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Orders of Knowledge in Early Modern Europe

Abstract: This paper offers a brief sketch, first, of the organization of knowledge that was inherited from the Middle Ages and remained dominant in Europe around the year 1450, and in the second place, of the ways in which this organization was modified in response to the challenges of the early modern world, notably the Renaissance, the Reformation, the invention of printing and the discovery of America.

Keywords: order, regime, renaissance, overload, America

"Quam facile sit colligere, intelligis, quam difficile collecta disponere non nescis".[1]

It was particularly appropriate to speak on this topic at a conference in Zurich, since that city was the home of one of the most famous organizers of knowledge in sixteenth-century Europe, Conrad Gessner, whose scheme was, he says, inspired by the reorganization of the public library there by his master Conrad Pellican.[2]

In the recent rise of the history of knowledge, a number of scholars have paid particular attention to its organization, to the different 'regimes' or 'orders' that helped create knowledge out of relatively raw information. Studies of this kind, often inspired by Michel Foucault, range from ancient Rome to Song China and British India. Their particular value is to reveal how people in a particular culture "made sense of the world".[3]

This brief account of orders of knowledge in early modern Europe is offered as a contribution to comparative analysis. The classic essay on comparative history by Marc Bloch distinguished two kinds of comparison. There are distant comparisons, between Europe and China, for instance, and there are comparisons

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1 Caspar Wolff (1569) quoted by Kessler 1994: 274.
2 Zedelmaier 1992: 109n.
3 Murphy 2004, 1; cf. Bayly 1996: 3–6; De Weerdt 2006; König and Whitmarsh 2007.

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between neighbours. In the case of this article, we might speak of "semi-distant" comparisons between Europe and the Islamic world, since in the periods in question, these two cultures shared the Greek and especially the Aristotelian tradition even though they were divided by religion.[4] Scholars in the West were well aware of the achievements of some of their Muslim counterparts, notably "Averroes" (Ibn Rushd) in philosophy and "Avicenna" (Ibn Sina) in medicine, while the thirteenth-century friar Vincent of Beauvais inserted a text by al-Farabi in his *Speculum doctrinale* under the title *De origine scientiarum*.[5] It is therefore illuminating to think about this topic in terms of "connected history", or as the French say, *histoire croisée*, as well as of comparative history.[6]

This essay focusses on what are increasingly described by scholars as orders, regimes, systems or cultures of knowledge in early modern Europe. Its place in this collection of studies on Islamic learning is to compare and contrast – implicitly if not always explicitly – two periods, the ninth and tenth centuries and the sixteenth and seventeenth, as well as two large regions.[7]

The essay is divided into two main parts. First comes a brief description of the old regime of academic knowledge inherited from the Middle Ages, followed by an account of the ways in which this regime was modified in response to the challenges of the early modern world, notably the Renaissance, the Reformation, the invention of printing and the discovery of America, in other words the main features of early modernity – with the exception of gunpowder.

1 The old regime of knowledge, c.1450

The phrase "organization of knowledge" is an ambiguous one, perhaps usefully so, since it refers to both intellectual and institutional systems and of course to their interaction as well. Central to the Western institutional system from the twelfth century onwards were the universities, dominated by the clergy despite the presence of laymen, whether doctors or lawyers. Where the encyclopaedic tradition in the Islamic world was mainly the work of "state bureaucrats", as the editors of this volume suggest, in Europe it was the work of the clergy, especially friars such as Albertus Magnus, Thomas Aquinas, Vincent of Beauvais or Roger Bacon.

The intellectual order presented by these thirteenth-century friars was still dominant around the year 1450. This order included a hierarchy of the academic

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4 Bloch 1928.
5 Zedelmaier 1992: 260n.
6 Werner/Zimmermann 2004.
7 On the concept of 'orders' or 'regimes' of knowledge, Burke 2016: 25–28.

disciplines that can be seen in what might be called a "tripod" composed not only of the organization of universities but also of the arrangement of books in libraries and of entries in encyclopaedias. Theology, queen of the sciences, was at the top of the hierarchy, with law and medicine competing to be next. Then came the "liberal arts" (especially grammar, logic and rhetoric). At the bottom, outside the academic system, came the so-called "mechanical arts" such as agriculture, architecture, trade, weaving and cooking. This hierarchy corresponds at least to the way in which scholars saw the crafts, since much less is known about the way in which the artisans regarded themselves or indeed the way in which they viewed the scholars. The isomorphism between the order of knowledge in libraries, universities and encyclopaedias encouraged a vision of the different categories as natural and eternal, rather than as peculiar to western culture and subject to change over time.[8]

2 Changes in the system

Despite the presentation of the system as natural and eternal, important changes gradually took place. Between the middle of the fifteenth and the middle of the eighteenth century, scholars witnessed and attempted to respond to a succession of challenges to the old regime. There were conflicts between the tendency to view the traditional categories as natural and the need to insert new information. There were also conflicts between the disciplines, leading to the dethronement of Queen Theology as well as to the replacement of the friars as intellectual authorities by a more heterogeneous group of scholars, lay as well as clerical, some of whom tried to reorganize knowledge. These reorganizers included the philosopher Pierre de la Ramée (better known as Ramus), the lawyer Francis Bacon, the Calvinist minister Johann Heinrich Alsted and the polymath Gottfried Wilhelm Leibniz. Their concern, almost an obsession, with what they variously called "method", "system" or "order" was a response to the acceleration of change in their time. For the sake of brevity, the changes in the system may be summarized in three main points.

3 The renaissance and reformation

In the first place, the movement to revive classical antiquity that we know as the Renaissance made an impact on the traditional order. For example, the Spanish

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8 Burke 2000: ch.5.

humanist Juan Luis Vives, writing about the different intellectual disciplines in a book published in 1531, attacked medieval philosophy, declaring that the disciplines had been corrupted and needed reform, and defending a mixture of innovation with a return to ancient practices.[9] The humanists were indeed so-named because they replaced the traditional system of the seven liberal arts (grammar, logic, rhetoric, arithmetic, geometry, music and astronomy) with a new package of five studies that they called, following their master Cicero, the *studia humanitatis*. This package combined grammar and rhetoric with three new disciplines, poetry, history and ethics.[10]

Even more important, at least in the long term, was the rapprochement between the liberal and mechanical arts in the Renaissance, a process that the art historian Erwin Panofsky described as "decompartmentalization", illustrated, indeed symbolized, by the career of Leonardo da Vinci. Some scholars began to take non-academic knowledge more seriously than before, in fields ranging from mining to botany, while some skilled artisans, such as goldsmiths, decided to describe their technical expertise in writing, turning it from implicit into explicit knowledge. On one side, the German humanist Georgius Agricola interrogated miners in Joachimsthal (now Jáchymov in Czechia), before writing his treatise *De re metallica* (1556). On the other, in the late sixteenth century an anonymous French-speaking artisan produced a manuscript describing a number of technical processes, from making paint to casting cannon. One result of this rapprochement the rise of the practice of experiment.[11]

New kinds of knowledge that emerged in this period have also been linked to new building projects for spaces of knowledge, among them museums (known at the time in German as *Wunderkammern*), laboratories, libraries, anatomy theatres and botanical gardens.[12] As a result, a map of the "sites of knowledge", the *lieux de savoir*, as Christian Jacob calls them, in 1650 or 1750 would be very different from a similar map made for 1450.[13]

The movement to reform the Church that we call the "Reformation" had a more indirect and unintended but perhaps a more profound impact on the old regime. The conflict between the tradition of the Church, upheld by Catholics, and the authority of the Bible, supported by Protestants, ended by undermining both sources of knowledge, since the negative arguments offered by both sides

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9 Buck 1981.
10 Kristeller 1979: 21–31.
11 Zilsel 1941; Panofsky 1953; Smith 2004; Long 2011; www.makingandknowing.org/
12 Findlen 2004: 16–17.
13 Jacob 2007–2011.

were stronger than the positive ones. The unintended consequence of this debate was to encourage both scepticism and minds open to new ideas.[14]

4 The irresistible rise of printed books

In the second place, Gutenberg's invention of printing with moveable type (whether or not it was inspired by news of a similar invention in Korea a little earlier), combined with the increasing availability of relatively cheap paper, produced what is arguably the most important divergence between the orders of knowledge dominant in Europe and the Islamic world at this time.

Printing might have been thought to have supported the old regime of learning, since early printed books were usually Catholic works of theology and devotion or classical texts such as the works of Cicero. However, what scholars now call "information overload" was already becoming a problem, increasingly perceived as such as a result of the proliferation of books. "So many books that we do not even have time to read the titles" as one Italian writer complained in the middle of the sixteenth century: – while himself adding to the pile. Books were frequently described as a "forest" in which readers could lose their way, or as a "flood" in which they risked drowning.[15]

One response, on the part of printers, was to order individual books by chapter, index, headings, marginalia, footnotes and the insertion of diagrams, tables and so on.[16] Another, on the part of readers, was to take more systematic notes on paper slips, a process now described in German as the *Verzettelung des Wissens*.[17] A third response, associated with Ramus and his followers, was to summarize books or indeed to classify knowledge more generally by means of dichotomies, dividing a subject into two parts, each part into two parts, and so on, often displaying these nested dichotomies in the form of a diagram.[18]

A fourth response was to reorganize libraries or to search them with the aid of a new tool, the printed bibliography.[19] This genre began with Gessner's *Bibliotheca universalis* (1545–8). The first part of this work, which provided information about some ten thousand scholarly books, mainly in Latin, was arranged in alphabetical order of authors, together with biographical

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14 Popkin 2003.
15 Chartier 1992; Blair 2003; Blair 2010.
16 Siegel 2009; Waquet 2015: 282–287.
17 Meinel 1995: Blair 2010: 62–116.
18 Hotson 2007.
19 Besterman 1935.

information about them. The second part offered a pioneering subject index, including the commonplaces or *loci communes* of ancient and medieval tradition.[20] A hundred years later, it had already become necessary to produce select or specialized bibliographies, usually limited to contributions to a particular academic discipline: theology, law, medicine, philosophy, history and so on. In these ways print was used to fight print, to solve the problems produced by the growing numbers of books.

5 The new world

In the third place, the discovery of the New World (together with increasing contact with India, China and Japan) produced the most dramatic examples of "classifying the exotic" (as another contributor to this volume puts it), in other words new information that needed to be incorporated in the old system yet could not be incorporated without restructuring that system. Scholars were forced to be innovative, despite their respect for tradition. Some of them (most famously Bacon and Leibniz) even expressed enthusiasm for new knowledge, viewing it in terms of a new world of learning, beyond the intellectual Pillars of Hercules.

At this point a reference to Thomas Kuhn's classic essay on the structure of scientific revolutions may be helpful, especially his idea that the discovery of "anomalies" is a challenge to a given intellectual system or paradigm. The first response, so he suggests, is to try to adjust the paradigm, but the accumulation of anomalies eventually produces a crisis that can only be resolved by means of a new paradigm, a new idea of "normal science", as Kuhn calls it, while we may refer more broadly to "normal knowledge".[21] Columbus's attempt to fit the discovery of America into the traditional paradigm of three continents may be described in these terms, followed by what has been called the "invention" of America; that is, the incorporation of a fourth continent into the world traditional picture by cosmographers such as Gemma Frisius and Sebastian Münster (even though Münster was reluctant to criticize the work of Ptolemy, the authoritative ancient geographer as well as astronomer).[22]

In similar fashion, the discovery of the fauna and flora of the New World stimulated interest in natural history and undermined statements by Aristotle and Pliny (the Roman polymath whose work was well known in the West, if not

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20 Zedelmaier 1992: 5. Cf Schmidt-Biggermann 1983.
21 Kuhn 1962.
22 O'Gorman 1958; Grafton 1992: 97–111; Portuondo 2009: 59.

in the Islamic world). 'The disparities between classical knowledge and New World experience forced a slow reorganization of existing epistemological models'.[23] For example, Gonzalo Fernández de Oviedo, author of the *Natural Historia de las Indias* (1526), made new observations but inserted them into a framework derived from Pliny. On occasion he went so far as to criticize Pliny, but with obvious reluctance.[24] Later in the century, the Jesuit missionary José de Acosta, who worked in Mexico and Peru, noted that Aristotle was wrong in asserting that the tropics were uninhabitable.[25]

In Spain, Juan de Ovando, head of the Council of the Indies, classified the knowledge that was flowing in from the New World into two grand categories, natural and "moral" (including religion and government), a classification followed by Acosta in his *Historia natural y moral de las Indias* (1590). Again, Francisco Hernández, who had been sent to Mexico and Peru by King Philip II on a botanical expedition (1571–77), found himself obliged to abandon the "classical" classification of plants made by the ancient Greek physician Dioscorides. He learned Nahuatl and adopted a hybrid method of classification that drew on both classical and indigenous traditions.[26]

The discoveries linked to the expansion of Europe encouraged the emergence of natural history in the sixteenth century as a new discipline, based on the precise description (*historia*) of plants and animals, an emphasis that "marks Renaissance natural history off from its medieval predecessors".[27] Exotic plants unknown to ancient scholars were described, while their classification drew on the knowledge of the indigenous peoples of the Americas, exemplifying an encounter (or better, perhaps, a collision) between different orders and the consequent production of what has been called "pidgin-knowledge".[28] The story of discovery in botany and medicine was a similar one in the case of India, where the Portuguese Jewish physician Garcia de Orta, working in Goa, published his *Coloquios dos simples e drogas da India* (1563), drawing on the expertise of local healers as well as on his own observations.[29]

Again, Christian missionaries and other Europeans in Asia, Africa and the Americas faced the problem of classifying the practices of worship that they observed but did not always understand. Seeing the unfamiliar in terms of the

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23 Barrera-Osorio 2006: 103.
24 Barrera-Osorio 2006: 111.
25 Barrera-Osorio 2006:102–103.
26 Bustamante García 1997: 243–268; Portuondo 2009: 94, 119.
27 Ogilvie 2007.
28 Fischer-Tiné 2013; on botany, Portuondo 2009: 94.
29 Fontes da Costa 2015.

familiar, Vasco da Gama and his fellow-Portuguese interpreted the image of the gods Brahma, Vishnu and Shiva as a representation of the Christian Trinity. In Japan, Francis Xavier and his companions viewed the emperor, who was venerated but powerless, as a kind of "pope". In Mexico, the Franciscan missionary Bernardino de Sahagún viewed indigenous deities as versions of the ancient Greek and Roman pantheon: Huitzilopuchtli as *otro Hercules*, for instance, and Tezcatlipoca as *otro Jupiter*. More frequent and more careful observation "forced the missionaries to re-invent and reformulate categories and distinctions".[30]

6 Towards a new synthesis?

The new discoveries did not lead to the immediate destruction of the older order of knowledge with which they were incompatible. It has been argued, for instance, that the traditional Aristotelian-Ptolemaic view of the cosmos remained dominant until 1650, despite the publications of Copernicus and Galileo. Interaction between new discoveries and the classical tradition continued.[31] In the universities, the medieval system of the seven liberal arts (plus theology law and medicine) was not scrapped but repaired or reformed. The schemes of Ramus, Bacon and Alsted made some impact but not enough to destroy the old regime. Medieval monastic libraries were still in use in this period. Indeed, the library of the abbey of St-Victor in Paris was opened to the public in the middle of the seventeenth century. Famous medieval encyclopaedic works by Vincent of Beauvais were reprinted in Venice in 1591 and in Douai in 1624. No wonder then that one scholar has commented on "la longévité étonnante des classifications traditionelles".[32]

The perception of the new in terms of the old generally proves impossible to sustain over the long term. New experiences first threaten and then undermine the old categories. The traditional "cultural order" – as the American anthropologist Marshall Sahlins calls it – first absorbs the new and then cracks under the strain of assimilating it.[33] All the same, the process of changing the norms for "normal knowledge" is usually gradual rather than revolutionary, and in early modern Europe it lasted for centuries. At the end of the early modern period, the 1750s, the famous French *Encyclopédie* combined its sometimes subversive content with a Baconian reformulation of medieval categories.

30 Barreto Xavier/Županov 2015: 119, 123ff, 186. Cf. Rubiés 2014.
31 Grant 1978; Grafton 1992.
32 Brockliss 2002: 45. Cf Mandosio 2010: 20–26.
33 Sahlins 1981.

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