

When Information Came of Age

How does the author explain the relation between information—what it is, how it is produced, stored, organized, disseminated, consumed—etc., and the development of modern culture?

Daniel R. Headrick explains the relation between information and the development of modern culture through five types of information systems that were developed during the seventeenth and eighteenth centuries. These systems are outlined in his book, *When Information Came of Age*, and are presented as the forerunners of the modern information age.¹

Headrick starts off with an introduction on how he defines information. In sum, he says, information is an assemblage of organized data that humans can understand.² He goes on to say that because of our limited capacity to remember everything, it is necessary for some sort of system to be in place to facilitate the finding of information in an efficient manner: “Information systems were created to supplement the mental functions of thought, memory, and speech. They are, if you will, the technologies of knowledge.”³

The five systems he presents make up the core of information systems as we know them today. The system categories used are gathering information, organizing information, transforming information into other forms more visual, storing and retrieving information, and communicating information.⁴

In each of these early systems can be seen evidence to support its modern day equivalent. Headrick starts off with systems for organizing information and in particular the development of classification naming schedules, developed by Linnaeus, that influenced similar development in chemistry, biology, zoology and other sciences, including the development of the metric system.⁵ The importance of these early developments is described by Headrick as “essential to further advances in the natural sciences but also provided models for other fields of knowledge.”⁶

The next system discussed is the system for gathering information. Here Headrick presents a lengthy discourse on the development of statistics as a way to garner patterns from numeric information for the use of government and public (health) agencies. The effects of statistical studies led to improved public health concerning epidemics and the eventual production of the census survey technique which in turn helped bring about many reforms. Although the French, British, and Americans put different values on types of statistical information, Headrick explains succinctly “But behind the differences lies a common cultural phenomenon: the quantifying spirit, or the desire to reveal truths that could not be found in verbal descriptions. In all these cases, statistics were the expression of the need to master large quantities of information, to find patterns in those large quantities, to understand those patterns, and to use the understanding to control the world.”⁷

Determining a pattern from numbers is easier to discern when information is presented in a visual display. “As a means of conveying information, pictures have a distinct advantage over both writing and numbers.”⁸ Although not the first use of visual information, graphs could be considered an offshoot of the rise in statistical information gathering. Together with maps, graphs represent the third type of information system. Headrick calls this system a transforming or displaying system. One on hand,

information is transformed from numerical data into visual data; and on the other hand information is displayed to facilitate a better understanding of the information than could be obtained from the numbers themselves or narrative description. In speaking of graphs and maps produced by cartographers, geologists, and statisticians, Headrick says “They represent a transition from a descriptive or narrative visual language to a scientific system of showing data visually.”⁹

The ongoing growth in the amount of information collected and the demand for access to this information in turn led to developments in how information was stored and retrieved. Thus Headrick names his next system simply a storage and retrieval information system. Headrick presents development accounts of the dictionary and the encyclopedia as examples of storage devices that allowed quick access or retrieval of the information within. Although many other reference works were also made popular during the seventeenth and eighteenth centuries, Headrick puts forth criteria that define what makes a reference work an information system:

“To analyze reference works as information systems, we use three criteria: storage, retrieval, and dissemination. To judge dictionaries and encyclopedias as information storage systems, we need to consider their length, their choice of topics, and the quality of their coverage. The arrangement of entries, whether thematic or alphabetical, and such tools as indexes and cross-references determine the value of a reference work as an information retrieval device. Finally, we can judge the dissemination of the information contained in a reference work by the number of subscriptions or copies sold, by the number of subsequent editions, and by the number of imitations and pirated editions.”¹⁰

According to his definition, libraries would also fall under the heading of a storage and retrieval information system, as would modern day databases, but I will discuss this at greater length later on in this paper.

The last information system presented by Headrick is comprised of systems that communicate information to others: be it between two points or from one point to many. He explains the development of the postal service, optical telegraphy, and naval communications that preceded the electronic telegraph and subsequently radio, phone, tv, the internet and modern communication devices. All three examples show a communication base system controlled by governments that were then shared with the public only to offset costs and facilitate growing public demand. However, Headrick points out that many governments still seek to control the communication of information, he says “The issue of ownership, however, is still being debated...(and that) two hundred years after the liberal revolutions, elected officials sworn to uphold the constitutional rights of citizens to privacy still propose to censor private communications in the name of protecting the public from hate speech, pornography, and terrorism.”¹¹

In summary, Headrick explains that the cultural changes that define the seventeenth and eighteenth centuries also brought about “increasing interest in information of all sorts—about nature, people, events, business, and other secular and practical topics. Public officials and private citizens alike not only demanded more information but also wanted it more readily accessible and easier to understand and apply—hence the development of information systems that the Age of Reason and Revolution

produced in such profusion. It is these information systems that are the basis for today's information age."¹²

How do books and libraries fit into the emergence of modern society?

Books and libraries fit into the emergence of modern society in that they are an information system in their own right that produces, stores, organizes, disseminates, and consumes information. Libraries and books are found in three of the information system types: classifying and organizing, storing and retrieval, and communication. It can also be argued that libraries are also part of the gathering and transmission information systems.

Libraries and books can be viewed as classifying and organizing information systems based on the cataloging of books and materials within the library in an organized fashion. Modern bibliographic records classify books and material much like Linnaeus did in using "a number, the author's name, the title, the place and date of publication, the size and number of pages, and comments on the contents" for his *Hortus Cliffortianus* or catalog of Clifford's books. The nature of the MARC record and authority guides are a direct application of Linnaeus' efforts in nomenclature of botanical specimens in a library environment dealing with books and library 'species.'¹³

How books and libraries are used as systems for storage and retrieval of information is evidenced not only through the examples Headrick provided concerning dictionaries and encyclopedias that are often found within libraries but also in how the library functions as a whole. The *Foundations of Library and Information Science* text by Rubin explains the library as a collection of information retrieval systems:

"The library itself can be viewed as one type of information retrieval system. Its content is a database, which is organized in such a way as to produce effective access to that content. Any information retrieval system has at least two parts: a database and a system for retrieval of the database. The database of the library would be its contents: the books, periodicals, audiovisual materials, and other items in the collection. The system would include the hardware, software, rules, policies, and management used to effect retrieval of the information in the database. The library catalog might also be considered an information retrieval system in itself. The database is the content or information (the electronic records or the cards in a manual system and the descriptions of the items in the catalog), the retrieval system would be the hardware, management, software, rules, policies, and procedures by which the catalog records are prepared (file preparation) and manipulated for access purposes. Classification schemes can also be seen as information retrieval systems...a library is not only an information retrieval system, but it relies on many other information retrieval systems that function within it."¹⁴

In view of the remaining three information systems, libraries are a communication system for information in that they facilitate the movement of information from many points to many points; they are the ultimate repository of information. In addition, libraries have as one of their credos: the application of access to information for all. Being the repository for information denotes a 'gathering' or collecting of information. In the more statistical nature of gathering, library science is more about gathering numbers and distinguishing patterns, but libraries do gathering numerical information to

better facilitate services for patrons. Gathering of collections has slowed somewhat due to a shift in handling of information and as such Libraries have become more like transmission systems in that they help facilitate the transmission of information from the printed word to the visual, the audible and even the present digital age. Rubin explains the modern role of the library as such:

“The information infrastructure is a complex and dynamic environment. The role of libraries within this context is also dynamic. Traditionally libraries were part of this infrastructure long before electronic information technologies were even conceived. They have been a constant source of information in the United States since the settlement of America, although the number and sophistication of these libraries were quite limited until the nineteenth century....Suffice it to say here that libraries have played a role in the infrastructure largely by providing institutional support to individuals or small groups through the provision of services and materials for educational, informational, and recreational purposes. Historically, libraries have been an especially important channel of exposure to books, promotion of reading, literacy, and self-development within the population.” ...“the contemporary library integrates many other information channels in its continuing mission to meet the needs of its users.”...The complex interrelationships among the various components of the information infrastructure present many challenges that libraries must meet if they are to prosper...Information providers must realize that developments in electronic information technologies have led to the emergence of many powerful stakeholders in the development of the information infrastructure. Business and industry, the communications industry (cable and telephone companies), electronic database producers, the federal government, the military, libraries, researchers, academic institutions, and citizens all are eager to influence developments related to the infrastructure.”¹⁵

Discuss the points that the author raises about of the advent of the information age.

Although many people may say we are living in the ‘information age’, Headrick disagrees and instead suggests that “the information age has no beginning, for it is as old as humankind.”¹⁶ He explains that there have been periods of advancement brought about from increases in the amount of information accessible and in the creation of information systems to ‘deal with it.’ He attributes these advancements to what Kuhn has termed ‘paradigm shift’ and Kilgour has noted as ‘punctuated equilibria’; neither of which I would apply. Headrick’s explanation without terminology is much more appropriate in calling the advancements what they were: advancements greater at some times over other times.¹⁷

Headrick points out several ‘advancements’ that he feels contributed to the development of information systems that influenced the modern ‘information age’. First and foremost is the time or culture of the day: the Age of Reason and Revolution that brought with it the Enlightenment, Romanticism, and the political revolutions in Europe and the United States. Second is the growing demand for information from several sectors of the populace: the government, the military, and the growing educated ‘middle classes.’ Third is the creation of information systems to handle all the demanded information and last was the spirit of progress. The information systems were covered earlier in this paper and the spirit of progress al bite noble in design fell rather short of the best intentions. Headrick states of progress:

“The eighteenth and nineteenth centuries were characterized not only by a growing thirst for knowledge but also by a strong faith that more knowledge would lead to the betterment of humankind.” ... “One of the favorite words of that era was progress. This was the mantra of the philosophers, the enlightened despots, the educated people on both sides of the Atlantic in the Age of Enlightenment. ... two hundred years later...we have so much information, and yet the ‘betterment of humankind’ still escapes us. Nevertheless, we still want information—more than ever, faster than ever.” “... In ethical terms, the human race has made little or no progress in the past three centuries. But the instrumental progress in information systems has been phenomenal. And no one would want it otherwise.”¹⁸

Denise A. Wallace, July 17, 2008

1. Headrick, Daniel R., *When Information Came of Age: Technologies of Knowledge in the Age of Reason and Revolution, 1700-1850*, (New York, New York: Oxford University Press, 2002).
2. Ibid, 4.
3. Ibid.
4. Ibid, 4-5.
5. Ibid, 25.
6. Ibid, 50.
7. Ibid, 88-89.
8. Ibid, 97-98.
9. Ibid, 133.
10. Ibid, 143.
11. Ibid, 210.
12. Ibid, 217-218.
13. Ibid, 25.
14. Richard Rubin, *Foundations of Library and Information Science*, 2ed. (New York, NY: Neal-Schuman Publishers, Inc., 2004), 218.
15. Ibid, 25-26.

16. Headrick, Daniel R., *When Information Came of Age: Technologies of Knowledge in the Age of Reason and Revolution, 1700-1850*, (New York, New York: Oxford University Press, 2002), 7-8.
17. Thomas S. Kuhn, *The Structure of Scientific Revolutions*, 2nd ed., (New York, NY, New American Library, 1986) and Frederick G. Kilgour, *The Evolution of the Book* (New York: Oxford University Press, Inc, 1998).
18. Headrick, Daniel R., *When Information Came of Age: Technologies of Knowledge in the Age of Reason and Revolution, 1700-1850*, (New York, New York: Oxford University Press, 2002), 12.