Communication Technologies and the Concept of Knowledge Organization – A Medium-Theory Perspective[1]

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Jack Andersen is enrolled as a PhD-student at the Royal School of Library and Information Science, Copenhagen, Denmark. He expects to finish his dissertation in July 2003. His PhD-project is a theoretical analysis of the role of knowledge organization in scholarly communication. Here he analyzes how knowledge claims are rhetorically embedded and put forward in scholarly literature and the consequence of this for the organization and representation of these knowledge claims in knowledge organizing systems. This is basically an analysis of the shift in genre from primary literature to bibliographic literature. This shift in genre must be accounted for in knowledge organization theory. His overall theoretical framework consists of epistemology, genre theory, activity theory and academic writing.

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ABSTRACT: In this article the relationship between communication technologies and the LIS concept of knowledge organization will be examined from a medium-theory perspective. The purpose of the medium-theory perspective is to trace the historicity of the LIS concept of knowledge organization, that is, an examination of which tradition has produced the concept. The perspective will help to reveal the condition of possibilities of knowledge organization and its strong connection with communication technologies, and their constitution of the social organization of society. The means and modes of communication fundamentally alter existing ways of thinking and of producing, communicating and organizing knowledge. The LIS concept of knowledge organization will be analyzed in relation to the storing and communication of knowledge in oral cultures, written cultures, print culture, and electronic cultures. Through this, it will be argued that the narrow LIS concept of knowledge organization is subordinated and in interaction with a broader social organization of knowledge in society. Further, it will be argued that the rise of the Internet as a source of knowledge and information must be understood in relation to and in continuation of this interaction.

Among other things, it will be concluded that a relevant socio-historical background and framework for the LIS concept of knowledge organization is how humans have organized their intellectual activities throughout history in terms of particular means and modes of communication. Medium theory can provide part of this background and framework.

Introduction

In recent years several scholars within the library and information science (LIS) research community have discussed and suggested the importance of recognizing more historical, cultural, and social approaches to knowledge and knowledge organization (Albrechtsen & Jacob, 1999; Bowker & Star, 1999; Hansson, 1996, 1999; Hjørland, 1998; Hjørland & Albrechtsen, 1999; Jacob & Shaw, 1998; Mai, 2000; Olson, 1999). These approaches should all be appreciated. Yet, when speaking of knowledge organization and its communicative purposes, not many approaches have taken communication or media perspectives into account.

The aim of this article is to trace the library and information science LIS concept of knowledge organization (i.e., organization and representation of documents in information systems) in relation to the

means and modes of communication in society. This will be done by using a medium-theory perspective as described by Joshua Meyrowitz (1994). This perspective will help reveal both the condition of possibilities of knowledge organization in cultures with and without particular means and modes of communication, and how it has been a means to structure social order.

The objective is to illuminate the historicity of the LIS concept of knowledge organization and how it is constituted by the social organization of knowledge. This article will examine how the idea of organization and representation of documents in information systems can be seen *as a consequence* of society's attempt to organize itself by its use of the various means and modes of communication.

Thus, the thesis to be pursued is that the LIS concept of knowledge organization is subordinated and part of a broader social organization of knowledge in society, and that every attempt to organize knowledge in information systems can be understood in relation to the means and modes of communication. By viewing the LIS concept of knowledge organization in this manner it is further shown why and how the task of knowledge organization can be conceptualized to provide "the best textual means to an end" (Wilson, 1968, p. 21) or "the epistemological or informative potentials of documents" (Hjørland, 1992, 1997, p. 86). But this enterprise cannot be undertaken without taking into account the activities the documents are going to serve or be used in which they will be used. Viewing documents as tools means that they serve particular communicative needs and purposes and are used in different socio-communicative activities. These activities are to a large extent constituted by the social organization of knowledge insofar as this is expressed by the means and modes of communication. In short, the organization and representation of documents in information systems is an accommodation and a support to these particular kinds of activities. This demonstrates the importance of taking the social organization of knowledge into account when organizing and representing documents in information systems.

Consequently, it will be argued that a relevant background for a history of the intellectual foundation of knowledge organization is to look at the way knowledge has been and is searched for, stored, and retrieved; that is, how knowledge or information is communicated. While it is not claimed to be the only way of tracing the LIS concept of knowledge organization, it seems reasonable to shed light on it in terms of how the knowledge or cultural capital of a culture or society is stored and communicated. This can contribute to an explanation of the socio-cultural and textual factors leading to the idea of the organization of knowledge in a LIS context, and offer an understanding of the role played by knowledge organization in social and cultural practices, insofar as they are defined by the means and modes of communication. What can be retrieved by a culture and inherited by posterity is dependent on the means and modes of storing knowledge and information. The development of bibliographic classification systems and cataloging rules for knowledge organization is born out of this history. That way, the history of LIS knowledge organization is basically a part of the history of the socio-cultural development of society and how it organizes itself.

One may argue that this was what Margaret Egan & Jesse Shera (1952) were trying to get at when they put forward their social epistemology as the analysis of the production, distribution, and consumption of intellectual products and the role of bibliography in the social communication of knowledge. In this way they recognized the important relationship between communicative action and knowledge organization, and emphasized knowledge organization as part of a broader socio-communicative activity (i.e., the production, distribution, and consumption of intellectual products). However, Egan and Shera (1952) did not put much emphasis on the historical aspects of communicative action and knowledge organization.

In order to trace the historicity of the LIS concept of knowledge organization it seems reasonable to do it in terms of particular communication technologies; in this article writing, printing, and the computer. They are examples of communication technologies, which have had, and have, a direct impact on any library activity in that they have affected and changed the nature of the production, distribution, and use of documents. Thus, other communication technologies such as the telephone, radio, or television will not be taken into account, even though their social and cultural impact cannot be underestimated. But they have not had as much impact on library activities as writing, printing, and the computer have had.

The article is structured in the following way. First a short presentation of the medium-theory perspective is given. This is followed by an outline of how the concept of knowledge organization develops in a LIS context. Then the condition of possibilities of knowledge organization is examined from the different perspectives of orality, writing, printing, and the computer. The main exclusive features of these per-

spectives are outlined and the concept of knowledge organization examined in relation to these perspectives.

The perspective of orality is necessary in this connection. Walter Ong (1982, p. 78), for instance, has argued that one cannot understand the structuring of knowledge in literate cultures without an adequate understanding of its counterpart in oral cultures, since it is so radically different in the latter compared to the former.

The Perspective: Medium Theory

In his essay *Medium Theory* Meyrowitz (1994) argues why he has chosen the singular term *medium* and not the plural *media*. He criticizes much existing media theory for being too concerned with the content of various media messages and its effect on people in various situations. While Meyrowitz acknowledges media theory in this manner, it does not, according to him, exhaust the picture. Medium theory is, therefore, concerned with

> "...the particular characteristics of each individual medium or of each particular type of media. Broadly speaking, medium theorists ask: What are the relatively fixed features of each means of communicating and how do these features make the medium physically, psychologically, and socially different from other media and from face-to-face interaction?" (p. 50)

Accordingly, Meyrowitz sees medium theory as being concerned with the particularities of each means of communicating in order to see how they change the content of what is communicated. The means and modes of communication in different cultures and civilizations are dependent on the available communication technologies. As a media scholar, Meyrowitz does not have the LIS concept of knowledge organization in mind when suggesting his medium-theory approach. But he does suggest that on the macro level medium theory seeks to analyze what effects a new medium has in relation to the already established media in society, and how that transforms social interactions and social structure (Meyrowitz, 1994, p. 51). As a result of this, medium theory acknowledges that various media have effects on and may alter social organization; that there is a close relationship between communication media and the social organization they mediate, respond to, and transform.

Meyrowitz labels some of the medium theorists inspiring this article as "First-generation medium theorists". Despite their different agenda, approaches, and conclusions, the common denominator between these theorists is, according to Meyrowitz, that when taken together:

> "...a surprisingly consistent and clear image of the interaction of media and culture emerges. Broadly speaking, theses theorists' works cohere into a shared image of three phases of civilization matched to three major forms of communicating: the move from traditional oral societies to modern print societies (via a transitional scribal phase), to an electronic global culture." (p. 53)

The writings of David J. Bolter (1991), Elizabeth Eisenstein (1979), Niels Ole Finnemann (1999a, 1999b), Jack Goody (1977, 1986, 1987, 2000), Jack Goody and Ian Watt (1963), and Walter Ong (1982), will be used in the following analysis. Broadly speaking, these theorists analyze from different viewpoints the transition from oral culture to written and print culture, and to electronic culture in terms of its implications for the communication and organization of knowledge in society. An examination of the LIS concept of knowledge organization, in light of this medium-theory perspective, will elucidate how the concept can be seen as growing out of the interaction between media and culture.

The Context: Library and Information Science

Knowledge organization has a long history of study in LIS. With the exception of, for instance, Henry Evelyn Bliss (1929), Egan and Shera (1952), Patrick Wilson (1968), and Birger Hjørland (1994, 1997), all of whom have argued for and analyzed the role of knowledge organization in society's production and communication of knowledge, this tradition has been characterized by a search for techniques, standards, and rules for knowledge organization, rather than having strived for a profound understanding of its role in society's production and communication of knowledge. The result is a rather narrow conception of knowledge organization within LIS ignoring the broad social organization of knowledge, which actually constitutes the LIS concept of knowledge organization. James Anderson (1996) defines this narrow conception in the *International Encyclopedia of Library and Information Science* as follows:

> "The description of documents, their content, features and purpose, and the organization of these descriptions so as to make these documents and their parts accessible to persons seeking them or the messages that they contain. Knowledge organization encompasses every type and method of indexing, abstracting, cataloguing, classification, records management, bibliography and the creation of textual or bibliographic databases for information retrieval ... In the context of library and information science, the organization of knowledge (often called the organization of information) is the organization of documented messages in which knowledge or information is represented." (p. 336)

This conception of knowledge organization fails to take into account the role played by the social organization of knowledge according to which

> "...knowledge is organized in learned institutions, in professionals, in journals, in libraries, and so on. Knowledge is produced as a part of human activity and tied to the division of labor in society." (Hjørland, 1997, p. 45).

This social organization of knowledge referred to by Hjørland demonstrates its connection with human communicative activities. For example, the documents to be organized and represented in information systems are the outcome of an already established social organization of knowledge (e.g., the organization of scholarly knowledge production into disciplines (Burke, 2000, pp. 81-115)), which is an organization of human activity. This human activity, defined by Karpatschof (2000) as "...the societally-formed life process realized through the actions of the individuals participating in it" (p. 184), is characterized by the production and use of tools (i.e., material production) such as documents (Karpatschof, 2000, p. 187).

Furthermore, in a recent book on the intellectual foundation of information (knowledge) organization, and concerning the historical context of knowledge organization, Elaine Svenonius claims that: "The *relevant* [italics added] background is the tradition of Anglo-American descriptive and subject cataloging during the last century and a half." (2000, p. 2). Although Svenonius recognizes that some kind of knowledge organization has taken place since 2000 B.C., limiting the background to the last 150 years, according to Svenonius, is that the major bibliographic classification systems and cataloging rules used for knowledge organization were invented in this period. While this is true, it makes the history of the intellectual foundation of knowledge organization in a LIS context quite a short one. Such a view on knowledge organization does not take into account the social, cultural, historical, epistemological, and communicative circumstances constituting any attempt to organize knowledge. A counter-argument could, of course, be that the way documents are actually classified, indexed, and cataloged today is irrelevant to how knowledge organization is viewed in a broader historical perspective. But, still, this argument cannot provide an understanding of the societal role of knowledge organization. It is necessary to acknowledge this role. Otherwise one cannot come up with an argument demonstrating that LIS knowledge organization makes a difference. To establish such an argument one just cannot disregard history. Books like Burke's *"A Social History of Knowledge"* (2000) and Stockwell's *"A History of Information Storage and Retrieval"* (2001) are examples of works that examines the societal role of knowledge organization in a historical perspective. Furthermore, bibliographic classification systems and cataloging rules are clearly the historical products of a particular communication technology; namely writing. But writing was in the first place, as a technology of the intellect, a technology used to organize society (see for example Goody, 1986; Goody, 2000, pp. 132-151). This calls for a broader conception of knowledge organization in LIS in order to account for and understand its historicity.

Orality and Knowledge Organization

In his book, *"Orality and Literacy: The Technologizing of the Word"* Ong (1982) gives a very clear picture of the communication and organization of knowledge in oral cultures and how it structures modes of thought. Oral cultures use stories, rhymes, and narratives to store, organize, and communicate knowledge. These are the memory techniques of oral cultures. They are the means and modes of passing onto future generations the cultural heritage.

In an oral culture "[t]here can be no reference to 'dictionary definitions'..." (Goody & Watt, 1963, p. 306). The expression "to look up something" simply makes no sense (Ong, 1982, p. 31). This expression is a product of writing and is essentially what the narrow LIS conception of knowledge organization heavily relies on. To organize and represent documents in information systems is to make it possible 'to look up something', to document something. But does that

mean that oral cultures are not able to organize knowledge? Of course not! To claim that would be like saying that they do not produce any knowledge at all, which, of course, they do. Otherwise they would not have any social and cognitive advancement at all.

Where knowledge is produced, a need almost logically arises for knowledge organization in order to communicate and retrieve that knowledge. Since every culture throughout history *has* produced knowledge, an oral culture has an interest in preserving that which is, for it, valuable, symbolic knowledge or insights, i.e. to keep the valuable from oblivion. As described by Goody and Watt (1963) and Ong (1982), the cultural heritage of an oral culture is restricted to what can be remembered and forgotten. What can be remembered (or retrieved) is dependent on what can be stored in the individual memory. The only way to communicate knowledge is through verbal language. There is no such thing like books or other physical materials for recording language. This has implications in terms of how and what to remember. For instance, according to Goody and Watt (1963, p. 311), this is why myth and history merge into one. The only medium available is verbal language, a medium by which it is very hard to differentiate between myth and history, when using it to communicate the cultural heritage.

Wilson (1977, p. 34) speaks of the organization of knowers as knowledge organization. In oral cultures knowledge organization is equivalent to organization of persons (or knowers). They are the cognitive authorities of an oral culture. Due to, for instance, occupational roles these persons are crucial elements in the social organization of society and contribute to determining what can be thought and known. These particular persons are consulted when something needs to be documented. In that way they hold positions of power. This further implies that when these persons are not present anymore, the cultural heritage of the oral culture is impossible to trace, unless it has been transmitted through narratives, myths, and the like to other persons.

The information systems of oral cultures are, therefore, the social groupings of persons. The storage and retrieval of knowledge depends on how rhymes, narratives, and myths are communicated, and on who performs the act(s) of communication. These genres of communication mediate forms of social organization and organize social activities. The organization and representation of knowledge in information systems is not then detached in space and time from those who produce, communicate, and store knowledge. Accordingly, in oral cultures the relationship between social organization and knowledge organization is of a highly interactive nature. Knowledge stored in information systems shapes the social structures of oral cultures. On the other hand, the social structures shape what kind of knowledge is to be stored and retrieved. As for knowledge organization this dialectic can serve as an indication of how knowledge organization in oral cultures is closely linked to the social organization of persons in society, demonstrating the socio-political nature of knowledge organization.

Writing and Knowledge Organization

Jack Goody has examined the consequences of writing as a means and mode of communication and its cognitive impact on societies. In several books he has stressed the social and cognitive implications of writing (Goody, 1977, 1986, 1987, 2000).

With the advent of writing, humanity witnessed a technology making it possible to go beyond the memory of an individual in terms of storage and organization of knowledge. According to Goody (2000, p. 136), writing not only meant a change in the means and modes of communication, but also a change in what was actually communicated. Writing enabled communication at a long distance in both time and space. It enabled a given culture, compared to oral cultures, the possibility of preserving knowledge for posterity without being dependent on time and space, and the memory of particular individuals:

> "No longer did the problem of memory storage dominate man's intellectual life; the human mind was freed to study static 'text' (rather than be limited by participation in the dynamic 'utterance'), a process that enabled man to stand back from his creation and examine it in a more abstract, generalized, and 'rational' way." (Goody, 1977, p. 44)

In this way writing represents an exceptional technology in the history of the cognitive and socio-cultural development of civilizations. Goody examines this in his book, *"The Logic of Writing and the Organization of Society"* (1986) and analyzes the significance of writing to society's social structure and institutions. By arguing for the significance of writing in cultures such as Mesopotamia and Ancient Egypt to institutions like religion, commerce, the state, and the law, Goody

demonstrates how the practices of these institutions change fundamentally by the use of writing in contrast to orally based communication. These societal institutions produce and make use of writing in order to exercise power and to maintain their particular practices. That is, writing is the place where social interaction happens. Moreover, because the effective use of writings, in these social practices, is dependent on their actual retrieval, a need for an organization of these writings is created. That way writing gives rise to the notion of written or recorded knowledge, and through this contributes to the objectification of thought (Goody, 1977, p. 44).

The notion of recording implies that knowledge can be accumulated for future generations and be exposed to criticism and used for documentation. In terms of knowledge organization this further implies an externalization. While in oral cultures it is bound to particular persons, groups, or localities, knowledge can be organized in a more stable and steady form with writing.

Libraries and their organization of knowledge are a logical extension of and a response to the development of writing as a means to structure literate activities (Gaur, 1994, p. 661). Societies and cultures producing writings for use in the organization of them are dependent on means of storing and accessing writings. The information systems (such as libraries or archives) for organizing and representing writings are then part of the larger textual space of social interaction. One may say that while stories, narratives, and myths were the methods and genres for retrieving and organizing knowledge in oral cultures, in written cultures these are replaced by, or at least supplemented with, other sophisticated methods and genres of retrieving and organizing knowledge, such as lists. The use of lists in social practices meant that in order to use them, individuals had to be literate. Since to be literate is not naturally given, this implies an organization of society into literate and non-literate people. Thus, organizing knowledge in lists is a consequence of, and a response and support to, a particular organization of society, the literate organization of society.

Being able to record something illustrates that the LIS concept of knowledge organization is connected to textuality and, through this, to literacy. However, this connection to textuality is constituted by the use of writing in the social organization of knowledge; that is, in the social practices of institutions in society.

This is the beginning of the LIS concept of knowledge organization. The concept can be seen as developed out of the social practices outlined above. Thus, when looked upon from the perspective of writing, the LIS concept of knowledge organization can also be seen as an outcome of the struggle of humans to organize their intellectual activities as part of the structure of a literate society.

Printing and Knowledge Organization

Elizabeth Eisenstein (1979) has argued for the social and cognitive consequences of the printing press in early modern Europe. Printing had, according to Eisenstein, implications for religion (i.e. Protestantism), the rise of capitalism and nationalism, and the beginnings of modern science. That is, implications for the development of certain structures of society in early modern Europe.

One big social consequence of the printing press is its connection with and manifestation of written communication as an important means for communicating knowledge (in particular scholarly knowledge). Meyrowitz (1994,) argues that "print divides people into separate communication systems" (p. 55). This "modernization" of written communication resulted in the development of an early public sphere and specific professional discourse communities, "different informational worlds" (Meyrowitz, 1994, p. 55), expressing an organization of activity that implied a specialization in knowledge production and use (Burke, 2000, pp. 18-31). One example of this is the development of modern science and its communication system, and its agents and artifacts such as authors, readers, editors, and texts (see for example Bazerman, 1988, pp. 128-150).

According to Eisenstein (1979) the printing press gave rise to a new conception of the notion of authorship in terms of intellectual ownership,[2] to the notions of a title and of an edition, and to a new media industry consisting of, among others, booksellers and publishers. This view demonstrates the various agents involved in document production, implying that they, as such, are part of the particular document. In terms of the single document, these notions (author, title, editor, and publisher) become textual features connected to the production and identification of the document. That way they contribute to the materiality, individuality, and publicity of a document. These textual features are still utilized today, when organizing and representing documents in information systems such as bibliographies or library catalogs. They constitute important elements in the bibliographic record and imply that bibliographic control can be exercised. These textual features were also part of the

reorganization and standardization of texts, such as the use of alphabetization, imposed by printing. Thus, there is a strong connection between what printing as a technology did to texts in terms of their modes of organization and production, and how that altered the organization of texts in information systems.

Moreover, texts were also the commodity of a growing media industry, signifying a new social organization of the means of cultural production as opposed to the production of texts in written cultures. Texts could now be sold in a market creating the need for publishers' sales catalogs in which titles played a significant role of identification. This market for texts also implied a multiplication of types of texts. For instance, maps showing the boundaries of the growing national states could be produced.

Further, the advent of printing, and its consolidation of written communication, contributed to the significance and dependence of what Wilson (1983) calls *second-hand knowledge*; that is, knowledge acquired by other means than the use of perception or pure reason, knowledge acquired through the use of documents. Acquiring knowledge by other means than perception or pure reason is also practiced in oral and written cultures. But the printing press gave way to a production of multiple copies of texts. This meant that more people than ever came in touch with documents as part of their learning and knowledge acquisition practices. The library or any other kind of information system with an organized collection of documents is a support to these practices by preserving and making documents available for posterity and for retrieval. Bibliographies and indexes using alphabetization as an organizing principle were created as a response to these practices and as a consequence of a new social structure enforced by printing.

Although the LIS concept of knowledge organization of course rests on writing, printing has, more than any other communication technology, contributed to a manifestation of the concept as organization and representation of documents in information systems. Printing enforced an increase in document and knowledge production. This led to the need for collections of organized knowledge so that posterity is able to retrieve documents; the textual features mentioned above are all means of securing retrieval. That way the printing press brought about changes in the LIS concept of knowledge organization; different changes from that of writing.

The Computer and Knowledge Organization

In the following discussion the computer and the Internet will be discussed simultaneously. This seems reasonable since the computer is the precondition for the workings of the Internet, and not vice versa.

Since the 1950s the tradition of information retrieval (IR) is known for research into the use of computers for problems of storing and retrieving information. However, mainstream IR is not particularly known for showing an interest in sociohistorical issues of the use of computers for information storage and retrieval. Rather, on some points this tradition can be characterized as "...a partly unreflexive response to developments in computer and telecommunications technology in the late 1940s." (Warner, 2001, p. 1). Accordingly, in line with Julian Warner (2001), the following discussion will try to examine the relationship between the computer and knowledge organization as a reflexive response.

Niels Ole Finnemann (1999a) has argued that the computer is part of the social and cultural transformations witnessed in today's societies. He defines the computer as a multi-semantic machine and considers it a medium for the representation of knowledge in general. Finnemann stresses that what characterizes the computer as a medium is its capability of encompassing functions that were formerly handled by different media separately. These "old" media now become *genres* within the digital computer (Finnemann, 1999b, p. 13). Finnemann (1999a, p. 147) mentions three distinct characteristics of the computer: *First*, the computer is capable of producing, editing, processing, storing, copying, distributing, and retrieving knowledge. *Second*, the computer is a medium for presenting linguistically (spoken or written), formally, pictorially, and auditorily expressed knowledge. *Third*, it is a medium for communication (including mail, telephone, television, radio, telegraph). As a consequence of these functions, Finnemann (1999a, p. 147) claims that we see the beginnings of one globally distributed, electronically integrated archive of knowledge. Witnessing this globally distributed, electronically integrated archive of knowledge has influence on what is known and what can be known, because it determines the means of how to find out what *is* known. It is obvious that this globally distributed, electronically integrated archive of knowledge is also part of the infrastructure of society, because any given society is to a large extent defined by what is, what can be, and, how to find out what is known. To the extent that this is right the LIS con-

cept of knowledge organization becomes more than ever connected to what might be labeled the "social epistemological infrastructure" of society. This also seems to be implied by Finnemann (1999a):

> "Since the computer provides new ways to produce, represent, and organize knowledge in general as well as new ways of communication, it also provides a change in the societal infrastructure, in so far society is defined by the methods of knowledge representation and communication." (p. 147)

These functions of the computer as a medium have been strengthened and manifested by the Internet.

The advent of the Internet as a source of knowledge or information implies that information seeking in this globally distributed, electronically integrated archive of knowledge becomes more than ever a part of the social and cultural practices of society and its members. This being the case implies a need for organized knowledge. This may sound trivial. But the point is that knowledge organization now, more than ever, has to take on a visible social responsibility in order to fulfill its role in the "social epistemological infrastructure" of society, because many more people than ever before rely on it. They do so exactly because the computer takes on tasks, as pointed out by Finnemann (1999a, 1999b) that formerly were carried out and handled by different media, and because the Internet is part of people's everyday and work activities. The social responsibility of knowledge organization consists of, among other things, determining what subject access points the texts are going to have (see for example Hjørland & Kyllesbech Nielsen, 2000) and which search and navigation facilities are available. Not all access points are necessarily desirable for all kinds of electronic texts. The indexer must determine which access points are appropriate for a particular kind of text. The role of the indexer therefore seems to be similar to the one Finnemann (1999b) ascribes to the hypertext-author: "...the role of the author is to reduce the unlimited optional freedom to a set of reasonable, or attractive, motivated choices, all of which should be worth to pursue – at least if one actually want the user to utilize the possible options." (p. 27) Consequently, knowledge organization cannot escape a value-laden approach to its practice. This is, however, not a bad thing. It is a recognition and exploitation of the interpretive skills humans possess and it enforces knowledge organization to take part in the socio-political game of shaping knowledge to help provide "the best textual means to an end" (Wilson, 1968, p. 21). Otherwise the social responsibility of knowledge organization cannot be accounted for and an argument for its qualitative difference becomes superficial.

From another point of view, Bolter (1991) considers the computer and electronic writing almost a natural consequence of the history of writing. Bolter argues that the computer and its concept of hypertext must be seen as a natural development of writing *and* as a radical departure from the textual linearity fostered by writing and printing, along with its influence on the form-content aspect. The computer and the concept of hypertext do rest on the technical nature of writing. The crucial difference is the way hypertext in computers provides an opportunity for a radically different mode of composing, organizing, and reading texts. This is what Bolter considers a change in writing space. This is at the same time also the problem with Bolter's conception of hypertext. He seems to argue that hypertext provides the reader with a unique interpretative authority of the text that the reader did not have before. In this way Bolter does not recognize that in order for the reader to read a text in appropriate ways, the reader is dependent on a hypertext author (see Finnemann above) that makes this kind of reading possible. Further, by giving authority to the reader in the act of reading, Bolter does not pay attention to the fact that texts, or hypertexts, are always produced within some discourse community that is historically developed and has therefore already loaded the texts with meanings, conventions, and interpretations before a particular reader approaches them.

Although Bolter did not think of the Internet (nor of the Web for that matter), as we know it today, this change in writing space has implications for the LIS concept of knowledge organization. With the Internet, and its many kinds of texts (and genres), it is evident that hypertext is an important aspect of knowledge organization. It is a means and a mode of structuring texts and genres on the Internet, and in that way, the LIS concept of knowledge organization becomes connected to hypertextuality and change to embrace the organization and representation of (hyper)texts in digital knowledge archives. Further, these digital knowledge archives can be seen as expressing a social organization of knowledge enforced by a transformation in the means and modes of communication. In this way the Internet is an inherent part of a new social organization of knowledge, as is the LIS concept of knowledge organization.

Conclusion

In this article it has been argued that the LIS concept of knowledge organization is subordinate to a broader social organization of knowledge. The historicity of the LIS concept of knowledge organization in relation to the means and modes of communication in society indicates that, to the extent the social organization of society is defined by its means and modes of communication, the LIS concept of knowledge organization is altered when a new communication technology enters the scene.

Viewing the LIS concept of knowledge organization from a medium-theory perspective illustrates how the concept can be seen as an inherent part of the interaction between media and culture. Tracing the historicity of the LIS concept of knowledge organization through the lenses of medium theory suggests that the latter can help to illuminate the socio-historical nature of the concept. Medium theory offers knowledge organization theory a socio-historical perspective on the role of various media in society and how they shape the storing and communication of knowledge. Medium theory does not suggest solutions to concrete knowledge organization problems. It does, however, force knowledge organization theory to consider knowledge organizing activities in a broad socio-historical perspective. Such a perspective is necessary when evaluating the strengths and weaknesses of particular ways of organizing knowledge in information systems because the very strengths and weaknesses are themselves historically developed. An example of this is the classic debate between the uses of controlled vocabulary versus uncontrolled vocabulary in knowledge organization (see for example Rowley, 1994). This debate could not take place without the availability of certain technologies for organizing knowledge.

Writing, printing, and computing have, throughout history, brought about significant social and cultural changes in modern societies that have resulted in changes in the social organization of knowledge in society. They have done so by fostering new ways of producing, communicating, storing, retrieving, and organizing knowledge. Writing, printing, and the computer/Internet have in this connection all contributed to changes in the LIS concept of knowledge organization. In oral cultures knowledge organization and social organization are intertwined because these cultures are not in possession of any externalized means of storing knowledge. Writing provides this externalization and social organization is mediated through the use of writing and lists and other record-keeping devices to control these writings. The printing press fostered a media industry supplying society with a variety of texts. Texts were re-structured according to new principles of organization such as alphabetization to be used in indexes. The computer is capable of storing and organizing texts in ways that enhance their retrievability, and the ways that knowledge can be organized in digital archives on the Internet by using a variety of potential access points. As a consequence, this relationship between communication technologies and the LIS concept of knowledge organization is in constant socio-historical interaction.

By analyzing the LIS concept of knowledge organization in connection with the various ways of communicating it has been argued that this conception of knowledge organization is always part of a broader human activity, expressing a primary social organization of knowledge that is historically constituted. This must be recognized and addressed in knowledge organization research in LIS. Otherwise our concept of knowledge organization becomes too abstract and detached from the communicative activities it serves. Thus, the narrow LIS concept of knowledge organization is in interaction with and derived from the social organization of knowledge. This indicates that a relevant socio-historical background and framework for the LIS concept of knowledge organization is how humans have organized their intellectual activities throughout history in terms of particular means and modes of communication.

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Notes

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2 It was not, however, before the late 18th century authors gained legal rights over their works as part of the commodification of literature (see e.g. Foucault, 1979; Rose, 1993; Woodmansee, 1994; Siskin, 1998). Nonetheless, printing paved the way to this notion of the author.