

Bibliography (Field of Study)

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Abstract: This article presents bibliography as a field of study. It consists of several traditions, of which enumerative (or "systematic") bibliography is considered most important in relation to information science, but at the same time tends to be rejected as a scientific or scholarly field by other bibliographical traditions. It is about making, using and evaluating bibliographies, which list all kinds of publications. Analytic, descriptive and textual bibliography are other subfields, which are important for establishing the identity of a given document (is the Hamlet that scholar A is reading the same Hamlet that scholar B is reading?) and for providing critical editions of important works. Historical bibliography (with the sociology of text and book history) is yet another subfield, a very broad one that lacks coherence, but which provides important perspectives on the functions of different kinds of publications. In the UNISIST model, bibliographies are considered secondary kinds of publications (based on primary literature and a prerequisite for tertiary literature). From the Library of Alexandria (c. 285- BC) to Google (and Google Scholar) it has been a utopian dream to establish universal bibliographical control, to make all publications relevant for those needing any special set of them. To optimize visibility and retrievability of documents is an important task for information science, related to the goal of bibliographical control, and to literature- and information searching in bibliographic and full-text databases. A theoretical view on (enumerative) bibliography was suggested by Margaret Egan and Jesse Shera in 1952, in which a new field called "social epistemology" was seen as a "parent" discipline for the study of bibliography. This view is critically examined in this article, and it is suggested that Shera's 1951 characterization of social epistemology represents a better foundation for bibliography.

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1.0 Introduction

The term "bibliography" is used about a kind of document (which is characterized by focusing on providing bibliographical references to published documents), as well as about a field of study (or fields of study). This article focuses on the last sense, while an article about the first sense is planned as an independent article.

Foot (2006) found that bibliographical studies originated in nineteenth century with an emphasis on "enumerative bibliography," which means the norms and processes of making lists of publications and the typologization and evaluation of such lists. From the end of the nineteenth cen-

tury the field widened out to include historical bibliography and the study of books as material objects. In the mid-twentieth century this wider approach narrowed down, as a consequence of much emphasis being placed on descriptive, analytical, critical and textual bibliography, but again widened out under the influence of French book historians. These different fields (or subfields, approaches or traditions) of bibliography are briefly presented in Section 2 of the present article.

The relations between bibliography on the one hand, and on the other hand information science (here considered synonymous with library and information science, LIS^[1]) with knowledge organization (KO) are important^[2]. What

today is called “information science” had, according to Kline (2004, 19), “bibliography” as one of its former names:

Called bibliography, documentation, and scientific information during the first five decades of the twentieth century, the field became known as information science in the early 1960s^[3].

One of the most important indicators of the relationship between documentation and information science is the change in name of the *American Documentation Institute* (founded in 1937) in 1968 to the *American Society for Information Science* (today the *Association for Information Science & Technology*, ASIS&T)^[4]. The term LIS arose in connection with the inclusion of information science by library schools from 1964 until almost all schools had changed to LIS by the end of the 1990s (cf., Galvin 1977).

“Documentation” is thus a former name of information science, and it is closely related to bibliography^[5]. The founder of the documentation movement, Paul Otlet, founded the *Institut International de Bibliographie* (IIB) in 1895, and wrote articles about bibliography as a science (Otlet 1990a; 1990b), which understood bibliography to be about publications in general, not just about books. Otlet wrote (1990b, 86):

The Science of bibliography can be defined as that science, whose object of study is all questions common to different kinds of documents: production, physical manufacture, distribution, inventory, statistics, preservation, and use of bibliographic documents; that is to say, everything which deals with editing, printing, publishing, bookselling, bibliography, and library economy. The scope of this science extends to all written or illustrated documents which are similar in nature to books: printed or manuscript literary works, books, brochures, journal articles, news reports, published or manuscript archives, maps, plans, charts, schemas, ideograms, diagrams, original or reproductions of drawings, and photographs of real objects.

Otlet created, with Henri La Fontaine, the *Universal Decimal Classification* (UDC), which illustrates its close connection to the field of knowledge organization^[6].

There are indications that bibliography became less influential in relation to LIS when the field changed name to information science. Bibliography was considered a core element in schools of library science, but gradually the study of information behavior came to play a larger role at the expense of courses in bibliography. There were even some voices claiming “the bibliographical paradigm” to be obsolete (e.g., Henri and Hay 1994), a view which was counter argued by Hjørland (2007).

Michael Buckland raised the question (referred by de Fremery 2024, 1): “What might be gained by reinvigorating bibliography?”. This question indicates that bibliography has lost influence in information science, and that this loss may have been harmful. This question was raised by de Fremery (2024), by Hjørland (2024a), and is also central in the present article.

2.0 Different subfields of bibliography and their relations to LIS

2.1 Enumerative/systematic bibliography

Hjørland (2024a) found that the most important distinction is between enumerative bibliography (also called systematic bibliography and reference bibliography) on the one hand, and all the other bibliographical traditions on the other hand. Compared to other parts of bibliographical studies, enumerative bibliography seems to lack proper theory as well as recognized bibliographers^[7] (one of the leading persons, Theodore Besterman, 1904– 1976, was more a compiler of bibliographies than he was a theorist; another, D.W. Krummel displayed a research attitude and important insights [e.g., in his 1984 book^[8]], but overall his contributions seem insufficient to form the theoretical basis for enumerative bibliography as a research field). Leading bibliographers, such as W. W. Greg and Donald Francis McKenzie, considered bibliography a science, but did not include enumerative bibliography in this science, as they recognized its utility as a separate activity^[9] (it is well-known, that a list of bibliographical references in itself cannot be accepted as a research contribution in academia). Hjørland (2024a) argued however, that enumerative bibliography is the part of bibliography, which is most important for information science, and that information science with knowledge organization has provided the most important theoretical works which are relevant for this field. In other words enumerative bibliography is more connected with LIS than with other traditions of bibliography. The theoretical contributions from LIS include classification, indexing, and metadata assignment (or resource description) for documents in bibliographical databases, search strategies, recall and precision as evaluation criteria, bibliographical control, the use of references in literature searching, and much more. The term systematic bibliography indicates that candidates for inclusion in the bibliography are based on systematic criteria (e.g., lists of journals being indexed). Systematic bibliographies are necessary for systematic searches, and thereby also for systematic literature reviews, which illustrates its close connection to LIS.

There are various ways of classifying enumerative bibliographies, for example, national bibliographies, subject bibliographies, author bibliographies, and bibliographies lim-

ited to certain kinds of documents such as dissertations, journals, journal articles, books, and maps. As already said, bibliographies as kinds of documents fall outside the scope of the present article, but are mentioned here because the study of national bibliography, subject bibliography, etc. are parts of the field of enumerative bibliography.

Hjørland (2024a) concluded:

A domain in which systematic literature searching and thereby enumerative bibliographies and bibliographical control is taken most seriously is evidence-based medicine, where knowledge of the most important findings is of utmost importance. Much research is carried out about databases coverage of relevant findings, about retrieval strategies etc. Such research, about the bibliographical coverage and findability of documents relative to a research paradigm is a core issue for a theoretical research in enumerative bibliography as well as in information science.

The relation between enumerative bibliography and literature searching is further developed in Section 5.

2.2 Analytical, descriptive and textual bibliography

2.2.1 Analytical bibliography

Analytical bibliography studies the processes of making books, especially the material modes of production. One of its purposes is to show how the processes of material production affect the nature and state of the text preserved in the book. A main representative is Philip Gaskell (1974) *A New Introduction to Bibliography*. This book covers hand printed and machine printed books through the ages.

2.2.2 Descriptive bibliography

Descriptive bibliography emphasizes details about page layout, typefaces, bindings, and other elements that help identify a book's edition^[10]. It draws on analytical bibliography. Probably the main representative of this field is Fredson Bowers' (1949) book *Principles of bibliographical description*. As exemplified by de Fremery (2024, 184), the descriptions "created by Bowers and Greg made it possible to know that the Hamlet discussed by scholar A is the same Hamlet discussed by scholar B".

Three comments should be made. First, it is clear that not every writer can be carefully studied in the way that descriptive bibliography suggests. For average writers, the task of making precise identifications of versions of their works, must be done by themselves in cooperation with publishers and editors. As with the example with two scholars discussing Hamlet, ordinary researchers need to know if the text

they read and cite is the same as another author has cited. It is a sign of bad scholarship if the edition or version of a document is not made explicit and precise, for example, when articles are reproduced in edited books.

Second, in relation to electronic documents, two electronic copies of the same text can be considered entirely the same because each bit is checked in the copying process, and the probability that two copies are not exactly similar is extremely small. However, different instantiations^[11] or versions often have been published, and even the same file does not interact in the same way with different versions of the software used to display it. These facts are issues to consider in relation to digital documents related to the issues of traditional descriptive bibliography. Gants (2010) presents principles for description of electronic publications analogue to the principles developed by Bowers (1949).

Third, "descriptive bibliography" is not about the description of contents of publications, such as done, for example, by "abstracting journals" (e.g., Chemical Abstracts, MEDLINE, and PsycINFO). Neither is this field about descriptive cataloging of documents (see Tanselle 1977; Yee 2007) concerning the relations between descriptive bibliography and library cataloging). The ways of referencing in academic books and journals, such as ISO 690, "Harvard system", "APA-style", "Chicago style", "MLA Style", and "Vancouver system" or in electronic referencing systems such as "EndNote," "Zotero," "Reference Manager," "RefWorks" and "ProCite" have also failed to attract the interest of bibliographers as well as information scientists.

2.2.3 Textual bibliography

Textual bibliography is also called "critical bibliography". It was defined by Reimer (2015):

Textual bibliography attempts to establish the "state" of a text, especially in terms of the various versions that are extant, and analyzing who (author, editor, compositor, printer, etc.) was responsible for particular variants. Textual bibliography is obviously part of the process of preparing a scholarly edition of a text, though its significance is certainly not limited to editors.

Textual bibliography is used to produce "critical editions," which are attempts to construct a text of a work using all the available evidence. Prominent examples are studies of the Bible, of Shakespeare and other "Great Books" in different cultures. Such bibliographical studies have often been extremely important for subsequent researchers. Among the influential works in this field is G. Thomas Tanselle (1990), *Textual Criticism and Scholarly Editing*.

2.2.4 Considered together

Considered together, analytical, descriptive and textual bibliography do not have the same importance for LIS as enumerative bibliography has. However, libraries with collections of old and rare books have an interest in such studies in order to identify different versions of the books, and in order to support scholarly research based on them^[12]. Therefore, these areas of bibliography are important in relation to the management of some kinds of collections. In addition, principles and concepts developed in these areas may have importance for other areas of bibliography as well as for LIS (Tanselle 1977 advocated for a cooperation between bibliographers and cataloguers).

2.3 Historical bibliography / sociology of texts/ book history

Historical bibliography examines the history of the book as a cultural artifact. It explores how books and other documents have influenced and been influenced by historical contexts, including how they reflect and affect social, cultural, and intellectual movements. It includes the evolution of book production and dissemination over time as well as the history of reading practices. McKenzie (1999) focuses on how texts are intended by their authors as well as on how they are received and interpreted by readers. He advocates for a view of bibliography that not only acknowledges the technical and physical aspects of texts but also fully embraces their social and cultural dimensions. This is a wide field, which has been difficult to define. Krummel (2017, 479) found that if there are differences between historical bibliography and the new fields of study called “print culture” and “book history,” they are subtle and often irrelevant.

Information science also has interest in these kinds of studies, especially as this relates to scientific and scholarly communication and the roles different kinds of documents play in domains, between domains and in relation between science and the broader society. Although this part of bibliographical studies is broad, and in lack of coherence, it is important in order to obtain a deeper understanding of the fundamental issues in information science.

3.0 Bibliographies according to the UNISIST model

Bibliography is one among many types of documents. The UNISIST model, originally published in 1971, later revised and updated by Fjordback Søndergaard et al. (2003), offers an important sociologically-oriented perspective on the activities of scholarly communication. It seeks to draw attention to information communication between knowledge producer and knowledge user, as a system consisting of di-

verse organizational and documentary units each contributing to the division of labor in scholarly communication. It provided a model of scientific and technical information services and document types, in two dimensions, of which the most important is based on three levels: (1) primary sources and services, such as books and journals mediated by publishers (2) secondary sources and services, such as catalogs, bibliographies, and abstracting and indexing journals provided by libraries, clearing houses and producers of bibliographic databases (3) tertiary sources and services, such as systematic reviews and other forms of syntheses of the primary literature.

A model such as the one provided by revised UNISIST Fjordback Søndergaard et al. (2003) put bibliographies in the context of different institutions, services and document types, and thereby raises important questions such as, which documents from which disciplines are included in different bibliographies? What are the relative roles of bibliographies for users in obtaining the documents they use? The answers are domain specific, where, for example, evidence based medicine (EBM) is a field in which bibliographies are extremely important, while, for example, many fields in the social sciences do not rely on bibliographies in the same way.

4.0 Bibliographical control/bibliographies as infrastructures

For some purposes, bibliographical control is important. In general it is considered important in academia that knowledge production is based on knowledge about what has already been written or documented about a certain topic. Throughout history there has been a utopian dream of organizing all publications (or all “information”) and make it possible to identify all relevant documents. Hjørland (2023) discussed the following historical examples of attempts of fulfilling this dream:

- The Library of Alexandria (c. 285- BC)
- Gessner's *Bibliotheca Universalis* (1545)
- The abstract journal and subject bibliographical databases (1790-)
- The Universal Bibliographical Repertory, RBU (1895-)
- Union catalogs (1930s-) with WorldCat (1971)
- IFLA's and UNESCO's program on universal bibliographical control (1970s-)
- The World Wide Web (1989-) and Google

Each of these attempts can also be said to represent important bibliographical infrastructures, and an important task for information science with knowledge organization is to study the effectiveness and efficiency of such infrastructures, to communicate about them to potential users, and contribute

to their improvements. These infrastructures are seldom examined from a holistic perspective, but the so-called “Sputnik crisis” in 1957 made important attempts in the USA to improve its systems of scientific and technological communication, and produced influential reports, including the Weinberg Report (President’s Science Advisory Committee 1963) and the SATCOM report (Committee on scientific and technical communication 1969) (see also Rayward 2024 about the overall development of attempts to create international bibliographical control or “information order” since World War II). It seems important that the field of information science maintains a holistic focus on bibliographical infrastructures and their effectiveness and efficiency.

5.0 Literature- and information searching

Libraries have for more than one² hundred years had important tasks helping users finding the documents they need for their activities. They have done so by designing their catalogues to serve this task, they have provided open collections of reference works with bibliographies and they have made bibliographic guides (now including “Lib-guides”) and provided courses in literature searching for students in different disciplines. Library schools were active in this field, for example teaching (enumerative) bibliography as a subject, introducing kinds of bibliographies as well as important examples of concrete bibliographies. Professional organizations, such as the American Library Association (ALA) contributed, for example with publications such as Webb et al. (1986) *Sources of Information in the Social Sciences. A Guide to the literature*. In short, bibliography was very important in this period. Before the online period, this was typically called “literature searching”, in the online period typically changed to “information searching” or “information retrieval,” although mostly the same bibliographical databases were used (e.g., *Psychological Abstracts* founded in 1927, but changed to electronic format and called *PsycINFO* from 1967).

When the online industry developed from about 1963, their services were partly offered by research libraries, and partly by so-called “information centers”. The formerly influential database host DIALOG organized its databases in five main groups (Niro et al. 2008, 5):

- Bibliographic databases. Each record in a bibliographic database is a reference or citation (many also include a summary or an abstract) to a publication, magazine or journal article, news story, patent, conference paper, etc.
- Numeric databases. Each record in a numeric database is a table of statistical data, often with text added.
- Directory databases. Each record gives factual information about companies, organizations, products, chemical compounds, etc.

- Complete text databases [fulltext databases] Each record includes the complete text of magazine [or journal] articles, newswire stories, patents, etc. [Books, encyclopedias]
- In addition, some databases contain a mix of several different kinds of data, such as bibliographic and fulltext records.

Among these groups, the bibliographic databases played by far the most important role in this period. In library schools (which from 1964 gradually changed their names to schools or departments of library and information science, LIS) the teaching of bibliography now typically included online searching (an influential textbook was Harter 1986), which clearly contributed to increase the status of LIS/information science.

Around 1990 began a new development when full-text databases became common (which was primarily due to falling costs of storing information on computer discs) and the development of the Internet and search engines. From that time full-text retrieval began to compete with databases that only contains bibliographical records. Bibliographical searching still is important, and, for example in EBM are “classical” databases like MEDLINE still considered core information sources (see Higgins and Green 2009 and updates). The core competencies of information specialists involve both bibliographical databases and fulltext-databases, and the basic principles are not much different. What is different, of course, is the tendency to let algorithms and artificial intelligence perform the searches. Hjørland (2015) argued however, that such systems, although very user-friendly, do not provide the necessary transparency and control over the search process for important purposes such as EBM. It is therefore no exaggeration to say that core competencies of information professionals to select, use and evaluate information systems are still closely tied to the concept of bibliography.

The research front in the study of bibliography is visible, for example, in EBM, where much research is carried out about databases coverage of relevant findings, about retrieval strategies etc. Such research, about the bibliographical coverage and findability of documents relative to a research paradigm, is a core issue for theoretical research in enumerative bibliography as well as in information science.

6.0 Theory of enumerative bibliography

Enumerative bibliography is by some researchers considered a part of bibliographical studies (e.g., Foot 2006), while other researchers have denied this connection (e.g., Greg 1930; Bowers 1949) a. It is generally considered theoretically weak compared to other bibliographical traditions. However, as stated in Section 2.1, it is closely related to in-

formation science. Here we shall consider its theory with the point of departure in Egan and Shera (1952) “Foundations of a Theory of Bibliography,” which suggested (131-134) that “social epistemology,” an envisioned new field of study should function as a “parent” discipline for [enumerative] bibliography. This paper is often cited as the first occurrence of the term “social epistemology,” but as documented by Hjørland (2024b) the term was used by Shera (1951, 82) in the context of classification and in another sense. While the 1951 understanding is considered valuable, the understanding provided by Egan and Shera (1952) seems muddled. The analysis of why this is the case can shed light on the theory of enumerative bibliography.

Egan and Shera (1952) aimed to base the theory of bibliography on the needs of users, and wrote (135):

The first basic need is for a complete analysis of the kinds of information, knowledge, and insights developed by all the contributory sciences or disciplines that are brought to bear upon each of the many focal points of human activity. Such analyses would answer, for example, such questions as: What information or knowledge is required when a business enterprise or commercial undertaking proposes to open a new market? What information or knowledge should be available when a legislative body is considering a new or revised tax law? What information or knowledge is essential to a chemical industry that is developing a new synthetic fiber? Such situations might be multiplied indefinitely; although each is unique, all probably fall into a finite number of discoverable types distinguished from one another by the possession of identifiable characteristics.

The authors recognized an important problem (135):

That exploration of this kind cannot be done once and for all is obvious, for the situations themselves will change as the factors that condition them change. An illustration will make this clear. Let it be assumed, for example, that someone should suddenly establish beyond all doubt that the cause of poliomyelitis is not bacteriological but systemic and chemical. Such a development would be immediately reflected in a drastic alteration of the informational needs and requirements of those working to improve the diagnosis, treatment, cure, and prevention of this dread disease.

The example says “suddenly establish beyond all doubt,” but why this reservation? Why not say: “the scientific theory that the cause of poliomyelitis is bacteriological is replaced by a new theory that it is systemic and chemical”. The example therefore suggests that the information needed

change when the theory in the domain of enquiry changes. This would require that bibliographic services are tailored to theories rather than to users, a view that corresponds to the domain analytic perspective (cf., Hjørland 2017). In a given field, for example, art studies or psychology, there may be competing theories and “paradigms”, and thereby a need for competing bibliographical services, in psychology for example cognitive, psychoanalytic and sociocultural services. The providers of bibliographical services are therefore necessarily parts in the epistemological struggles in the domain (therefore, as pointed out by Hjørland (2024b), it was very unfortunate, that the epistemological understanding of social epistemology in Shera (1951) was replaced by a sociological understanding in Egan and Shera 1952).

Egan and Shera were right when they suggested social epistemology as a parent discipline for enumerative bibliography, but unfortunately they forgot the important epistemological perspective suggested by Shera (1951), which, according to Hjørland (2024b, 194) implied:

1. That a classification cannot be universal, serving all purposes for everybody that a classification cannot be permanent;
2. That classificationists build on their predecessors, making classifications developmental and dynamic;
3. That classifications are based on “the materials at hand”, i.e., based on the knowledge and concepts of its time;
4. That classifications are designed to serve specific needs.

Hjørland (2024b, 194) continued:

Shera’s expression “the intellectual environment of its age” may be translated to the dominant worldview, paradigm, epistemology, or metatheory. Probably, we should not take “generation” too literally. It may well be that some classifications have a longer and some have a shorter lifetime and that not all fields of knowledge necessarily develop in a synchronized way. What is important is that the classifier (and the resulting classification) is influenced by views represented in a broader social, cultural, and domain-specific context. This is a clear social epistemological position that denies the possibility of constructing classifications based on the isolated individual’s observation and cognition.

This view is opposed to Otlet’s (1990b, 85) view, that considered that bibliography and documentation should communicate scientific information “in an analytic form from which any personal interpretation has been removed”. Otlet’s article even suggested that books would become obsolete, and the production of knowledge would change to publication of catalog cards and loose-leaf publications,

which should constantly be updated and replace older catalog cards and loose-leafs^[13]. Such thoughts reflect a positivist philosophy, which is strongly opposed to Shera's social epistemology.

7.0 Conclusion

What, then, is bibliography? The conclusion here is that that this term does not relate to a single field of study, but to a family of fields as presented in Section 2. Some of these areas are highly interrelated, whereas enumerative bibliography has a weaker connection to these highly interrelated fields, but has a tighter connection to LIS. Therefore, we cannot expect a single definition of bibliography as a field of study to be found^[14].

What, then, is enumerative bibliography (synonyms: systematic bibliography and reference bibliography)? Like the other fields labeled "bibliography" in Section 2, enumerative bibliography is about the study of documents (or "information resources"). The focus of enumerative bibliography is to facilitate information retrieval by listing, analyzing and describing documents in order to enable users to identify the documents needed for a specific task. The concept of "bibliographical control" is central, just as the synonym "systematic bibliography" as already said, indicates a relation to "systematic search" and "systematic review".

Enumerative bibliography, in some form or another, is an essential tool for science and scholarship. Hjørland (2012, 63) wrote (translated by the author):

All good research – and all good, independent university assignments – begin and end in the literature of the discipline.

If a person P is educated in discipline X, this means that the research done in X is what makes P a professional person (as contrasted to an amateur). P may draw on other disciplines, but the point of departure is the field in which P is educated. P may find serious gaps or problems in the literature of X (in general or just in relation to P's topic), and therefore P may draw on other disciplines or on his own common sense. This implies, however, an attempt to improve X, and if P argues for this in the literature of X it may constitute a contribution to X. If nobody contributes to X, and if claims in X are not examined, then X will be sterile, obsolete, or simply useless. This implies that people educated in X, including P, cannot be a competent professional, although they may be unaware of this because they have not examined the basis of what they have been taught. This process also implies that a contribution to X is not just an isolated fragment, but is at the same time an argument about developing X in a certain direction. There are always plenty of different directions in which a given discipline can be developed, but if too many ways are

followed at the same time, it means that the discipline is dominated by what Cronin (2002) and Hjørland (2013, 208) called "centrifugal forces" bringing about conceptual fragmentation with the risk of a dissolution of the field. Any discipline therefore needs a balance between centripetal and centrifugal tendencies^[15] in its research fields.

It follows that in well-functioning disciplines or specialties, researchers are interested in following what their colleagues are doing, and the directions in which the field is developing. For this purposes, different kinds of bibliographic tools are important for current awareness as well as retrospective searches and citation networks. In order to support these activities in an optimal way, bibliographic tools must be based on knowledge of theoretical positions in the field, and a conscious priority. Billig (2013) suggested that in order to succeed in the social science, researchers must learn to write badly. Of course, this is not a goal that an ideal bibliographical services should aim at supporting, but Billig's view should not be considered a joke, but a serious criticism of the state of the art in these domains, which is also important to know about for information and KO professionals.

Hjørland (1992, 189) concluded: "Thus an analysis of a subject is itself, at its most profound, a part of the scientific process of knowledge gathering". This can be generalized to bibliography as a whole: The provision of bibliographical services and product, is, in the end, a matter of supporting the activities of researchers and the theoretical development of the discipline or specialty. If, for example, information specialists are unable to distinguish between bad and good writing in the way suggested by Billig, they are in a bad position to provide quality information services^[16]. In short, a subject bibliography is a kind of map of a subject domain, and as is the case with other maps, it cannot be a neutral mapping^[17]. This view corresponds to Shera's 1951 social epistemology, and is opposed to Otlet's positivism as described above.

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Endnotes

1. Information science and LIS are not always considered synonyms, and "information science" is an ambiguous term. Hjørland (2013, 223-224) wrote: "In 2002, two different international conferences about the foundations of information science took place. One was the Fourth Conference on Conceptions of Library and Information Science (CoLIS 4) in Seattle, USA, the other

was the International Conference on the Foundations of Information Science (FIS).²⁶ Were these conferences discussing two different fields, each of which claimed to be an “information science”, or were they two different scholarly meetings in the same field? Perhaps they are both forums for multidisciplinary approaches using different disciplinary outlets? Whether they represent one, two, or more kinds of information sciences can only be uncovered by theoretical analysis of the core assumptions expressed in the respective conferences and their proceedings. Inasmuch as FIS is founded on cybernetics and CoLIS is founded on something more related to social and epistemological studies of knowledge production and dissemination, different information sciences may well be at play”.

2. One of the anonymous referees objected to the view that KO is considered a subfield of information science. The definition and delimitation of fields/terms such as KO, information science, library and information science (LIS), documentation, bibliography etc. is a complex task. I have formerly written about this in, for example, Hjørland (2013; 2016; 2018; 2018b) and I find that a further discussion of this falls outside the scope of this article. The referee indicated that (s)he considers KO to be a science in itself. I have some reservations about this view. As far as I know, “knowledge organization” (or “information organization”) only exists as courses in the field of LIS/information science, and therefore must be considered a subfield of LIS (or information science). One cannot, in my opinion speak of a science (or discipline or field of knowledge) as a purely hypothetical, or possible, or logically given thing. ISKO is a community of KO, but it is not in itself enough to define a scholarly discipline (let alone given theoretical divergences within ISKO). Also, the term “science” seems excessive; field of study or discipline are more modest.
3. An anonymous reviewer wrote: “Kline’s (2004) statement, which suggests that Bibliography is an old name for Documentation and that Documentation is an old name for Information Science, lacks argument and needs to be questioned”. Well, I admit that the development is complex and not unambiguous. It is however outside the scope to provide a more detailed account (see e.g., Hjørland 2013). Kline’s quote is made in order to state the relation between bibliography and LIS (with KO). Some other comments from the reviewer seem-not to indicate that (s)he disagrees that there is a close connection between these fields.
4. One of the anonymous referees wrote: “Basing oneself on changes in the names of institutions, such as the change of the Institut International de Bibliographie (IIB) to the International Federation for Documenta-

tion, and of the American Documentation Institute to the American Society for Information Science, does not theoretically support the idea that Bibliography became Documentation and that it would later become Information Science. This is merely a perspective that seeks to understand scientific fields as excessively linear in a causal relationship”. I agree with the reviewer that it is important to distinguish between the institutional constitutions of fields of knowledge and their theoretical constitutions. I have in former writings, e.g., Hjørland (2000), objected to the institutionalization of the term “information” rather than “document”/ “documentation”. However, each of us cannot operate with our individual languages, but has to consider the common languages as institutionalized in university departments, in journal names, in scientific societies etc. Therefore, I use names in institutions such as the *Institut International de Bibliographie* (IIB), the *International Federation for Documentation*, the *American Documentation Institute* and the *American Society for Information Science* as indications of overall trends. I see such name changes as neither linear nor causal, but just as representing a dominant but problematic trend or paradigm. I fully agree with the reviewer that the field of bibliography has a complex history, including the history of “informatika” in Russia. But when we use terms, we cannot each time produce a listing of different meanings, but have to suggest our own concepts in an argument with the dominant meanings in the context where we live.

5. Buckland (2021, x): “The resolution was to adopt document as the term of choice for any and all objects regarded as signifying, as evidence of anything. By extension, during the 1930s documentation came to replace bibliography as the term of choice in Otlet’s circle and elsewhere. What began as an International Institute for Bibliography in 1895 became an International Institute for Documentation (IID) in 1931 and the International Federation for Documentation in 1937”. Compare, however, Buckland (2021, xiv): “Paul Otlet was dedicated to an expansion of the interest in physical forms of documentation beyond printed documents to include administrative records, statistical data sets, heritage objects, specimens, and records of every kind”.
6. An anonymous referee wrote: “The gloss that Otlet created ... the UDC ...” is quite a gloss. The Smiraglia and van den Heuvel piece (2013) provides more context. Otlet was quite concerned with KO as a basis for many things, right down to architecture (see the work of Wouter van Acker for example, start with his 2011 PhD dissertation).
7. Biagetti (2020) is an article suggesting the historical-bibliographical paradigm as a supplementary paradigm

in knowledge organization. Her article is mainly based on Alfredo Serrai's monumental work *Storia della Bibliografia* in 11 volumes (Serrai, 1988-2001). Biagetti's article suggests that Serrai might be the most important researcher in [enumerative] bibliography, as his research is based on a careful study of bibliographies and library catalogs over centuries, emphasizing the development of indexing theory (mainly based on rhetoric). Unfortunately this work is only available in Italian. Although it has received citations in the English-language literature (including a few in LIS/KO journals) Serrai is still not a well-known name in enumerative bibliography.

8. As pointed out by an anonymous reviewer, Krummel (1986) treated the whole field of enumerative bibliography in some detail, from the situation of the academic purposes of bibliographies to the enumeration of citation styles, annotation, and internal organization.
9. In the field of bibliography Cowley (1939, 6) wrote that "subject bibliography" in his opinion is not really bibliography, and therefore this term should not be used about these kinds of work, but should be replaced by, for example, "register", "catalogue", or "guide". He wrote: "[In this] kind of compilation [...] Minute description of the physical form of the material is therefore out of place, whereas criticism of its subject-matter is all-important". It is important to consider, however, that the kind of bibliography which gave rise to the documentation movement and thereby to information science and library and information science (LIS) with knowledge organization (KO) is the kind which Cowley dismisses.
10. An example of how descriptive bibliography typically describes the contents of books is given by Cowley (1939, 120): "Analysis of the Contents. The object of the contents paragraph is to provide a complete description of all the literary contents of the book or rather all the printed parts of it, including preliminaries, text, appendices, tables, etc., and to indicate their places within the physical framework. Hence every printed part is mentioned in the order in which it occurs and a reference is given to pages on which each part begins and ends. For this purpose every piece of printed matter is treated as of equal importance, even if it has no real significance for the literary value of the book, and every page must be accounted for, including blanks, if a complete description is being written. In subject bibliographies only the text and such subsidiary parts as modify the value of the text need to be mentioned".
11. Concerning the concept "instantiation," see Smiraglia (e.g., 2001; 2017).
12. An anonymous reviewer commented: "When the author states that descriptive, analytical and textual bibli-

ographies do not have the same importance as enumerative bibliography for Library and Information Science, except in cases of libraries that have collections of rare and old books, he seems to neglect the fact that Library and Information Science courses also concern themselves with subjects corresponding to book publishing, book history, bibliographic publications, among others". Yes, this is correct, but still does not change my view that enumerative bibliography is closer related to LIS than it is to analytical and descriptive bibliography, and for LIS is the most important part of what goes under the name of bibliography.

13. This description of Otlet's philosophy represents an extreme example, which is not intended to characterize all of his opinions. The example is presented to illustrate contrasting philosophical positions in bibliography, not as an overall evaluation of Otlet's work, which should be the topic of an independent biographical article.
14. One of the anonymous reviewers suggested a definition of bibliography. He suggested:
 - " – [1] the act of resource description even in library cataloging is derived from bibliography and follows a set of particulars known by various names, the most well-known being a "formulary";
 - [2] the formulary (or rules) yield a description that matches precisely the details of specific artifacts (items) and of the works contained in them;
 - [3] the structuring of retrieval systems (files, bibliographies, catalogs, etc.) for works constitute an alphabetic-classed form of KO in which the class is named for a creating entity, divisions identify the works created by that entity, and subdivisions identify the specific items/artifacts that contain and transmit those works;
 - [4] the formularies themselves constitute a form a set-theoretic that is essentially the "science" of bibliography".

Comments: (1) The relation between library cataloging and bibliography has, according to Tanselle (1977), been intrinsically complex. He regrets the lack of contact (and the sometimes unsympathetic, or even Hostile attitudes, toward each other's practices) and argues for a cooperation between the two fields. Therefore, I doubt we can say that library cataloging is derived from bibliography, although there probably has been some influence. (2) The cataloging rules are influenced by changing ideas, theories and ideals in the library community. There is no reason to believe that one best way of describing documents have been reached, rather, any set of rules always tends to serve some interests at the cost of other interests. It is one of the tasks of bibliography to examine the functionality of different descrip-

tions in relation to various goals and interests. (3) It is hard to understand the reviewer on this point. For me, what is constructed in catalogs and other kinds of bibliographical databases are bibliographical records. Such records provide different kinds of access points for information searching, including subject access points (see Hjørland and Kyllesbech Nielsen 2001). (4) The optimization of bibliographical records may be considered one task for the field of bibliography, but bibliography (but not cataloging) may be also about selecting the documents to be included in bibliographies, and about developing different kinds of bibliographical tools for different purposes and users.

15. Corresponding to what Becher and Trowler's 2001 discussed as "convergence" and "divergence" in research fields.

16. In national bibliographies formal criteria, not quality criteria, are used to define what should be included. In *Web of Science* the dominant selection criterion is the journal impact factor (JIF). Such examples seem to contradict the statement "if information specialists are unable to distinguish between bad and good writing, they are not able to provide quality information services". A defense for this thesis is that (1) national bibliographies may serve the book trade well, but be a poor tool for finding literature by researchers (2) That the use of JIFs as selection criterion implies a hypothesis that can be questioned. Probably this criterion is used because it is a cheap and easy way to manage the selection problem. Information specialists' knowledge about good and bad writing may be utilized in indirect ways, for example, by make methodological, epistemological and related characteristics visible for the searcher.

17. *The Times Comprehensive Atlas of the World* (2014, 42) wrote: "The power of maps. Maps are an extremely powerful form of geographic representation. Maps define territory – they tell of ownership and domination, they marshall spatial information. They can also subvert and propagate alternative worldviews. All maps serve an interest and work through two main forms of power. First, the external power of their creators, often governments and their agents, who control the content of maps both in terms of what is included and what is withheld, and thereby broadcast a particular viewpoint. Second, the internal power of maps themselves – the perception of maps as precise, objective and accurate representations of reality which convey an image of geographical order. Maps are still regarded by many people as dispassionate representations of the external world. However, this has been challenged in recent decades as their political and cultural connotations are revealed and become more widely understood".

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