The Museum as Knowledge Environment

Brent Nelson
University of Saskatchewan

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Abstract
Early modern cabinets of curiosities (precursors of the modern museum) were sites for collecting and generating object-centred knowledge in the early days of empiricism, but they were equally dependent on text-based ways of knowing and disseminating knowledge. These collections thus provide an important historical point of reference for thinking about the possibilities of new knowledge environments for representing cultural heritage objects on the Web, which presents new possibilities for textual and visual representation. After elaborating the historical context of early modern collections as knowledge environments, this paper concludes with some principles for representing cultural heritage objects to support scholarship in the humanities.

Keywords
Museums; Cultural heritage; Object-centred knowledge Cultural heritage; Object-centred knowledge

Brent Nelson is Professor at the University of Saskatchewan. Email: brent.nelson@usask.ca .

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Introduction

Much of the work of Implementing New Knowledge Environments (INKE) has implicitly focused on text-based knowledge environments. Image has of course been an important complement to text – whether as a facsimile of a historical document or as a contextual element for framing a text, such as the graphical elements of a browser interface – but we have not given a lot of attention to representing objects that are not, at their core, textual. And yet one of the most important knowledge environments of the modern era is the museum, which is in common practice a collection of material (typically non-textual) objects. Indeed, the emergence of the museum in the seventeenth century is one of those moments of transition (as discussed by Gitelman & Pingree, 2004, for example) when the introduction of a new medium forced a rethinking of the way in which knowledge was understood and represented. To put it simply, the seventeenth century saw an important shift in attention away from books to objects, from the verbal representation of things to the things themselves. As Anthony Grafton (1991) points out, this shift was neither simple nor complete, but there was nonetheless in the formative years of the new science a new emphasis on the material world that displaced literature as the principal means of higher knowledge. It is here that we first begin to see a meaningful distinction between what Daniel V. Pitti (2004) terms "document-centric" and "data-centric" (p. 475) sources of information. The early modern cabinet of curiosities was at the centre of this epistemological negotiation, making it a good starting point for considering how museums generate knowledge and how we relate to material objects in these knowledge environments (Hooper-Greenhill, 1992). It is also a good place to begin contemplating the ways in which real-world material objects can be remediated in new and emerging information technologies: in the case of the early museums, the contemporary medium was the printing press; today, of course, it is the Web. In this article, I provide a historical backdrop for considering museums as knowledge environments, and use this backdrop as a basis for some preliminary thoughts about the potential for these knowledge environments on the Web.[1]

Early modern knowledge environments

New knowledge systems developed in response to the information overload that began in the Middle Ages and continued through the Renaissance explosion of new learning and into the age of geographical and scientific discovery.[2] Much of this information was textual. According to Neil Rhodes and Jonathan Sawday (2000), "The databases of the Renaissance computer are the great collections of knowledge assembled by the humanists: rhetorical thesauri, dictionaries, mythologies [sic], histories, atlases, and cosmologies" (p. 9). One might add the compendium, florilegium, commonplace book, and commentary to this list of knowledge environments. Sawday and Rhodes (2000) go on to argue that "[i]n the seemingly limitless world of production, distribution, and retrieval spawned by print culture, a new model of the human mind itself began to emerge," (p. 9) one propelled by the promise of the ancient and scholastics' dream of accumulating universal knowledge. Along with this new ambition came the need for more powerful means for sorting, processing, storing, and accessing information. The codex itself enabled new ways to manage knowledge: most importantly, it enabled non-linear navigation, with help from marginalia, indexes, cross-references, tables of contents, and even graphical interfaces, such as diagrams, graphs, and charts. The desire to reconcile the encyclopedic urge to accumulate information, with the concomitant

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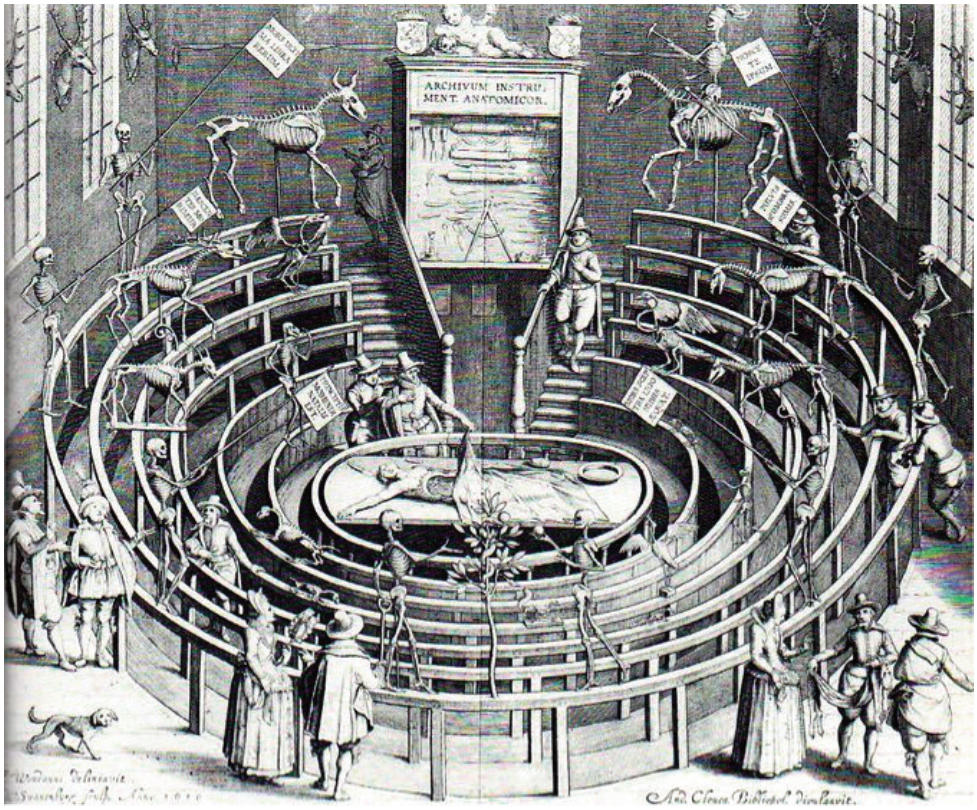
dream of the means to marshal it, resulted in various technologies and practices for breaking down text into manageable, tractable units for storage and retrieval, including memory systems, compendia, commentaries, and commonplace books.[3] But the critical and defining development in this profusion of knowledge was a new kind of information and a change in how certain kinds of information were understood, what we might call the objectification of knowledge, a shift from texts to objects as the basic unit of information.

During this epistemological shift, even the library – the knowledge environment par excellence in the Middle Ages and the Renaissance – was changing to reflect the new science. To support his interest in the new philosophy, the polymath John Dee filled his library with objects of study that included maps, globes, mathematical instruments, and natural specimens; and his library was contiguous with his three laboratories for alchemical experimentation (Sherman, 1995). At Oxford University in the seventeenth century, the anatomy school had its own collection of natural curiosities, and other curiosities (such as coins, pictures, etc.) could be found in the Bodleian Library. Through the seventeenth century, new and integrated knowledge environments continued to emerge in the form of collections or "cabinets" of curiosities. These precursors of the modern museum contained objects of any kind that the collector found fascinating and interesting or, in the language of the time, "curious." These objects were of interest because they were rare or uncommon in some way, deriving from origins remote in time or place, and because they carried potential for new knowledge or understanding of the natural or cultural worlds. Collectors of curiosities operated from a variety of motives, from simple curiosity to self-fashioning and social climbing, but for virtually all of them, the pursuit of knowledge was part of the mix, and for most, it was central. The cabinet of curiosities was the new knowledge environment of the sixteenth and seventeenth centuries, supporting a wide range of research. As "reference collections," they "were essential tools for the fundamental research undertaken by early naturalists" (Impey & MacGregor, 1985, p. 1). The anatomy theatre at Leiden University in the Netherlands situated the new empirical methods of anatomical study within a broad, multifaceted context of interest in the material world very much resembling a cabinet of curiosities (see Figure 1). For John Tradescant the Elder, the first major collector in England and royal gardener to the Duke of Buckingham and Charles I, collecting curiosities went hand in hand with his experimentation with foreign plants in his gardens. For Tradescant, collecting involved building on English soil a model of the wide world beyond. These new knowledge environments were borne out of the methods of the new epistemology of empiricism. The primary materials were not texts (or not only texts), but objects, the things themselves.

A key factor in this epistemological shift was the explosion of new objects that entered into the consciousness of the early modern subject. Rapid geopolitical expansion in exploration and trade resulted in the proliferation of new and exotic objects in Europe. The accumulation of material things demanded new means of representing and managing information and new conceptual structures for making sense of new categories of being. According to Paula Findlen (1994), "the catalogue was an early modern invention" that arose out of the need to manage this new interest in material objects; unlike an inventory, which aims simply to list things, a catalogue both

Figure 1. The anatomy theatre at Leiden University in the early seventeenth century.



quantifies and interprets reality by "attaching analytical meaning to objects" (p. 36). An important contributor to this redefinition of the object was the empirical turn that began in the sixteenth century and was codified by Francis Bacon in his "Great Instauration" of learning as expressed in his *New Organon* (1620). Here Bacon sought a new start for learning; no longer tied to the authority of the ancients and a received, assumed order of things, this new learning was built on the careful examination of things themselves (*res ipsae*) and the patient cataloguing and recording of natural phenomena and their properties. This tabulation of data for the first time looked beyond semantic unities to locate and aggregate the bits and bites of the material world.[4] In this empirical turn, each object, in the first consideration of it, was understood not by its place in the grand scheme of things, but rather as a unique and isolated thing defined by its particular combination of attributes. "The whole secret," says Bacon (2000) in his *New Organon,* "is never to let the mind's eye stray from things themselves, and to take in images exactly as they are" (p. 24). The goal was to amass a collection of particulars derived from observation and arranged into "well-organised … tables of discovery of things relevant to the subject of the investigation" (p. 82). In early modern England, this method of accumulated observation went hand in hand with the accumulation of collections (Hunter, 1981).

The cabinet of curiosities as knowledge environment

Knowledge could not, of course, rest on observation and trial alone. The early modern cabinet of curiosities was explicitly understood as a knowledge environment that integrated artefact with text. Just as libraries increasingly included other kinds of

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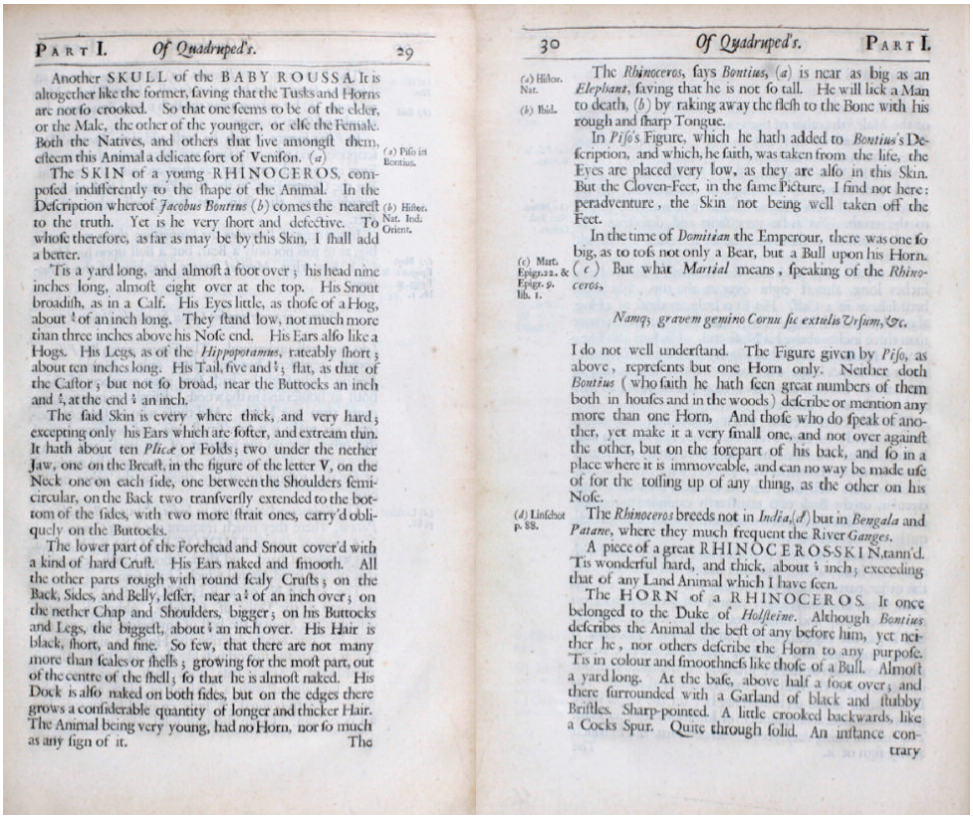
objects of study, so too collections of curiosities typically contained books and manuscripts, both as objects in their own right and as supplementary and complementary information. And while the thing itself was the new focus of study, and observation and demonstration were given a new place of prominence, much of the dissemination and scholarly engagement with the object-world was conducted in the medium of the written and printed word. A couple of examples from Nehemiah Grew's (1681) catalogue *Musaeum Regalis* illustrate the way in which the Royal Society's collection served and facilitated the production and reception of knowledge. The society's "Repository" was a collection of objects donated by members and associates as a data set for their researches. In some cases, objects were deposited after being presented and/or demonstrated, then discussed, at society meetings (Hunter, 1985). Some were documented in the proceedings of the society, the *Philosophical Transactions.* For example, among the objects catalogued by Grew are mineral substances he called "fixed salts," which were solid, soluble, non-inflammable substances extracted from plants. They were called "salts" because of their taste, and they were often used in early modern medicines. Grew (1681) experimented with several of these mineral substances, which he then deposited in the Repository along with a report he read before the society that he also (he says) intended to publish. He adds in his catalogue entry a reference to a series of previous reports on the same subject by Daniel Coxe (1674a, 1674b, 1674c), medical doctor and fellow member of the Royal Society, which were already published in *Philosophical Transactions.*

Figure 2: Nehemiah Grew's (1681) catalogue entry for "The skin of a young rhinoceros."



PART I. *Of Quadruped's.* 29

Another SKULL of the BABY ROUSSA. It is altogether like the former, faving that the Tusks and Horns are not fo crooked. So that one feems to be of the elder, or the Male, the other of the younger, or elfe the Female. Both the Natives, and others that live amongft them, eftcem this Animal a delicate fort of Venifon. (a)

(a) Pifo in Bontius.

The SKIN of a young RHINOCEROS, compofed indifferently to the fhape of the Animal. In the Defcription whereof *Jacobus Bontius* (b) comes the neareft to the truth. Yet is he very fhort and defective. To whofe therefore, as far as may be by this Skin, I fhall add a better.

(b) Hiftor. Nat. Ind. Orient.

'Tis a yard long, and almoft a foot over; his head nine inches long, almoft eight over at the top. His Snout broadifh, as in a Calf. His Eyes little, as thofe of a Hog, about ¼ of an inch long. They ftand low, not much more than three inches above his Nofe end. His Ears alfo like a Hogs. His Legs, as of the *Hippopotamus*, rateably fhort; about ten inches long. His Tail, five and ½; flat, as that of the Caftor; but not fo broad, near the Buttocks an inch and ½, at the end ¼ an inch.

The faid Skin is every where thick, and very hard; excepting only his Ears which are fofter, and extream thin. It hath about ten *Plicæ* or Folds; two under the nether Jaw, one on the Breaft, in the figure of the letter V, on the Neck one on each fide, one between the Shoulders femicircular, on the Back two tranfverfly extended to the bottom of the fides, with two more ftrait ones, carry'd obliquely on the Buttocks.

The lower part of the Forehead and Snout cover'd with a kind of hard Cruft. His Ears naked and fmooth. All the other parts rough with round fcaly Cruftsj on the Back, Sides, and Belly, leffer, near a ½ of an inch over; on the nether Chap and Shoulders, bigger; on his Buttocks and Legs, the biggeft, about ¼ an inch over. His Hair is black, fhort, and fine. So few, that there are not many more than fcales or fhells; growing for the moft part, out of the centre of the fhell; fo that he is almoft naked. His Dock is alfo naked on both fides, but on the edges there grows a confiderable quantity of longer and thicker Hair. The Animal being very young, had no Horn, nor fo much as any fign of it. The

30 *Of Quadruped's.* PART I.

(a) Hiftor. Nat.

(b) Ibid.

The *Rhinoceros*, fays *Bontius*, (a) is near as big as an *Elephant*, faving that he is not fo tall. He will lick a Man to death, (b) by raking away the flefh to the Bone with his rough and fharp Tongue.

In *Pifo's* Figure, which he hath added to *Bontius's* Defcription, and which, he faith, was taken from the life, the Eyes are placed very low, as they are alfo in this Skin. But the Cloven-Feet, in the fame Picture, I find not here: peradventure, the Skin not being well taken off the Feet.

In the time of *Domitian* the Emperour, there was one fo big, as to tofs not only a Bear, but a Bull upon his Horn.

(c) Mart. Epigr. 2. & Epigr. 5. lib. 1.

(c) But what *Martial* means, fpeaking of the *Rhinoceros*,

Namq; gravem gemino Cornu fic extulit Urfum, &c.

I do not well underftand. The Figure given by *Pifo*, as above, repreſents but one Horn only. Neither doth *Bontius* (who faith he hath feen great numbers of them both in houfes and in the woods) defcribe or mention any more than one Horn. And thofe who do fpeak of another, yet make it a very fmall one, and not over againft the other, but on the forepart of his back, and fo in a place where it is immoveable, and can no way be made ufe of for the tofling up of any thing, as the other on his Nofe.

(d) Linfchot p. 88.

The *Rhinoceros* breeds not in *India*, (d) but in *Bengala* and *Patane*, where they much frequent the River *Ganges*.

A piece of a great RHINOCEROS-SKIN, tann'd. 'Tis wonderful hard, and thick, about ¼ inch; exceeding that of any Land Animal which I have feen.

The HORN of a RHINOCEROS. It once belonged to the Duke of *Holfteine*. Although *Bontius* defcribes the Animal the beft of any before him, yet neither he, nor others defcribe the Horn to any purpofe. 'Tis in colour and fmoothnefs like thofe of a Bull. Almoft a yard long. At the bafe, above half a foot over; and there furrounded with a Garland of black and ſtubby Briſtles. Sharp-pointed. A little crooked backwards, like a Cocks Spur. Quite through ſolid. An inſtance contrary

Another entry further illustrates the way in which the material collection interacted with other kinds of information. As with each entry in Grew's (1681) catalogue, this one begins by identifying the object, "The SKIN of a young RHINOCEROS, composed indifferently to the shape of the Animal" (p. 29, emphasis mine) (see Figure 2). Grew seems to be alluding here to a crude, early modern form of taxidermy in which the skin was formed to resemble the shape of the animal.[5] Grew then uses this object to evaluate the best description then on record, that of Dutch physician Jacobus Bontius (1658) (also known as Jacob de Bondt, 1592-1631) in his *Historiae naturalis et medicae Indiae orientalis* (1658). Grew finds the description wanting and so supplements it with one of his own (over three paragraphs) using measurements of his reconstructed model together with detailed observations about the physical properties of the moulded skin and other remaining features. When Grew (1681) reaches the limits of his own observation, he returns to his source and rests on Bontius' authority to fill in the gaps:

> The Rhinoceros, says Bontius, is near as big as an Elephant, saving that he is not so tall. He will lick a Man to death, by raking away the flesh to the Bone with his rough and sharp Tongue. (p. 30)

Then Grew consults another kind of source, the pictorial representation of Willem Piso (1611-1678) accompanying Bontius' description in *Historiae*, which Grew (1681) again examines in dialogue with his own observation (see Figure 3):

> In Piso's Figure, which he hath added to Bontius's Description, and which, he saith, was taken from the life, the Eyes are placed very low, as they are also in this Skin. But the Cloven-Feet, in the same Picture, I find not here: peradventure, the Skin not being well taken off the Feet. (p. 30)

Figure 3: Willem Piso's illustration of a rhinoceros in Jacob Bontius' (1658) *Historiae Naturalis.*

Source: Courtesy of Wellcome Images, a website operated by the Wellcome Trust.

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Grew also has recourse to ancient literature, taking an epigram by Martial as evidence that the rhinoceros has not one, but two horns (sig. [E3v]):

> Namq[ue] gravem gemino Cornu sic extulis Ursum, &c. (Martial, 1919, pp. 16-17)
> For a heavy bear he tossed with his double horn, etc.[6]

Grew (1681) has difficulty squaring the evidence:

> I do not well understand. The Figure given by Piso, as above, represents but one Horn only. Neither doth Bontius (who saith he hath seen great numbers of them both in houses and in the woods) describe or mention any more than one Horn, and those who do speak of another, yet make it a very small one, and not over against the other, but on the forepart of his back, and so in a place where it is immoveable, and can no way be made use of for the tossing up of any thing, as the other on his Nose. (p. 30)

He concludes with supplementary information about the animal's habitat, drawing on Jan Huyghen van Linschoten's (1563-1611) *Discours of voyages into ye Easte and West Indies* (1598).

We see in these examples from Grew a radiation of information that begins with the collected object but extends outward to reference other kinds and sources of information. In some ways, his method resembles that of a text-based technology with standard mechanisms for establishing inter-textual relationships (references and citations), but the physical museum is the primary point of reference: text is supplement, at once enhancing and rectifying a perceived lack in the material object at hand.[7] This new knowledge environment of the museum thus sat at the intersection of traditional humanities processes and the empirical methods that would develop in the modern sciences and have increasing sway in the way objects were handled in museums.

Knowledge production and dissemination

For the modern humanities scholar interested in the study of cultural heritage objects, it is the representation that is of primary interest and not the object in itself in the Baconian sense. We are interested in the "subject-object relation," the way in which the object world is perceived, received, and represented, and the way in which it both eludes objectification and informs human subjectivity (Brown, 2001). In this approach, text is a crucial supplement to object. Museologists have also begun to think again about the museum as "knowledge environment" (Cameron, 2005, p. 244). Presented with the new affordances of digital technologies, in particular the Web, Fiona Cameron (2005) has advocated a fundamental reconsideration of how collections are managed and curated. Cameron is concerned on the one hand with critiquing the objectivist tradition of in-house documentation, which has assumed a central, authoritative voice without consideration of the complexities of the object-subject relation; and on the other, with advocating an approach to curation that gives voice to the polysemic quality of objects and the plurality of perspectives associated with them, including those of the modern users of the museum. While the humanities scholar shares a similar critical

stance, our attention is much more focused on the representation of objects in the historical record. For the humanities scholar, this means a reconsideration of the way in which textual representation relates to both its referent object and the various humans involved with that object.

In what follows I attempt to resituate the museum in relation to the textual world, to assert the importance of the document and the need to support scholarly approaches in the museum space. To test the aptness of this notion of the cabinet of curiosities (and potentially the modern museum) as knowledge environment, we might take John Unsworth's *Scholarly Primitives* (2000) as a guide. Unsworth has been evoked frequently in the context of INKE in reference to the sort of knowledge environments that we as humanities scholars (including Unsworth) take for granted as being scholarly and largely textual. Unsworth takes primitives to mean "some basic functions common to scholarly activity across disciplines, over time, and independent of theoretical orientation" and which "form the basis for higher-level scholarly projects, arguments, statements, interpretations" (n.p.). Unsworth is quick to say that this list should not be taken as definitive but rather as a starting point for further consideration of what constitutes the processes of knowledge generation.

Discovering

The cabinet of curiosities was both a result and a source of new discoveries, whether geological or biological, ethnological or archaeological. It was a place for both depositing newly found and collected objects and for retrieving them for consultation and study, giving rise to new knowledge and discoveries.

Annotating

Results of observation and experiment involving these collected objects were frequently recorded, and sometimes information in textual form was directly attached to objects. John Bargrave (1610-1680) – a canon of the Canterbury Cathedral, who amassed a small, private collection of curiosities – made labels for his objects indicating bits of information that he thought important to understanding the nature of the object. For example, his label for a lachrymatory reads:

> very ancient.
> A lamp and lacrymatorio of earth from Roma Sottervanea
> an other lachrimatorio of glass fro[m] the same place. (see Figure 4)

Catalogues of collections, such as Grew's, also served this function of providing supplemental information attached to an object.

Comparing

Comparison was an important function in attempting to make sense of newfound objects. Cabinets in the pre-Linnean era sought "to recreate by spatial analogies the supposed likeness between things" (Preston, 2000, p. 172). Categories were based on physical evidence and observation in the mode elaborated by Bacon: "colour, location, parturition, and size, as well as designation derived from emblematic, mythological, and Hermetic signification" (Preston, 2000, p. 172). Objects were also arranged

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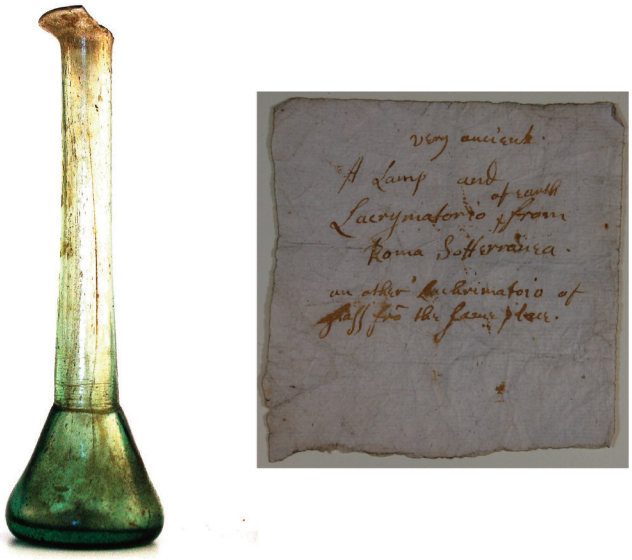
Figure 4: John Bargrave's lachrymatory and label.



Source: Canterbury Cathedral Archives

(notionally and sometimes spatially) in terms of binary values: natural/artificial; normal/abnormal; valuable/valueless (Preston, 2000). The cabinet thus provided a means for making analytical comparisons and correspondences between objects, with reference to received knowledge:

> In a world which seemed to present itself as a wilderness of forms, a variety of analogous or synonymous systems could provide the equivalent of a visual search-engine, much as we search a modern electronic database by finding an exact alphabetic or ASCII match for a flagged semantic item. (Preston, 2000, pp. 174-175)

As in the case of Grew above, various samples or descriptions of samples also served for comparison.

Referring

In the textual environment, explicit referencing to previous work was crucial in providing a context for understanding collected objects; but even in the real-world environment of the collection, there is an implicit referential function in the way objects were framed and displayed. The presence of an Inuit kayak, for example, would be recognized by some as a symbol of or reference to New World exploration and expansion.

Sampling

One might say that sampling is core to the very nature of the cabinet of curiosities: it was a collection of samples from various classes of objects. This sampling function was highlighted by the classifying function, implicitly, and sometimes explicitly, in the arrangement of objects into groupings, and more obviously in the categorization of objects in catalogues according to a common, though variable, taxonomy that begins with a distinction between natural and artificial, with the former category typically divided further into mineral, vegetable, and animal, and so on.

Illustrating

Closely related to the sampling function is illustrating. The objects themselves provided a fulsome indication of the object-world from which they derived. They presented a sense-impression of a context remote in place, time, or experience. They also provided source material for drawn, painted, or printed illustrations.

Representing

Following from the previous two primitives, the cabinet of curiosities was a representation of a world "out there," a kind of epitome or a microcosm. John Tradescant the Elder named his collection "The Ark," with a nod to the representative function of Noah's collection of animals. Ideally, a collection of curiosities would contain a representative sample of every class of object in the world. The cabinet of curiosities was thus a kind of index, pointing to things, but it was a special kind of index. It contained, in a directly referential way, the thing itself as a token. In this way, the museum is a unique knowledge environment, creating much more intimate connections to the world of referents: one layer of referentiality is removed. They were also highly structured spaces. What Gerald Pocius (1991) says of modern museums was already true of their early modern precursors: "Museums, their collections, and the exhibits they put together from these objects, reveal the categories we created when we carve up the universe in our attempts to make manageable our collective reality and exact some measure of control over collective experience" (p. 20).

Visualization

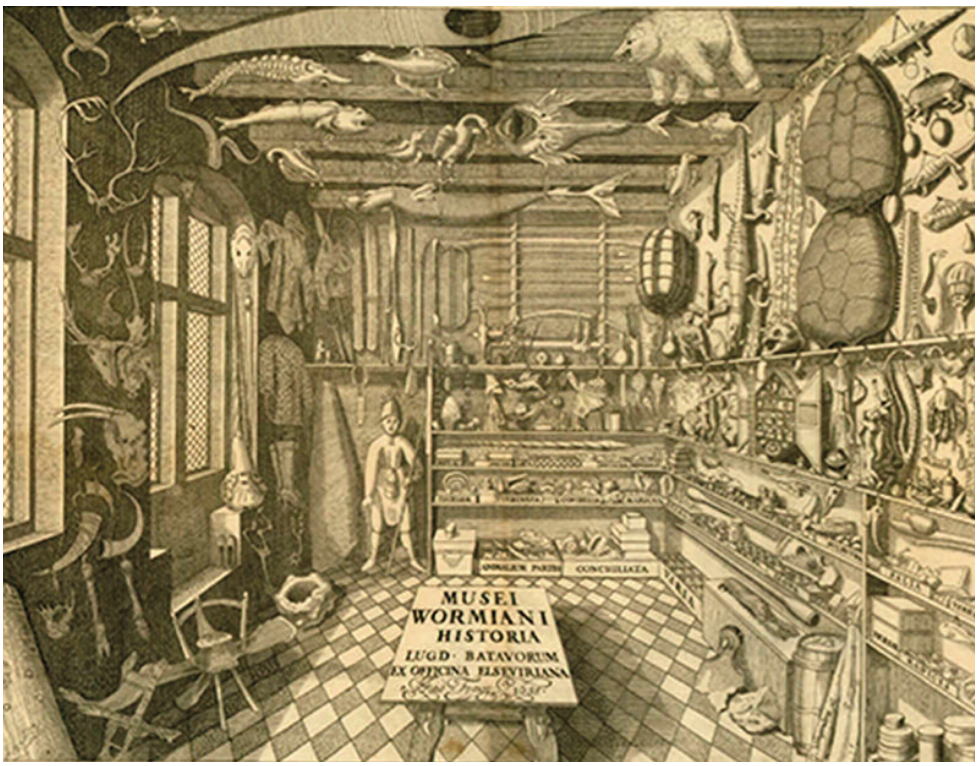
One other affordance special to the museum as knowledge environment deserves particular attention: visualization. In some ways, the cabinet of curiosities was another step in a development that began in the transition from orality to writing, from the subjective to the objective: "Writing is a technology, an artificiality that exteriorizes thought; alienates the self from nature and even (by allowing for individuation) from other selves; allows for the development of lists, facts, science, and other marks of the exteriorization of knowledge" (Gronbeck, 1991, p. 15). Even more objectifying was the cabinet of curiosities, which placed visualization before verbalization. The role of the visual interface in this knowledge environment is nicely illustrated by the case of John Ray, whose collection of naturalia was a generative source of new knowledge. Edward Brown (1664-1665), writing from Rome in a letter dated January 16, 1664-1665 to his father Sir Thomas Browne, the famous writer and (less famously) collector of curiosities, describes an encounter with fellow countrymen John Ray and Philip Skippon. He describes in particular Ray's "collection of plants, fisshes, foules, stones, and other rarities, which hee hath with him." Unlike minerals and cultural artefacts, these specimens were difficult to preserve for display, particularly during this peripatetic period of Ray's life, and it is unclear whether he ever kept a physical museum. Many of these specimens did, however, make their way into John Ray and Francis Willughby's *Ornithologiæ* (Willughby & Ray, 1676) and *De Historia Piscium* (Willughby & Ray, 1686) in the form of engravings. These works, much like the catalogues described above, name the species, classify and describe them, and then, in many cases, provide illustrations based on collected specimens. These engravings were based on drawings and watercolour illustrations from various sources, including firsthand observation of collected specimens (Grindle, 2005).[8] Here we see the new

Baconian sciences in an integrated environment that is textual and documentary, but oriented toward the material object.

The cabinet of curiosities itself – at least as represented in the engravings of the collections of Olaus Worm (1588-1655) and Ferrante Imperato (d.1615), for example – carried special visualization possibilities (see Figures 5 and 6). The early museum was perhaps the first graphical interface for "rich prospect browsing." Three characteristics of rich prospect browsing (as defined by Stan Ruecker, Milena Radzikowska, and Stéfan Sinclair, 2011) are particularly relevant here:

1. The principal (and persistent) point of access should be visual and should show every item in the collection in a meaningful way.
2. Users should be able to reorganize and rearrange the presentation of items
3. Users should be able to get to more data for each item, that is, information should be layered.

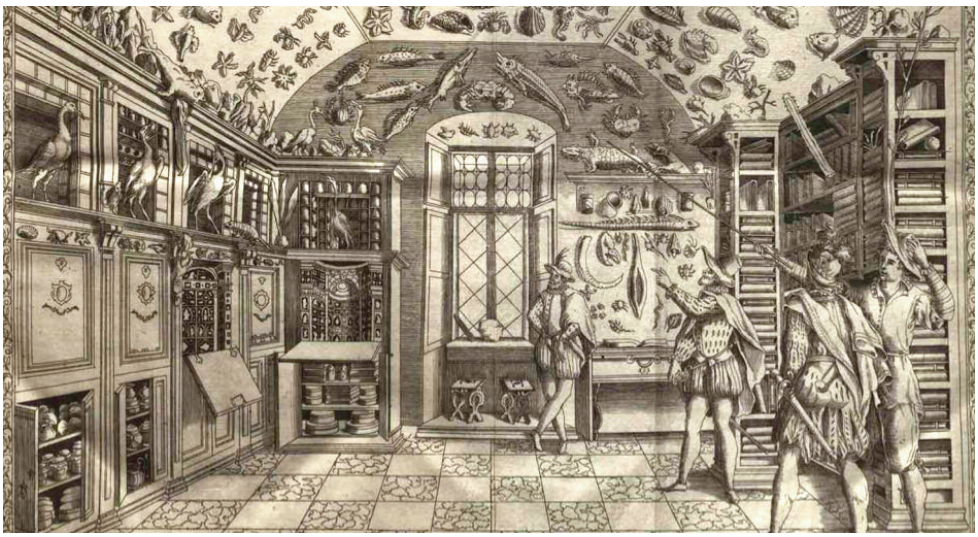
Figure 5: Engraving of Olaus Worm's museum, Copenhagen, Denmark.



Much like the table view in a flat database, the real-world cabinet of curiosities provided all of its data at once, or at least, a meaningful representation of the full diversity of the categories and species represented in the collection. (Not every rock in a mineral collection is visible, for example). Similarly, an engraving of one of these collections (though it does not represent perfectly its real-world source) provides a graphical representation that gives a fairly granular view of the whole collection at once. It is, of course, impossible to rearrange this graphical interface, but the real-world cabinet was very malleable: in most cases, objects were moved, removed, circulated,

and handled. Above all, these collections provided layered access to information. As described above, information about the objects contained in these collections often circulated in textual forms, often in thorough detail, and these textual forms were often seen as part of the museum itself. In the case of John Bargrave, for example, labels, inventories, a personal (and illustrated) diary of his travels, and his own manuscript catalogue of the collection were all themselves elements of his museum.

Figure 6: Engraving of Ferrante Imperato's museum, Naples, Italy.



Conclusion

As we think about and develop "human-computer-culture interface[s]" and "the ways in which computers present and allow us to interact with cultural data," (Manovich, 2001, p. 70) it is helpful to think of these interfaces as knowledge environments. The early modern collection of curiosities provides an important historical point of reference for thinking about the possibilities of new knowledge environments for representing cultural heritage objects. It was a site of serious study that blended visual/empirical and verbal/textual ways of knowing in a complementary, though often complicated, relationship. It was a site, therefore, where many of the functions of the humanities scholar were still necessary and supported. From this perspective, the relation of text to object is critical both theoretically and practically as we consider how a museum might function as a knowledge environment, whether in material or digital space. Web curation of cultural heritage objects has thus far been the domain of museum professionals, whose representation of their collections have leveraged the powerful affordances of visualization technologies, but almost exclusively for a popular, public audience, with little support for scholarly primitives. In the next stage of this research, I will look to these first museums and their users – mostly scholars and researchers, but secondarily, the general public – as examples of multilayered access and as models for exploring the ways in which digital representations of these collections might be similarly layered to meet the needs and interests of both a popular and a scholarly audience.

Nelson, Brent. (2015). The Museum as Knowledge Environment. *Scholarly and Research Communication, 6*(3): 0301225, 15 pp.

Notes

1. What follows is a humanities-oriented consideration of curating and representing cultural heritage objects on the Web, while recognizing at the same time that museum professionals have well-established expertise in Web curation, as richly illustrated by the Best of the Web award winners (Museums and the Web, n.d.). For a complementary treatment of early modern collections as "sites of investigation" see Arnold (1996, p. 266).

2. See *Journal of the History of Ideas* (Rosenberg, 2003) for a whole issue on early modern "information overload."

3. See Leah Marcus (2000); see also Anne Lake Prescott (2000) on attempts to manage the results of the encyclopedic urge.

4. See Lisa Jardine and Michael Silverthorne's introduction to Bacon's *New Organon* (Bacon, 2000, pp. xii-xiii).

5. On early modern methods for preservation of naturalia see Wilma George (1985, pp. 184-185).

6. *Epigrams,* Book 1 no. 22 (Martial, 1919, pp. 16-17). Grew slightly misquotes. The correct reading is "namque gravem cornu gemino sic extulit ursum." He also cites but does not quote from epigram no. 9.

7. My framing of this distinction is of course indebted to Derrida's (1976) notion of the supplement, though equally to the historical context I elaborate below.

8. The remains of the Francis Willughby manuscript collection contains over 200 drawings. Sir Thomas Browne also supplied an illustration based on a specimen in his collection.

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