.

I saw *Scallop* before dawn, at the time when Aleppo was being bombed. The last line in this poem, “Making is our defence against the dark,” is the last line of a poetry collection about the Middle East which took me twelve years to write.¹ It’s a book that asks, “What can we rely on?” Perhaps, the answer is pattern. The buildings of the Cini Foundation are full of pattern, from carpet to columns. I see the motif of pattern as connected to selection; we all select pattern differently—we see things according to pattern. The stars were the first Rorschach test. We project onto them our own patterns, and now understand them, and humanity, through what we’ve patterned. Perhaps the next motif to explore is projection...

There seems to me now a thread of geology running through the works in this collection: an image reflected in the land we call holy, which the book that inspired this poem is about. Whatever “Holy Land” is, there is a geological rift in that part of the world that reflects and expresses all the other rifts that are currently present; perhaps, it reflects a rift in the Emerald Tablet of our own unconscious. We are conflicted creatures—so too, are our ways of knowing.

Facing East

This steel shell memorial to two lives,
 a composer and his singer, looms at me
 before sun-up like a guardian of the earth—
 or a freezing North Sea re-run of the birth
 of Aphrodite. Dark, says the sculptor
 in her book. Dark like a wave born
 backwards, shattering as it breaks.
 Light and dark like life and death,
 part shining and part rust, with movement
 between colours as between the forms.
 I creep in and run my hand along a frilled
 bronze rim. A bivalve—two shells or
 a single broken one self-joining at the core.
 I think of the philandering sigh of ocean,
 life-long partners betraying and forgiving
 and Plato’s cave: the fire, the sun

and how, arguing against his gift, he banned
 artists for reflecting our world back
 with a false beauty, making real unreal,
 enticing us to take the shadow for the thing.
 I gaze out, invisible as Echo,

at a lead gauze sea. Over my head
 the breaker's cusp is a fanned-card silhouette.
 Round the edge, letters punched out of metal
 like finger-holes in a flute, write in paling sky,
 I hear the voices of the drowned. Iron cloud
 on the horizon splices day from night
 like west from east. On the news
 is flat-to-flat urban warfare in Aleppo
 and air attacks on Gaza. Over here, in kitchens,
 at the Tuesday evening pub quiz, on the bus or tube,
 how quickly arguments flare up

even in England; even if we've never been
 to what we call the middle of the east.
 We identify. Some chasm through the centre
 must be in and of us all: creatures of relation
 and division, always wrong-footed by the past
 on its bed of ice, the sub-tectonic clash
 of ancient histories on common ground.
 Suddenly I see this rifted arabesque,
 a monument to music joined only at its core,
 is all of us. Harmonia's gift is cursed.
 She can't help it, she's Aphrodite's child—
 one false note and what you get is discord—
 and her father, lord of war,
 is Apollo's enemy. East or west, the first thing
 looting soldiers smash (before starting on God's
 perfect instrument, the larynx) is an oud or violin.

Sing the sadness and pain of Sabah,
 the microtonal range of the maqam.
 Hijaz, conjuring distant desert
 and our longing for it. Sing the body:
 tongue and teeth to whistle through,
 palms to clap, lips to hum, vibrate
 or tremble, and the fragile, mucus-laden
 vox humana. Sing also of David's harp
 placed sideways on the mountain, pitched
 to catch wind blowing from rocks
 below the tower of Lebanon which looks
 toward the oldest city in the world—
 whose sky burns indigo, dark-pearled

as strong espresso, above the fountain
in Umayyad Mosque. Where children
used to lick orchid-root ice cream

from Bakdash Parlour and now play
Asking-for-Papers-of-Identity-
at-Gun-Point. Where Saladin
and the head of John the Baptist
both lie buried. Where old men
with pewter urns poured tamarisk-
flavour liquorice in sudden jumps,
the way a flat stone skims water.
Al Fayha, Fragrant City, home
to rosa damascena and the damask plum:
these dawn-lit pebbles of the west
glow like your hieroglyph intarsia
whose weavers set compound floats
of warp and weft at angles to reflect
light scatter-wise, depending who you are
and where you're looking from.

What will survive are meanings we have found
in what the world has made. Like the calm
rufous freckling of those burnished steps—
infused with cardamom, I remember—
to Al-Hamidiyah Souq beside the citadel.
And at the top, strings of hanging flip-flops,
rosewood sets of backgammon like puzzle books
inlaid with mother-of-pearl, glinting gargoyle fish
and stalls of uncut samite, whose glitter-twill
depends on optic interference like the play of light
in Damascus Twist, the iron-plait steel
of sword blades and gun-barrels:
the mystery metal welded in carbon fire
which can cut a rifle muzzle or a hair
floating across a dagger. Whose laminate spirals,
acid-bitten into waves, resemble damask.

What would we be without desire for form?
Pattern keeps us safe. We look for omens in a flock
of redwing, the gods' will in dappled entrails,
the outline of a story in the stars. We break the line

to shape it, string catgut over membrane,
 set up a ten-foot memorial
 to music—a scallop shell, a pilgrim's prayer—
 in shale of an eroding coast
 and turn it east to face the storm.
 Voices of the drowned. I watch dawn
 gild the sea to iridescence. Sea-birds arc
 and squawk and flicker-print the air.
 Breakers roar on draining shingle.
 Palmetto patterns dint the waves
 from grey to silver, hyacinth and jade.
 Making is our defense against the dark.

“Facing East,” from Ruth Padel, *Learning to Make an Oud in Nazareth* (Chatto & Windus 2014), pp. 50-53

NOTES

1. You can hear Ruth Padel reading this poem in a reading for the 2014 T.S. Eliot Prize, <https://www.youtube.com/watch?v=hx2EniFE2tE>

FINAL DISCUSSION

Simon Schaffer

Thank you Ruth, that was moving and to the point. Those of you who would now like to contribute any thoughts or comments about what we ought to have discussed or mentioned that you really, urgently feel, now would be the moment, though I'm setting the bar fairly high here.

Aihwa Ong

Before we leave... can we have a definition of 'knowledge,' quickly?

Murtha Baca

(After a silence). Well, I'm no expert on this question, but I felt from the very first session that Geoffrey was talking about a particular type of knowledge. Someone else raised the question of self-awareness, which is also a form of knowledge, a subjective knowledge. I felt that there was a tension between the two. And they have very complex, different relations to digital form, to all forms. And it was Ruth who talked about the mystery—that some of these library machines didn't have any mystery, or serendipity. We seemed to be suggesting that mystery was another form of knowledge that could not be captured.

Simon Schaffer

Should we leave it there?

Aihwa Ong

Well, I've been thinking... we've talked about ways of reading and ways of looking and ways of observing, but there are many ways of knowing. And we haven't really talked about false knowledge either. We've done something amazing; we've talked for three days about something without defining it.

Simon Schaffer

That's because we're academics.

Part of this dialogue form that Pasquale has worked out so beautifully is that it recognizes that the progress of knowledge is not an advance in what one knows, but it's about asking better questions. So I'm not surprised that no one has even raised the question of how to define terms. But I think the questions have gotten much, much better over the last three days. I also thought one of the many things that came through, starting with Geoff's intervention right at the start, and then we returned to it in Ruth's last line: making is what defends us against the dark.

There's been a great and very welcome emphasis on material practice here; I certainly didn't anticipate that when thinking with John and Pasquale about the way in which the theme might develop. On the contrary, there's a sense in which the triad of digital arts, philology, knowledge worlds might, if it had been a different group or room or circumstance, have had taken us in a rather more idealist and abstract direction, than the set of directions in which the conversations did move, and I think that's fantastic and surprising.

We probably need to do lots more work around the material techniques that we've been discussing. One material technique that I was thinking about all the way through is rubrication. As several people here know infinitely better than I do, rubrication was the work of a group in scribal culture that marked in red—in a rubric—the passages or letter or incipits of particular significance, or that will guide the user or the reader or the believer or the singer through the material in front of her or him. And that's just a tiny example—though it has an extraordinarily complicated history, as the word rubric suggests. That material itinerary, including to read the recipe for how to make the red stuff that the rubricators used, guides you through some quite esoteric questions about what knowledge is, and it provides you with a very interesting precedent for thinking about a lot of issues that are allegedly new with the digital. For instance, hyperlinks. How do you draw attention to particularly important, related points? This is just one example that comes to mind.

So I'm not that surprised that a definition of knowledge was not thought to be that pressing. And it seems that, having followed the conversation in this more unexpected, material direction, and as we prepare to leave this marvelous island, this humanistic utopia located between many worlds, we might do well to underline in red another word which we arrived at in our exploration of the library. This word comes from a tale published in 16th century Venice; it's the Persian name for another island, Sri Lanka: Serendip. I think that's a good way for us to end. Serendipitously.

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