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Introduction

By James Delbourgo and Staffan Müller-Wille***

ABSTRACT

Anthropologists, linguists, cultural historians, and literary scholars have long emphasized the value of examining writing as a material practice and have often invoked the list as a paradigmatic example thereof. This Focus section explores how lists can open up fresh possibilities for research in the history of science. Drawing on examples from the early modern period, the contributors argue that attention to practices of list making reveals important relations between mercantile, administrative, and scientific attempts to organize the contents of the world. Early modern lists projected both spatial and temporal visions of nature: they inventoried objects in the process of exchange and collection; they projected possible trajectories for future endeavor; they publicized the social identities of scientific practitioners; and they became research tools that transformed understandings of the natural order.

SEVERAL YEARS AGO, Amazon offered its customers the chance to assemble their own online wish lists of books and other products, styling this venture “Listmania.” The term recalls the long-standing association of collecting, and its concomitant technology of list making, with obsession and madness, involving as they do the attempt to give finite expression to potentially limitless series of things. Museums have paid close attention to lists in recent years. Umberto Eco’s 2009 Louvre exhibition “Vertige de la liste” (rendered in English as “The Infinity of Lists”) celebrated the history of infinite enumeration in European art, while the Smithsonian’s “Lists” (2010) assembled a variety of American artists’ to-do lists. These expositions suggest the variety of roles lists play—from organizing the self

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to ordering the cosmos—and thus also their mediation between the finite and the infinite. “We like lists,” according to Eco, “because we don’t want to die.”¹

This transcendental power of lists deserves closer examination. No form of writing appears more matter-of-fact, unrheterical, and innocent than the list. But what kind of artifice is the list maker’s art? The logic of the list is not that of prose or flowing speech. It does not derive from sentences composed of subjects, objects, and predicates. Rather, as Jack Goody first made clear and as Cornelia Vismann recently reminds us, lists “are a non-syntactic formation of items.” A list is not a statement or an argument. Instead, its logic is spatial. It draws things together (often, but not always, referring to physical things), abstracting, enumerating, and linking them. How it does so may be as arcane as the Chinese encyclopedia imagined by Jorge Luis Borges that, as Michel Foucault laughingly observed, juxtaposed under the heading “Animals” such subcategories as those “belonging to the Emperor” and those “that from a long way off look like flies.” Such comic juxtapositions illustrate, among other things, the list’s function as a conceptual propinquity engine. Lists construct groupings, yet in so doing they provoke questions about those groupings. The aim of this Focus section is to examine this phenomenon by exploring the cognitive and social effects of list making in the sciences.²

Lists have attracted notable commentary from anthropologists and literary scholars, including Goody, Claude Lévi-Strauss, Walter Ong, and Jacques Derrida. In a section of *Tristes tropiques* he entitled “A Writing Lesson,” Lévi-Strauss recalled how the chief of the Nambikwara in Brazil produced a written “list” to regulate the exchange of objects with his metropolitan visitors. Nonliterate peoples, Lévi-Strauss suggested, were thus perfectly able to grasp (in Vismann’s gloss) “the function of writing, which resides in the power of staging.” Ong studied the overarching differences in mentality and worldview that the introduction of writing produced between nonliterate and literate cultures. Goody’s treatment of the list as an administrative device in ancient Mesopotamia was part of a broader account that emphasized how specific literate technologies produce distinctly local cognitive habits. The nonsyntactic organizational capacities of lists result from their status as historical artifacts, whose development can be traced from origins that were rooted in highly specific problems of administration and governance.³ Goody’s account thus drew attention to the

¹ Jean Baudrillard, “The System of Collecting,” in *The Cultures of Collecting*, ed. John Elsner and Roger Cardinal (Cambridge, Mass.: Harvard Univ. Press, 1994), pp. 7–24, esp. p. 7; Umberto Eco, *The Infinity of Lists* (New York: Rizzoli, 2009); Liza Kirwin, *Lists: To-Dos, Illustrated Inventories, Collected Thoughts, and Other Artists’ Enumerations from the Smithsonian’s Archives of American Art* (New York: Princeton Architectural Press, 2010); and Eco, interview in *Der Spiegel*, 11 Nov. 2009, online at <http://www.spiegel.de/international/zeitgeist/0,1518,659577,00.html> (accessed 4 Mar. 2012) (quotation).

² Jack Goody, *The Domestication of the Savage Mind* (Cambridge: Cambridge Univ. Press, 1977); Cornelia Vismann, *Files: Law, Media, and Technology*, trans. Geoffrey Winthrop-Young (Stanford, Calif.: Stanford Univ. Press, 2008), p. 5; and Michel Foucault, *The Order of Things: An Archaeology of the Human Sciences* (1966) (New York: Vintage, 1994), p. xv. See also Lucie Dolezalová, ed., *The Charm of a List: From the Sumerians to Computerised Data Processing* (Cambridge: Cambridge Scholars, 2009).

³ Claude Lévi-Strauss, *Tristes tropiques* (1955), trans. John Weightman and Doreen Weightman (London: Cape, 1973), pp. 333–334; Vismann, *Files*, p. 2 (see pp. 1–3 for a critique of Jacques Derrida’s phonological interpretation of Lévi-Strauss’s “A Writing Lesson” in *Of Grammatology*, trans. Gayatri Spivak [Baltimore: Johns Hopkins Univ. Press, 1997], pp. 107–110); Walter J. Ong, *Orality and Literacy: The Technologizing of the Word* (London: Methuen, 1982), pp. 123–124; and Goody, *Domestication of the Savage Mind*, pp. 74–111. On the capacity of non-European inscription practices to generate defamiliarizing perspectives on the historical anthropology of scientific writing see Simon Schaffer, “‘On Seeing Me Write’: Inscription Devices in the South Seas,” *Representations*, 2007, 97:90–122.

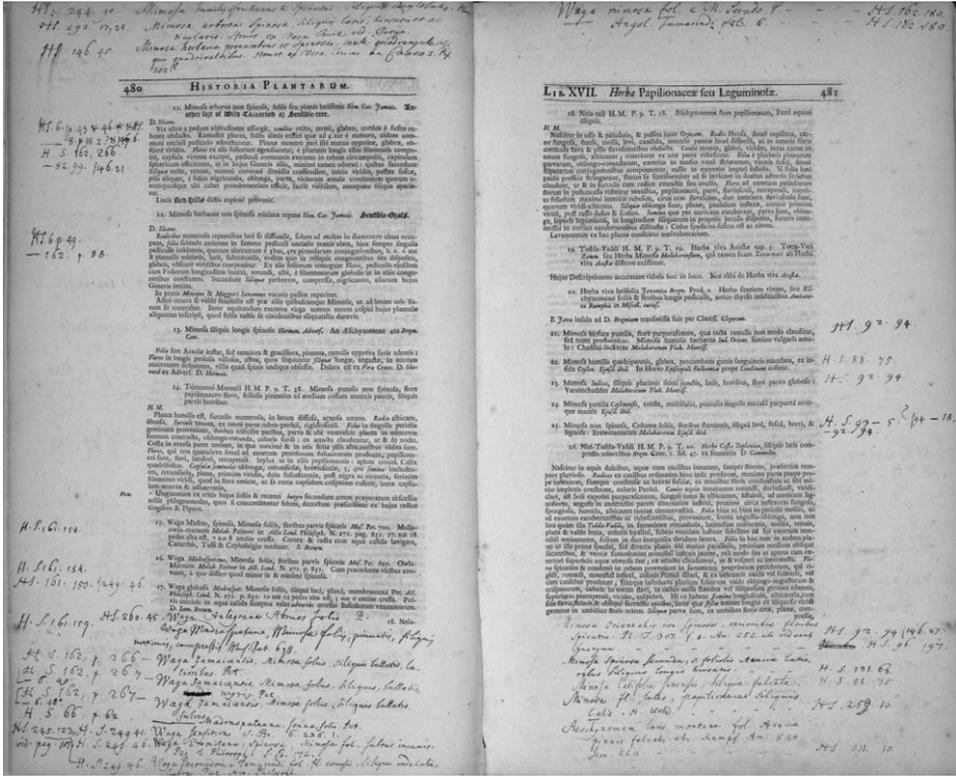


Figure 1. Hans Sloane's annotated edition of John Ray's *Historia plantarum* (1686–1704). The annotations include references to specimens from Madras, Antigua, and Jamaica supplied to Sloane by James Petiver. Botany Library, Natural History Museum, London.

necessity of taking the material aspects of writing seriously, to regard it literally as “paperwork” carried out to perform particular social, political, and cultural functions.⁴

In this Focus section, we aim to demonstrate that this approach to writing opens up fresh possibilities for research in the history of science. Figure 1 shows pages from Hans Sloane’s copy of the *Historia plantarum* (3 vols., 1686–1704) published by his friend, the English naturalist John Ray. Sloane used Ray’s catalogue of plant descriptions as an index for the specimens in his herbarium; the volume and folio numbers are noted by hand in the margins of the species descriptions. When, however, Sloane could not identify new specimens with Ray’s descriptions, he and his assistants enumerated them with new species designations at the head and foot of the page.⁵ The image well captures the interplay of divergent material regimes of scientific paperwork: the ostensibly fixed printed list and the recurrent manual reinscription required to update it. It is also the artifact of a specific moment

⁴ This approach has been endorsed by literary scholars for some time. See Almuth Grésillon, *Éléments de critique génétique: Lire les manuscrits modernes* (Paris: Presses Univ. France, 1994); and Friedrich Kittler, *Grammophon, Film, Typewriter* (Stanford: Stanford Univ. Press, 1999). See also Miles Ogborn, *Indian Ink: Script and Print in the Making of the English East India Company* (Chicago: Univ. Chicago Press, 2007). On the recent historiography of paperwork see Ben Kafka, “Paperwork: The State of the Discipline,” *Book History*, 2009, 12:340–353.

⁵ James Delbourgo, “Master of Scraps: Hans Sloane’s Paper Empire” (unpublished MS).

in the history of global exchanges, as long-distance shipping brought unprecedented quantities of goods and specimens into European ports from colonies and trading outposts in the Americas, Africa, and South and East Asia. It thus seems essential to understand scientific management systems in relation to administrative techniques in commerce, governance, and travel. Natural philosophers like Robert Boyle designed lists of queries to discipline what unlearned travelers (often merchants) should look for and describe. Lists helped organize proxies' observational labor and archive what they transmitted as records.⁶ While double-entry ledgers and inventories recorded the accumulation of capital, goods, and labor (including enslaved Africans, who were listed as priced commodities in bills of lading and were notoriously subject to insurance claims for "lost cargo"), naturalists adopted similar recording techniques to keep track of specimen accumulation and exchange.⁷ Crucially, lists organized the processes by which the contents of the world were to be known and described. This was true in both administration and science. In his political anatomy of newly reconquered Ireland, William Petty produced lists of statistical information about landscapes and populations as instruments of colonial governance. In natural history, Sloane's descriptive accession registers gave way to Linnaeus's species lists as material tools for reorganizing plant, animal, and human taxonomies. Lists simultaneously inventoried and organized the accumulated world.⁸

The essays that follow examine early modern lists designed both to record and to reorganize scientific labor. These include lists used by sixteenth-century Italian apothecaries and naturalists; the wish lists of seventeenth-century natural philosophers; lists of global specimen suppliers at the turn of the eighteenth century; and lists as research tools for Linnaean taxonomy. Valentina Pugliano explores how manuscript specimen lists in Venice fostered exchanges among networks of apothecaries and botanists. In so doing, she emphasizes the commercial and artisanal origins of specimen lists and suggests how vernacular lists documenting plants, recipes, and pharmacopoeias may have shaped the discourse and practice of botany rather than the other way around. Vera Keller pursues the career of wish lists in articulating a variety of goals for the acquisition of knowledge. Instead of drawing things together from the past and across space, these lists projected forward in time and outward geographically. Aiming to define scientific agendas for entire communities, they involved self-conscious exhortation, keyed to a Baconian rhetoric of the "advancement" of knowledge, often couched in metaphors of territorial conquest. James Delbourgo's essay draws together themes from these two essays by examining the lists of

⁶ John Law and Michael Lynch, "Lists, Field Guides, and the Descriptive Organization of Seeing: Birdwatching as an Exemplary Observational Activity," *Human Studies*, 1988, 11:271–303, esp. pp. 274–276; and Daniel Carey, "Inquiries, Heads, and Directions: Orienting Early Modern Travel," in *Travel Narratives, the New Science, and Literary Discourse, 1569–1750*, ed. Judy Hayden (Burlington, Vt.: Ashgate, 2012), pp. 25–52. On lists' utility for the bureaucratic organization of labor see William Clark, *Academic Charisma and the Origins of the Research University* (Chicago: Univ. Chicago Press, 2006), e.g., pp. 44–66.

⁷ Anke te Heesen, "Accounting for the Natural World: Double-Entry Bookkeeping in the Field," in *Colonial Botany: Science, Commerce, and Politics in the Early Modern World*, ed. Londa Schiebinger and Claudia Swan (Philadelphia: Univ. Pennsylvania Press, 2004), pp. 237–251; Harold J. Cook, *Matters of Exchange: Commerce, Medicine, and Science in the Dutch Golden Age* (New Haven, Conn.: Yale Univ. Press, 2007); Lissa Roberts, ed., *Centres and Cycles of Accumulation in and around the Netherlands in the Early Modern Period* (Berlin: Lit Verlag, 2011); and Stephanie E. Smallwood, *Saltwater Slavery: A Middle Passage from Africa to American Diaspora* (Cambridge, Mass.: Harvard Univ. Press, 2007).

⁸ Lorraine Daston, "Taking Note(s)," *Isis*, 2004, 95:443–448. On modern governmentality see Mary Poovey, *A History of the Modern Fact: Problems of Knowledge in the Sciences of Wealth and Society* (Chicago: Univ. Chicago Press, 1998); Ann M. Blair, *Too Much to Know: Managing Scholarly Information before the Modern Age* (New Haven, Conn.: Yale Univ. Press, 2010); and Ted McCormick, *William Petty and the Ambitions of Political Arithmetic* (New York: Oxford Univ. Press, 2010).

suppliers published by an English apothecary who sought to use global networks to define himself as an authoritative broker of exotic specimens. Publishing supplier lists to secure scientific credibility proved a double-edged strategy, however: doubts about social rank compromised the virtues of global reach, while the form of the list became synonymous with the debasement of true learning. Finally, Staffan Müller-Wille and Isabelle Charmantier demonstrate the transformation of species lists from seemingly static registers to dynamic research tools. Their portrait of Linnaeus suggests a pivotal early modern scientific life structured by the organizational power of the list, from the administration of his personal life to his production of a new “natural” system of plant taxonomy. They chart the centrality of physical paper lists in the assembly of this new system and conclude by tracing the shift from listing to mapping in its later articulations.

Taken together, these case histories illustrate the vital role lists play in the making of knowledge. This role is perhaps especially visible in the early modern period, when scientific lists appeared in their simplest form, as short phrases that were usually arranged in linear, vertical columns. It has recently been argued that the material practices of seriality (in visual representations and journal publications, for example) were linked in important ways with the emergence of evolutionary accounts of nature in the nineteenth century, as well as intensified preoccupations with sociohistorical progress. It likewise seems promising to explore further the significance of lists in relation to conceptions of nature and society as divinely ordained hierarchies under the *ancien régime* of early modernity. If series and evolutionary thinking were linked by logics of progressive temporality, lists for completing the inventory of the world proliferated in an era Europeans typically imagined as a rather more bounded age of mercantile political economy, when natural history was characterized by expansionist spatial arrangement (Bacon’s territorial metaphors, Sloane’s inventories, and post-Linnaean plant maps all come to mind).⁹

Lists did not, of course, disappear from science in the modern era, and their subsequent history as knowledge-making devices deserves attention in its own right. Perhaps most importantly, early scientific lists feed into the modern history of statistics, which Petty’s political arithmetic foreshadows. After all, the “avalanche of numbers,” analyzed so well by Ian Hacking, descended on Western societies in the form of lists.¹⁰ An important step in this process involved converting lists into tables—at their most fundamental, lists of lists that highlight both differences and correlations. Even the many more sophisticated statistical parameters developed in the long nineteenth century ultimately turned on the generation and manipulation of lists. New algorithms and, increasingly, calculation machines, whether analogue or digital, have obscured this basic fact—and thus too the interconnections between administrative and scientific practices that ushered in the modern age of statistics.¹¹

⁹ Nick Hopwood, Simon Schaffer, and Jim Secord, “Seriality and Scientific Objects in the Nineteenth Century,” *History of Science*, 2010, 48:251–285, esp. pp. 253–254 for the influence of Foucault’s account in *The Order of Things*; and Margaret Schabas and Neil de Marchi, eds., *Oeconomies in the Age of Newton* (Durham, N.C.: Duke Univ. Press, 2003). Early modern conceptions of historical time were by no means entirely static, however; see Paolo Rossi, *The Dark Abyss of Time: The History of the Earth and the History of Nations from Hooke to Vico*, trans. Lydia G. Cochrane (Chicago: Univ. Chicago Press, 1987). On period debates that contested the allegedly finite character of mercantile political economy see Steve Pincus, “Rethinking Mercantilism: Political Economy, the British Empire, and the Atlantic World in the Seventeenth and Eighteenth Centuries,” *William and Mary Quarterly*, 2012, 69:3–34.

¹⁰ Ian Hacking, *The Taming of Chance* (Cambridge: Cambridge Univ. Press, 1990), p. 5.

¹¹ See Volker Hess and Andrew J. Mendelsohn, “Case and Series: Medical Recording and Paper Technologies, 1750–1850,” *Hist. Sci.*, 2010, 48:287–314; and Theodore M. Porter, “Statistics and the Career of Public Reason:

The increasing power of data-collecting and data-processing technologies has led some to claim a transformation from hypothesis-driven to data-driven science in recent years, although such a view overestimates the historical stability of “the scientific method” and underestimates the longevity of data-driven inquiry.¹² All along, naturalists have continued to compile lists in the traditional manner, more recently for the sake of biodiversity and conservation research.¹³ Is it a mere coincidence, then, that the concerted efforts of physics and chemistry in the twentieth century revealed a linear sequence—DNA—as the foundation of life? Typically presented in the form of a long list composed of just four letters, the genome has become emblematic of the entanglement of life with writing. Understanding how we arrived at this moment should now, we submit, be added to the to-do lists of historians of science.

Engagement and Detachment in a Quantified World,” in *Statistics and the Public Sphere: Numbers and the People in Modern Britain, c. 1800–2000*, ed. Tom Crook and Glen O’Hara (New York: Routledge, 2011), pp. 32–47.

¹² Sabina Leonelli, “Introduction: Making Sense of Data-Driven Research in the Biological and Biomedical Sciences,” *Studies in History and Philosophy of Biological and Biomedical Sciences*, 2012, 43:1–31.

¹³ On Darwin see Richard Keynes, ed., *Charles Darwin’s Zoology Notes and Specimen Lists from H.M.S. Beagle* (Cambridge: Cambridge Univ. Press, 2000). Botanical gardens and natural history museums continue to play a central role in compiling so-called world checklists of plant and animal species; see <http://apps.kew.org/wcsp/about.do> (accessed 4 Mar. 2012).