Assignment 4B Research Paper:

Cataloging Metadata in the Ancient World

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Abstract

This paper provides an overview of libraries, metadata, cataloging practices, and prominent catalogers in the pre-Roman and early-Roman world, looking specifically at the Tigris Euphrates valleys and the Greek world into Roman rule. Particular focus is paid to the two Greek librarians Kallimakhos of Cyrene and Zenodotus of Ephesus and their innovations to libraries and metadata cataloging: the *Pinakes* and alphabetical sequencing, respectively. The overarching theme of this essay is metadata in an ancient context. Chiefly being what metadata was collected, how it was collected, what was used to establish metadata, how metadata was utilized, and the foundational roles ancient metadata cataloging provided for our modern understanding of cataloging systems.

Cataloging Metadata in the Ancient World

Cataloging is as essential to a library system as breathing is to us. It's necessary for any usage of a library's collection from the most basic search to the extremely theoretical scenario to occur with any expectancy of efficiency. It's no surprise, then, that cataloging systems of one rudimentary form or another have existed alongside libraries in physical manifestations for millennia, dating back at least to the seventh century BCE (Fons, 2016, p. 15; Kumar, 2013, p. 45), and likely being used far earlier in intangible formats. Just as cataloging is necessary for libraries, so too is metadata necessary for cataloging, with the ability to formulate data as well as the knowledge to record it necessary for metadata.

Catalog originates from the Ancient Greek word *Καταλέγω*, which means both to list as well as to recite in song (Oleson-Bagneux, 2014, p. 10). Our modern evolution of this word defines a system designed to be used by the library's users which indexes a library's entire collection of materials, their respective metadata, as well as where the items are located (Blum, 1991, p. 229; Diao, 2018, p. 79; Kumar, 2013, p. 45). Metadata, the information required in order to catalog materials, is simply defined as data about data (Diao, 2018, p. 80). Authors, titles, numbers of pages, and identification codes such as a book's ISBN are modern examples of metadata, but pre-modern catalogs did not have as many fields of metadata as we do in the present. Neither was it always apparent what the author or title of a work was, nor if that which was assigned to a work was accurate (Blum, 1991, p. 4). The earliest catalogs were static; being torpid, difficult, or otherwise physically incapable of being updated as a concomitant resource as their respective libraries updated their holdings. Such was true until the triad innovations of paper catalogs and two Greek librarians helped create not only the foundations for metadata cataloging, but a universal system of recording metadata.

Some professionals dismiss pre-modern catalogs as not being true catalogs or lacking in essentials that a modern catalog should have. Diao (2018), for instance, insists that catalogs "did not exist in the pre-modern period" on account of them lacking "an aggregation of structuralized bibliographic metadata" (79). It is true that catalogs in their modern mediums of online platforms and printed editions are far more thorough and complete in both scope and accuracy than catalogs of previous eras. Yet modern catalogs have the advantage of modern communications, global print industries, and 2,700 years of cataloging experience to lean upon.

Even still, our contemporary catalogs have, as Fons (2016) states, "an emphasis on the efficiency of the systems that create library catalogs" whereas older catalog systems had "a clear emphasis on the convenience of the reader" (15). This is an over-simplification, as historically catalogs have been in the private realm of librarians and reliant on the retentive capabilities of their personal memories (Blum, 1991, 229; Oleson-Bagneux, 2014, p. 10), which is hardly a system convenient to the reader. A better interpretation of Fons' statement would be that older catalog systems presented metadata in ways that were easier for users to understand and immediately utilize. Library patrons and catalogers in the 1st century BCE could view a catalog and immediately identify the title, author, and location within the library of their desired document. Conversely much of the metadata collected in modern catalogs is ignored by library users, such as ISBN, OCLC numbers, and contributors. Ancient libraries, however, stored catalogs in varying forms prior to using papyrus and parchment catalogs. Some etched catalog information onto stone pillars (Blum, 1991, p. 185; Fons, 2016, p. 15), some may have been sung aloud (Oleson-Bagneux, 2014, p. 10), and many more were reserved to memory (Blum, 1991, p. 229).

The history of cataloging is intertwined with the history of libraries, and therefore before an explication of ancient catalogs must come a quick discussion of the libraries they were made for. Sometime between 3,000 BCE and 2,300 BCE the oldest known libraries were created in the cities of the Tigris Euphrates valleys (Diao, 2018, p. 79). These libraries were not open to the public. Instead they would be more akin to modern government or corporate repositories used to store data, in this case on clay tablets, which recorded economic and administrative information, as well as lists of kings, gods, cities, states, objects, animals, and professionals (Diao, 2018, pp. 79-80). Literacy was not a commonality at this period, and was reserved for the ruling class or a smaller sub-group within the ruling class, often with a theological association involving priests (Diao, 2018, p. 80). Additionally, the concept of a user browsing through the collection or actively searching for an item on their own was not practiced at this time, and remained the norm until comparatively recently in the history of libraries. Instead discussions and interactions with the librarian(s) were necessary in order to locate and access a document, regardless of whether there was a catalog on display or if the information was retained mentally (Fons, 2016, p. 15).

Yet despite being used for a very small user population and being among the first facilities of their kind, these early libraries very quickly began to organize their collections with parameters familiar to librarians of modernity. One such instance can be seen in the Babylonian library in Akkad when, under the librarian Ibnissaru in the 7th century BCE, the library began to catalog collected tablets by subject (Fons, 2016, p. 15). Subject-based cataloging, as opposed to author-based cataloging, appears frequently, leading some experts such as Fons (2016) to speculate that “there was a code of practice among early catalog librarians and that they followed some set of rules” (15). Albeit only speculation or an educated guess, it does seem likely that an unwritten rule was followed, perhaps based upon an unsurviving original format or proven

system. It can be said with confidence, though, that these early catalogs and categorizations based on subject matter reveal that, in the words of Fons (2016), "...some of the principles, such as the value of subject description, have retained value" for the past 2,700 years (15).

Libraries in the Tigris Euphrates valleys from 3,000 BCE to 2,300 BCE, for example, recorded on clay tablets lists "grouping objects by their physical attributes or listing by types of the content" (Diao, 2018, p. 79). Whereas in the ancient city of Hattusas in Turkey tablets have been found containing sophisticated lists wherein titles of unnamed works were obtained from the first lines of the works—as is done now with unnamed poems, for example—and using titles as a "point" to represent works in their entirety (Diao, 2018, p. 80). Exemplifying clear instances of catalogers finding and creating metadata in order to efficiently catalog their collections' holdings, the historical record is clear in revealing that ancient catalogers performed the same duties as modern catalogers, seeking and creating the same information. The only differences being the mediums in which they were recorded, the lack of universal rules, and the diversity of metadata.

With the progression of time libraries became more prevalent and public in nature, largely due to the ancient Greeks. Even with a relatively small population able to read, the number of libraries, as well as their sizes, grew in Greece as public libraries were opened by governments and private libraries were acquired by the wealthy and scholars (Diao, 2018, p. 80). Perhaps the most famous library of history, the Great Library of Alexandria, also known as the Alexandrian Library, was one of these Greek libraries, from which comes the oldest known paper catalog: rolls of papyrus dated to between 280 BCE and 240 BCE (Fons, 2016, pp. 15-16).

It was during this time that two other additions to metadata and cataloging were established: alphabetical sequencing and ordering by author (Diao, 2018, pp. 80-81). The

latter—and partially the former—was championed by Zenodotus of Ephesus (330-260 BCE), the first head librarian of the Alexandrian Library (Blum, 1991, p. 244). Thanks to Zenodotus' work the Alexandrian Library was, from its very beginning, organized alphabetically (Diao, 2018, p. 80; Oleson-Bagneux, 2014, p. 5). Zenodotus conducted this organization in order to make sense of the library's unparalleled titanic collection, which by some estimations held between 40,000 and 700,000 scrolls (Olesen-Bagneux, 2014, p. 3) with Diao (2018) estimating 490,000 papyri in the main hall alone (p. 80). Unbeknownst to Zenodotus, his work laid the groundwork "for the principle of authorship in the future world" (Diao, 2018, p. 81) and therefore, indirectly, metadata cataloging as well. However, despite Zenodotus' great achievements and everlasting effect on categorization, metadata, and librarianship, he did not actively contribute to the evolution of cataloging himself. In the end it would be another librarian of the Alexandrian Library, Kallimakhos of Cyrene (alternatively spelled Callimachus or Kallimachos) (305 BCE to 240 BCE), who would be credited as the inventor of both the library catalog and biobibliography, "and therefore bibliography as such" (Blum, 1991, p. 244).

Kallimakhos and his fellow peers at the Alexandrian Library of the 3rd century BCE were responsible for the cataloging and categorization of scrolls and faced similar challenges to modern librarians working with medieval manuscripts. There were constant issues of scrolls containing multiple texts of different authors, subjects, and dates of origin, as well as scrolls with little to no data on their authors and titles or having incorrect data (Blum, 1991, p. 4). To address this, Kallimakhos and his aides conducted "a survey of all copies of works by Greek authors contained in the scrolls, including the collective ones," and then arranged them "by classes of authors and then by individual authors" (Blum, 1991, p. 230). Thus created the *Pinakes*, the 120 scroll collection cataloging all of the Alexandrian Library's documents ordered alphabetically by

author, as well as providing biobibliographic information about each author, a summary of all of their works, each available copy of their works, the number of books in each scroll and work, each work's title or incipit, and the number of standard lines (Blum, 1991, pp. 182, 230, 244-245; Diao, 2018, p. 80; Olesen-Bagneux, 2014, pp. 5-6). Each work was further organized also by classes—law, rhetoric, and miscellaneous are the only known classes, an estimated seven more were used—and subclasses divided chronologically, topographically, and biographically (Olesen-Bagneux, 2014, p. 5). After a herculean process of collecting all of the metadata from the tens or hundreds of thousands of documents in the Alexandrian Library, Kallimakhos made sense of it all in a manner easily used by librarians at the Alexandrian Library, but also librarians and library users anywhere else in the Greek-speaking world.

The *Pinakes* fit perfectly into Blum's (1991) definition of what a catalog should be: a list of "all copies/reprints of literary works in a library, regardless of whether in separate volumes or a collective volume, under (correct) authors and (correct) titles, serves for utilization of the collection and an aid to scholarly work" (p. 229). Not only was metadata made easily available for searching, but individual works were further made locatable by the class they were assigned to and the information on the author and title, since everything was alphabetized and ordered (Blum, 1991, p. 230; Olesen-Bagneux, 2014, p. 6). With this thorough and detailed cataloging system, there are clear parallels between Kallimakhos' *Pinakes* and modern catalogs, as well as classification systems such as the Dewey Decimal System and the Library of Congress Classification. In fact, the combination of an exhaustive collection of metadata of all writers and their writings put into a readable format with universal utility (within the Greek world) and a system of stated rules—again, numerous parallels are clear between this and modern systems with the principal differences being the medium and metadata fields—paved the groundwork for

what future catalogers would use and aim to emulate (Blum, 1991, p. 182; Olesen-Bagneux, 2014, p. 6).

Kallimakhos' ambitions went beyond the Alexandrian Library as well; his eyes were on "the entire world of scholarship (Blum, 1991, p. 246). Though created specifically for the Alexandrian Library's collection, the *Pinakes* were so comprehensive of existing texts that they were used and copied all over the Greek, and later the Roman, world (Blum, 1991, p. 245). On the island of Rhodes a gymnasium library (first or second century CE) decided that rather than conduct their own research into their collected works, it was preferential to use the notes available in the Alexandrian and Pergamenian libraries' *Pinakes* and handbooks (Blum, 1991, p. 244). Pergamon's *Pinakes*, it should be noted, were themselves not an original construction but rather an expansion upon the Kallimakhos' *Pinakes* (Blum, 1991, pp. 182, 244). Others also continued to copy and expand upon Kallimakhos' original *Pinakes*, primarily fellow Greek libraries and individuals such as Hesychios of Miletos whose work survives, partially, in the 10th or 11th century Byzantine lexicon the *Suda* (Blum, 1991, 245). Interestingly, under Roman rule librarians became even more prevalent and flourished, yet little is known of Roman libraries, resulting in some, such as Diao (2018), to claim that "very few libraries" used bibliographical catalogs ordered by alphabetized authors' names and other previously discussed metadata fields used in the *Pikanes* (81). Others, however, such as Blum (1991) support the logical conclusion that biographical data and metadata continued to be collected, recorded, and used to categorize in the Roman period as well (244). Albeit as demonstrated in the introduction with Diao's claim that catalogs did not exist in the pre-modern period, it should be remembered that Diao's claims are sometimes not based upon substantiated evidence.

The *Pinakes* are important both to modern discussions and their contemporary users because of the universal rules they created for cataloging and viewing metadata in a visible, accessible, and efficient format. To modern perspectives we can see the *Pinakes* as the first true, unarguable cataloging system. In the same way that public libraries today rely on the Library of Congress's repository of metadata from nearly all published works, so too did ancient Greek and later (most likely) Roman libraries rely upon, expand upon, and utilize the *Pinakes* for their metadata.

As the first widespread catalog, the *Pinakes* advanced metadata cataloging standards created by the works of Kallimakhos and Zenodotus and helped establish permanent ideas on metadata fields. An appropriate achievement to come as a result of the famed Library of Alexandria. They were created as a solution to the everlasting need of a system for collecting metadata, an issue which, in the time of the Alexandrian Library, every library faced individually and differently. Even though the art of cataloging was lost following the fall of Rome and the onset of the Middle Ages (Blum, 1991, p. 244; Kumar, 2013, p. 46), the foundational systems and experiments undertaken by ancient libraries and librarians to make sense and usability out of metadata survived. Today's modern cataloging systems and metadata fields, such as the DDC, LCC, and ISBNs are reliant upon these ancient achievements dating to thousands of years ago. Built not only to address issues we still face and think about today, the accomplishments and experiments of Zenodotus, Killamakhos, papyrus catalogs, as well as numerous other known and unknown individuals and organizations allow us to solve the everlasting issues and nature of cataloging metadata.

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