

Dewey Decimal Classification (DDC)

Birger Hjørland ¹

<https://orcid.org/0000-0001-9535-1732>

¹ University of Copenhagen, Copenhagen, Denmark

Abstract: The Dewey Decimal Classification is today the world's most widely used library classification system. This article presents the basic characteristics of the DDC, and discusses these in the context of their alternatives and research in the field. It provides a brief overview of its historical development, and addresses the theoretical issues and criticism raised against it. It argues that there is a discrepancy between on the one side Dewey Decimal Classification's worldly success, and on the other side its academic qualities. Some of the problematic issues in the Dewey Decimal Classification are connected to the philosophy of its founder, Melvil Dewey, which is characterized by a narrow pragmatism emphasizing the "mark and park" function at the expense of "keeping pace with knowledge". Henry Bliss developed an alternative philosophy and classification based on the principle that a bibliographic classification shall represent the scientific and educational consensus, leading to a closer connection between library classification and the study of knowledge domains. Finally, Jesse Shera developed a "social epistemology," emphasizing a deeper kind of pragmatism, which recognized fundamental disagreements in knowledge and its organization, implying an even deeper connection to knowledge domains (which today form the basis for the domain-analytic approach). None of these later alternatives has the same popularity as the Dewey Decimal Classification, but it is argued that they provide a healthier basis of knowledge organization as a field of study. It is important that the library and information science community consider such philosophical issues and how they influence the knowledge organization systems and knowledge organization processes.

Keywords: Dewey Decimal Classification; Library classification; Classification theory and principles

1 Introduction

The Dewey Decimal Classification (DDC), first published by Melvil Dewey in 1876, is today the world's most used library classification system, and it is often taught in courses in library and information science (LIS) and knowledge organization (KO). From this perspective, it is an extremely successful

classification. However, it is also a system, which has met with much criticism and it has a very long history of attempts to introduce better alternatives, some of which are based on research in LIS, KO, information retrieval (IR). An important question is if this research provides arguments for an alternative approach compared to the approach that lies behind the DDC. In order to answer this question, the philosophy of Dewey must be considered in relation to alternative approaches (although, as we shall see, the DDC during its history has not always been faithful to Dewey's principles). One alternative is the facet-analytic tradition, in which S. R. Ranganathan is an important name, and which led to the development of the Colon Classification, a system that, however, even in Ranganathan's homeland India, today is surpassed in use by the DDC. The principles of facet analysis are nonetheless widely recognized as important, and, as shown in Section 2.4, they have been influential in the DDC since DDC17¹ from 1965 (without ever being fully implemented). Two other theoretical approaches developed by respectively Henry Bliss and Jesse Shera are so far less considered in KO, but provide fruitful points of departure for bibliographical classification. Bliss developed an alternative philosophy and an alternative classification system based on the principle that a bibliographic classification should aim at representing the scientific and educational consensus (see Broughton, 2022). This led to a closer connection between library classification and the development in knowledge domains. Jesse Shera developed a "social epistemology" which emphasized a deeper kind of pragmatism, which recognized fundamental disagreements in knowledge and its organization and implied an even deeper connection to concrete knowledge domains (see Hjørland, 2024).² Shera's approach can be understood as related to the domain-analytic approach in KO (Hjørland, 2017a). It should be emphasized, however, that even if other classification schemes may be based on a philosophy aiming to reflect scientific consensus, their resources and conditions may not allow appropriate updating.³

The present encyclopedia article is an attempt to describe the DDC from the point of view of what is most important to teach about this system from an overall KO perspective in comparison to other bibliographic classifications, and in relation to main theories in KO. It tries to answer the question: What are the

most important characteristics of DDC as a kind of knowledge organization system (KOS)? It is not intended to be a users' guide to the DDC, to replace textbooks in relation to the technicalities of the system, to provide biographical information about Melvil Dewey, to provide detailed historical information, or trivia on the DDC.

Section 2 characterizes the DDC in 14 main points, which is an attempt to provide a straightforward, systematic and comprehensive listing of the most important characteristics of this system:

The DDC is:

- 1 A library classification system;
- 2 A de facto standard;
- 3 A general classification;
- 4 A modified enumerative system;
- 5 A discipline based classification;
- 6 A hierarchical classification;
- 7 A decimal classification;
- 8 A system providing relative locations of documents;
- 9 A system with a relative index;
- 10 A system based on literary warrant;
- 11 A system designed for middle-size and small libraries;
- 12 A well-supported and frequently updated system;
- 13 A narrow pragmatic system;
- 14 A proprietary, toll-access based system

These 14 points are in themselves considered factual characteristics of the DDC. With point of departure in the scholarly literature, each point describes what it means, what possible alternatives are, and which important implications this may have, implying the inclusion of criticism. This criticism is intended to provide a research based characterization of DDC's properties.

As already stated, the purpose is not to teach how to use the system, which is what most textbooks in the field aim to do, and this article provides bibliographical references to many of them. The aim is the broader and deeper one to teach about the DDC in the context of KO as a research-based discipline

focusing on optimizing information structures, evaluating different knowledge organization systems (KOS), as well as different approaches and theories in KO. This requires, in addition to a description of its basic characteristics, a critical examination of the DDC and its underlying principles and philosophy.⁴

The literature about the DDC is enormous, and written by different kinds of authors. Independent scholars, such as Blake (2011), Frohmann (1994), Miksa (1998) and Wiegand (1998), write a part of the literature on the DDC. Another part is written by people with “interests” in the system, such as Mitchell and Vizine-Goetz (2017) who are/were employed by OCLC, which is the publisher of DDC. This is not to say that such authors cannot disregard their interests and make fine contributions, but overall they tend to focus on issues that are more technical rather than on the weaknesses. Many textbook treatments of the DDC (Bowman, 2005; Broughton, 2015a, 2015b; Chan; Mitchell, 2003; Farkas, 2015; Salaba; Chan, 2023, Satija, 2013, Satija; Kyrios, 2023; Snow, 2024) also tend to describe and explain the system, rather than focus on its underlying philosophy and principles). Overall, in the literature about DDC, there is a tendency to take its quality and relevance as given, rather than to examine it in relation to contemporary information technology and in relation to interdisciplinary research about concepts and classification.

The present article therefore includes theoretical and critical analyses of the DDC and intends to focus on what lessons KO, as a research-based profession, should learn from the history and research on the DDC.

2 Basic characteristics of the DDC

The DDC is described below in 14 subsections, each of which covers one basic characteristic of this system, which is considered important and is related to research topics in the literature of KO. These 14 characteristics are found to be the most relevant ones for the systematic description of a library classification and together provide a reasonably broad characterization.

The DDC is:

2.1 A library classification system

A “library classification system”⁵ is a kind of bibliographical classification. Library classifications serve two main goals: shelving of physical documents in a linear order and searching library catalogs.⁶ They are typically also characterized by a lower number of classes (lower level of granularity and term specificity) compared to KOS intended for specialized bibliographical databases.⁷ (Although, in this respect the DDC has changed much during its history, cf., Section 2.11). These two basic functions are also emphasized by OCLC (2010) writing:

[Library] Classification schemes⁸ are used to provide a systematic arrangement of materials. The classification numbers applied to books and other materials are used to arrange items on shelves and to support browsing, filtering and retrieval of bibliographic information in online systems.

The distinction between library classification systems and other bibliographical classification systems is important because shelving and database searching put different demands on classification systems.⁹ Hyman (1980, p. 47) found:

This most recent national survey of classification use bears out the opinions cited earlier in this paper on the inevitable dichotomy between classification for the shelves and that for information retrieval. To attempt to use the same scheme for both purposes is to produce a seemingly hopeless ‘double bind,’ evident in many of the above respondents’ statements.¹⁰

Research on the specific problems of shelf classification is limited, but Hyman (1980) provided an overview up to that time, including studies of browsing behavior. A more recent research focus is reader-interest classifications (see Martínez-Ávila, 2017), in which user-friendly alternatives to the DDC were suggested.¹¹ Such user-friendly systems are sometimes found to be closer to how books are organized in bookstores. The use of the term “reader-interest classifications” has, however, declined drastically since 1995. Whether the

declining interest for reader-interest classifications as alternatives to the DDC is caused by problematic assumptions in this movement,¹² or by other reasons, shall not be discussed here. All we can say is that this movement has raised critical voices of DDC as a system for shelf browsing.

Regarding the other main function, catalog search, there is not much literature on DDC. Markey provided some in-depth studies of the use of DDC for searching online catalogs (Markey; Demeyer, 1986; Markey, 1987, 1989, 2006). Markey (2006, p. 64) found:

The DDC online project demonstrated that the DDC enhanced subject access to libraries' bibliographic records. It also provided new and fruitful subject searching capabilities that are not possible through the alphabetical and keyword searching permitted by existing online catalogues.

Markey's research did not tell if other classifications than the DDC might provide even better results, and, surprisingly, she found (Markey, 2006, p. 8): "Despite thirty-five years of research, the way in which today's end users search classification online in OPAC's is through simple shelflist browsing," and (Markey, 2006, p. 15-16):

Classification online for end users has evolved very differently from classification as a cataloger's tool. Classification online is a tool that thousands of catalogers use on a daily basis in North American libraries and elsewhere through OCLC's WebDewey, LC's Classification Web, and the UDC Consortium's UDC on the Web. The opposite is true of classification online for end users. With the exception of ETHICS [...] classification online in systems for end users has been and remains experimental. Classification online has usually figured into research projects that limited system use to subjects recruited for evaluation. After the research projects ended, so did use of the system.

Concerning searching Walker (1989, p.101) found:

It is probably true that in most online catalogue searching both recall and precision are much lower than that which a good intermediary would obtain in reference retrieval searching.

Walker discussed different reasons for this, but the main reason probably is that such specialized bibliographical databases often have a more specific terminology. There seems also to be a difference between the library tradition and the information science tradition in their approaches, as Saracevic (2012, p. 51) found.¹³

Because library classifications put constraint on searching compared to other kinds of knowledge organization systems (KOS), such as facet classification for online retrieval¹⁴ and thesauri, they may be less well suited for digital libraries and electronic databases, as well as for the processes of browsing, filtering and retrieval of bibliographic information in online systems. However, in Section 3.4, we shall consider DDC in relation to the linked-data technology.

2.2 A de facto standard

DDC is a system serving many libraries, and this is a basic design principle, which therefore is opposed to “in-house” or “homegrown” classification systems optimized to a particular collection of documents, such as Library of Congress Classification (LCC).¹⁵ Dewey (1920, p. 152) wrote in a retrospective essay: “Then [about 1871] there was the extravagant duplication of work in examining a new book for classification and cataloging by each of a 1000 libraries insted [sic]¹⁶ of doing this once for all at some central point.”

Dewey’s argument is administrative benefits rather than arguments about providing optimal retrieval performance.¹⁷ This design principle is closely linked to DDC’s status as a de facto standard for certain types of libraries in the US and many other countries. Wiegand (1998, p. 175) wrote:

In 1996 OCLC published the twenty-first edition of the 120-year-old Dewey Decimal Classification. By that time over 200,000 libraries in 135 countries were using the classification to organize their collections. In the United States alone, it was being used by 95 percent of public and school libraries, 25 percent of special libraries, and 25 percent of academic libraries (mostly at small colleges). [...] It is probably fair to say that at some time in their lives, a substantial majority of Americans living in the twentieth century have used the system.

Recently, however, DDC's role as a de facto standard has been challenged. Fister (2009) reported that some libraries in the USA as well as in other countries from 2007 abandoned the DDC in favor of the Book Industry Standards and Communications system (BISAC) commonly used by commercial bookstores, in an effort to make its libraries more accessible for their users.

The status as a standard is seen by some authors (e.g., by Mai 2003, 4 and by Mitchell in Fister 2009) as one of the real benefits of Dewey's invention because the same books in different libraries have the same call numbers and that it is easier to navigate different libraries since they would be organized in the same way. However, this benefit is probably more for the management of libraries than for the users, because of the rationalizing and outsourcing of the classification processes it enables. This has also been a major factor in library education and in shaping the sense of a library profession. From the users' point of view, things look different for two reasons: (1) Users are normally not using many different libraries classified by the DDC. (2) Users are embedded in contexts in which they meet different knowledge structures. For example, ornithologists have recently provided a new classification of birds (see Fjeldså, 2013). This new classification is also used in checklists for amateur ornithologists and in time it may be taught in schools and be broadly adapted in the literature, and in reference works such as Wikipedia. For such people, who in their daily lives are confronted with other classifications of knowledge, the standardized nature of DDC is of little use. It is probably a frustration that it does not correspond to how objects are classified according to more familiar classifications, in particular when these represent a more updated and authoritative organization of knowledge. In other words, this kind of standardizing is probably an obstacle to interoperability in relation to subject specific databases.¹⁸ However, as already said, such standardization provides huge advantages for library management.

2.3 A general classification

General (or universal) classifications are opposed to special classification systems limited to one or more subject fields. It is important to consider that because a

general classification covers many subject fields (e.g., classification of birds, celestial objects, musical instruments, religions etc.), knowledge about special classifications is necessary for designing universal systems, while the opposite is not the case. The term universal classification has other meanings, and in Section 4 we shall consider Jesse Shera's (1951, p. 77) objection to universal "classification that will be all things to all men."

Why were general library classifications originally developed? The answer is obvious: To be used in general libraries. Taube (1951) found that they originated with the development of public libraries and the open-shelf system.¹⁹ As argued in Section 2.11, the DDC is especially useful for public and medium-sized libraries rather than for large or specialized libraries. However, large research libraries like the Library of Congress (LC) have also developed general classification schemes.²⁰ University libraries historically tended to organize their libraries according to how the universities they serve were organized in faculties and disciplines. A prominent example of a general bibliographic classification from before the time of public libraries (although not a library classification) is the one Conrad Gessner developed for his *Bibliotheca Universalis*, the systematic part of which was published as *Pandectae* in 1548 (see Leu, 2023, p. 131-134).

In spite of the existence of general library classifications before modern public libraries, Taube points at a conducive factor for their development, which, together with the development of library education and library research has been a facilitator also for the development of the DDC. It is an interesting question whether the view of the needs of the "common man," as claimed by Taube, has influenced their characteristics. His main point, that all classifications, even the general ones, serve specific purposes is an important consideration.

2.4 A modified enumerative system

DDC was originally made as an enumerative classification system, but from DDC17 (1965) it was modified with analytico-synthetic features. The opposite of enumerative classifications are faceted classification schemes and DDC therefore is a cross between an enumerative and a faceted classification. Broughton (2015b, p. 219) wrote:

DDC was initially an enumerative scheme; the tables were introduced much later in its history, as were other means of creating numbers for compound subjects. Because of this it has no general mechanisms for handling compound subjects, but only ‘local’ provision in some classes. [...] Unfortunately you can’t apply this [local] principle to another part of the schedule except where there are specific instructions to do so, however useful that might be.

DDC has thus been improved according to research done in the facet-analytical tradition, but these principles have not been fully implemented.

2.5 A discipline based classification

A discipline²¹ or “aspect” based classification is opposed to “phenomenon” classification or “one-place classification” (see Gnoli; Smiraglia, Szostak, 2024). Dewey (1979, p. xxxi) formulated this fundamental principle:

A work on water may be classed with many disciplines, such as metaphysics, religion, economics, commerce, physics, chemistry, geology, oceanography, meteorology, and history. No other feature of the DDC is more basic than this: that it scatters subjects by discipline.

The introduction to DDC23 (Dewey 2011, p. xlviii) has a section with the title “Determining the Discipline of a Work.” However, this section does not provide guidelines on how to do so, just stating that a work should be classed in the discipline for which it is intended rather than in the discipline from which the work derives. This failure to provide guidelines for how to identify the discipline to which a work belongs, is probably not an accident, since DDC seems to have troubles delimitating disciplines (see the example of social psychology in Section 2.10 and bibliometrics in Appendix A). Rather than attempting to be true to disciplines, as these exist in the outside world, DDC tends to use its own administrative rules.

Although disciplines are the basic classification of concepts in DDC, many “phenomena” (such as animals,²² languages, musical instruments and plants) are relatively detailed classified in their respective disciplines.²³

Another important thing is that DDC’s relative index (see Section 2.9) gathers the scattered subject under the subject term in one place. In this way, the DDC as a whole contains an option to locate scattered phenomena.

Some researchers consider phenomenon-based classifications superior, and Gnoli *et al.* (2007) formulated the “León Manifesto,” which implies a criticism of discipline-based classifications such as the DDC.²⁴ The phenomenon approach is mainly motivated for supporting interdisciplinary research, but although the proportion of interdisciplinary studies is increasing, the majority of users are probably still discipline oriented.

2.6 A hierarchical classification

DDC consists of 10 superclasses, each of which is divided into ten subclasses (some of which may be unassigned), each of which again is divided into ten subclasses etc. In DDC23, the ten superclasses are:²⁵

- 000 – Computer science, information and general works
- 100 – Philosophy and psychology
- 200 – Religion
- 300 – Social sciences
- 400 – Language
- 500 – Pure science
- 600 – Technology
- 700 – Arts and recreation
- 800 – Literature
- 900 – History and geography

In Section 4.1, we shall go further into the background of this overall structure.

An example of a hierarchy in DDC23 is:

- 700 - Arts and recreation (one of the top 10 superclasses)
- 790 - Outline of sports, games and entertainment
- 796 - Athletic and outdoor sports and games
- 796.3 - The division for ball games
- 796.35 - The section for baseball
- 796.357 - The subdivision for professional baseball
- 796.357092 - The further subdivision for biographies of professional baseball players
- 796.3570922 - The subdivision for biographies of professional baseball players from specific continents, countries, localities; extraterrestrial worlds
- 796.357092273 - The subdivision for biographies of professional baseball players from the United States

796.3570922734 - The subdivision for biographies of professional baseball players from New York City.

There are no theoretical limits to the number of subdivisions, but we do not know if subdivisions further than 10 decimals exist in DDC, and very long notations may provide practical problems.

Whereas logic requires that hierarchies should be made by using one principle or characteristics at a time, this principle has not always been upheld. Custer (1965, p. 45) wrote:

It is true that editions prior to the present one [edition 17] did not always recognize and make provision for division by more than one principle, even when the literature would seem to have warranted it; and when they did make such provisions, they did not always clearly differentiate among the various principles.

It is also relevant to consider that a class in DDC is not necessarily limited to a specific concept or subject.²⁶ Custer (1965, p. 9) wrote:

A class is not necessarily limited to a specific subject. Altho [sic!] many subjects have their own numbers, e.g., representative democracy as a political entity 321.8, many other specific notations denote groups or collections of specific subjects, e.g., aristocracy, oligarchy, theocracy, plutocracy as political entities all 321.5.²⁷

Normally a class in a classification corresponds to a concept. The class “seabird”, for example contains the same species as the concept “seabird”, and a breach of this principle provides logical problems. In Section 4.2, it is further examined whether the hierarchy of DDC lives up to logical principles, which is a relevant question in considering the DDC from the perspective of computer processing.

2.7 A decimal classification

The notational²⁸ system of the DDC is a decimal classification. In DDC, each class is represented by Arabic numerals treated like decimal fractions. Dewey (2011, p. xlv, §4.16) explained:

A decimal point, or dot, follows the third digit in a class number, after which division by ten continues to the specific degree of classification needed. The dot is not a decimal point in the mathematical sense, but a psychological pause to break the monotony of numerical digits and to ease the transcription and copying of the class number.

A decimal classification has advantages and disadvantages. Among the advantages is its simplicity and ease of use. Paul Otlet, the founder of the UDC saw in Dewey's decimal system a rigorous language for designating concepts (cf., Frohmann (2004, p. 38-39).²⁹ Broughton (2015a, p. 201) wrote:

The use of nothing but Arabic numerals was also quite unusual at the time [1876]. Most schemes of arrangement used a combination of Arabic numerals, letters and roman numerals, with the type of character being changed at each step of division of the classification, or to indicate the bookcase, shelf and position of the book (and often these were closely related). Dewey's notation with its single character set, its decimal points and its single uninterrupted numerical sequence must have looked strikingly modern and scientific.

If strictly following logical principles, a decimal notation can be used to construe versions of the DDC with different degrees of granularity simply by choosing to display classes with more or less decimals (and abridged editions of the DDC are said to be made this way.) In principle, it should also facilitate the ability to broaden or narrow search strategies.

Green (2009, p. 91) summarized the advantages in the following way:

Historically, the notational system of the Dewey Decimal Classification provided for non-institution-specific, relative location shelf arrangements, thus substantially reducing bibliographic classification effort. Today its decimal notation continues to provide the classification scheme with flexible granularity, is hospitable to expansion, expresses relationships, interfaces well with modern retrieval systems, and is internationally understood.

A disadvantage of the decimal notation is that it introduces an element of arbitrariness because subjects have to be adjusted to ten subdivisions, although they may naturally fall in either less or in more subclasses. Pollitt (1998, p. 182) wrote:

Unlike a thesaurus the arrangement of descriptors in Dewey hierarchies are limited by the ubiquitous division by 10. The distorting effect that this can have on arrangements can be seen in the following extract from Table 2.

- T2-4 Europe Western Europe
- T2-41 British Isles
- T2-42 England and Wales
- T2-43 Central Europe Germany
- T2-44 France and Monaco
- T 2-45 Italian Peninsula and adjacent islands Italy
- T2-46 Iberian Peninsula and adjacent islands Spain
- T2-47 Eastern Europe Russia
- T2-48 Scandinavia
- T2-49 Other parts of Europe.

Dewey (1891, p. 17-19) described and defended his choices using the label “Decimalism:”

We have not sacrificed utility in order to force subjects on the decimal procrustean bed. Decimals have been used as servants, not as masters. When subjects have been combined or separated into just lo heads, it has been from no necessity of the scheme, but because it seemd the most useful way, all things considerd.

It is clear that the way Dewey used the decimals supports his practical purposes rather than sticking to logical rules. (This was, however, countered by Custer’s principle of “ subject integrity” and by the introduction of facet analytic techniques from edition 17, 1965).

As with the hierarchical structure presented in Section 2.6, the missing fulfilment of strict logical principles is relevant for the use of the DDC for algorithmic processes.

2.8 A system permitting relative locations of documents

This feature of the DDC is opposed to systems providing fixed locations (i.e., placing a book on a specific shelf). Broughton (2015a, p. 201):

Because his [Dewey’s] classmarks indicated the subject of the book (rather than a shelf where that subject was placed) there was no need to re-label books, or shelves, when books were moved. There was one single sequence which remained constant; books could be removed, or new ones inserted, but the overall order wasn’t affected, and a book once classified could retain its classmark for the whole of its life.

Dewey (1920, p. 152) wrote in the former cited essay:

In visiting over 50 libraries, I was astounded to find the lack of efficiency, and waste of time and money in constant recataloging and reclassifying made necessary by the almost universally used fixt [sic] system where a book was numbered according to the particular room, tier, and shelf where it chanced to stand on that day, insted [sic] of by class, division and section to which it belonged yesterday, today and forever.

This principle represents obviously a very important practical improvement of library classifications in relation to the shelving function.

2.9 A system with a relative index

The relative index is one in which a given concept is related to different disciplines and classes in the system.³⁰ It has been a part of the DDC since the first edition, and it is considered another of Dewey's important inventions. It is today maintained as a separate database, independent of the classification. Mitchell and Vazine-Goetz (2017, p. 1257) wrote about the Relative Index:

The index is so named because it shows the relationship between subjects and the disciplines (or in some cases, the various aspects within disciplines) in which they appear. For example, the Relative Index entries for Garlic are as follows:

Garlic	641.3526
Garlic-botany	584.33
Garlic-cooking	641.6526
Garlic-food	641.3526
Garlic-garden crop	635.26
Garlic-pharmacology	615.32433.

As mentioned in Section 2.5, the relative index complements the classification by gathering in one place the aspects of the subjects that have been dispersed in the schedules. See also Green (2008) and Miksa (2006).

2.10 A system based on literary warrant

Literary warrant is an approach that is opposed to theoretical or empirical identification of phenomena. An anatomical atlas, for example, may list all bones in the body based on empirical studies, while a system based on literary warrant

excludes the bones on which no candidates for documents to be indexed exists. It is a basis on which the DDC is developed, cf. Mitchell (2001, p. 217). Dewey (2011, p. lxxviii (glossary)) stated: “Literary warrant: Justification for the development of a class or the explicit inclusion of a topic in the schedules, tables, or Relative Index, based on the existence of a body of literature on the topic.”

Literary warrant is a term with more interpretations (cf., Barité, 2018). The primary meaning is that a term or class only is established in a knowledge organizing system (KOS) on the basis of literature to be indexed under that term (i.e., at the least one document must be assigned each term/class). This meaning was introduced by Hulme (1911), and this is the meaning used in the DDC. The then editor of DDC15, Ferguson (1951, p. vii), expressed the principle in this way: “[I]t is obvious that a number without a book is wasted effort.”

Majumdar (2021) discussed how this principle has been viewed by the DDC during its history. He wrote (Majumdar, 2021, p. 403-404):

Dewey passed away in 1931 and although there is no documentary evidence that Dewey had taken any note of the concept of Literary Warrant or had exchanged his views with Hulme, it may be argued that Dewey had a certain intuition about the value of existing literature on a topic for the justification of its inclusion in schedule fuelled by his experience during Amherst College days. As the DC Editorial Committee took over the responsibility of revision of DC and its eventual relocation to LC, the exposure to colossal collection of LC has definitely been the most influencing factor for allowing literary warrant to take the centre stage for revision of DC both print as well as web version as reflected in the recent editions.

Custer (1965, p. 52) expressed the ideal number of subdivisions in the DDC based on literary warrant:

The editors have tried to provide enough subdivisions but not too many, and have been guided by the principle that the existence in American libraries of more than ten to twenty titles on specific topics in a given number raises a presumption in favor of subdivision.

Unfortunately, Custer did not specify what he meant by American libraries, whether it included the largest and most specialized ones.

Mitchell (1995, p. 38) more precisely described the sources on which DDC based this principle:

The editors [of the DDC] depend on the Library of Congress online catalog and OCLC Online Union Catalog for guidance on literary warrant and usage. OCLC's database provides a broader picture than LC's of Dewey application to materials in nonbook formats, and also presents a view of international usage, since the OCLC catalog includes records from Dewey users in other countries, e.g., United Kingdom, Australia, Canada, and France.³¹

However, no investigation shows how this principle has been administered in relation to the DDC. Two relevant questions are:

(1) Does the DDC succeed in intercepting new concepts from the literature?

(2) Has at least one document been assigned to each DDC class number?

(Re 1) In Appendix A, some observations about the representation of library and information science in the DDC23 are reported. We see that even some terms with many books in English, such as “knowledge organization” are not represented in the DDC, demonstrating that collection of terms seems not to be effective.

(Re 2) Looking up in the Library of Congress 's catalog, some DDC class numbers representing bird taxa, do not always provide hits. Although some numbers such as 598.764 (Trochili, Hummingbirds) do retrieve birds of this taxa, other classes, such as 598.414 Aythya, 598.415 Mergini, and 598.762 (Apodi, Swifts), retrieved no documents (neither in LC nor in WorldCat).³²

The concepts in the DDC obviously depend on the sources classified. Nero (2006), for example, found challenges by classifying the music of Trinidad and Tobago according to the DDC because local literary warrants often are missing in the DDC.³³

A secondary meaning of “literary warrant” goes further, in also including the demand that conceptual relations in a classification should be determined by how documents in the literature are related to each other.³⁴ DDC generally violates this principle. For example, social psychology in the index referred to 302, but not to a specific class in 150,³⁵ although it is an important subdiscipline of psychology (and psychological social psychology tends to dominate over sociological social psychology.)³⁶ Milgram (1974) is a very famous book in the psychological, experimental tradition, but by Library of Congress, it is assigned

“Dewey class no. 301.15/52”. Where the secondary meaning of literary warrant suggests that social psychology is (also) a part of psychology and that bibliometrics is (also) a part of LIS, the DDC does not reflect such conceptual relations.

2.11 A system designed for middle-size and small libraries

Greater libraries generally demand greater granularity in classification systems, for example, by enumerating a larger number of categories. The full DDC-editions (sometimes called the “standard editions”)³⁷ used to be designed for medium-sized libraries. For small libraries (up to 20,000 titles), special abridged editions are produced.

For big or special libraries, the DDC is generally considered unsuitable. It was from the start not designed to be used for large libraries,³⁸ and even today, it is generally not judged suitable for these. As Broughton (2015a, p. 199) wrote: “Despite the fact that its publishers claim it to be used by 20% of special libraries in the US, it’s probably not sufficiently specific for many special libraries or those with a great deal of technical material.”³⁹

Because DDC from the start was not designed to suit large libraries or databases, the Universal Decimal Classification (UDC) was developed (first published 1905-1907) by the International Institute of Bibliography, based on the 5th edition of the DDC. Rather than the DDC, other systems such as UDC, Library of Congress Classification (LCC) or in-house-systems have mainly been used by large research libraries. In the beginning, there was a cooperation between the DDC and the UDC and it was the ambition that there should be a correspondence between the two systems. According to Miksa (1998, p. 16), in 1924 there was a plan to develop a third layer of editions of the DDC in addition to the abridged editions for small libraries and the “standard” editions for medium-sized libraries, “a well developed ‘bibliographic’ edition, which would meet the documentation needs of specialists and be used primarily in classified catalogs.”

This third layer should be made by a cooperation and coordination of the DDC and the UDC, but it never materialized, and the two systems grew apart.⁴⁰ Radical expansions of the DDC system itself were also later given up, although

there have been great variations among classes in different editions. (There were efforts to re-introduce some consistency between DDC and UDC in the 1990s and 2000s, particularly with respect to Religion (McIlwaine; Mitchell, 2006) and in the Place auxiliaries (McIlwaine, 1995).

The analytico-synthetic techniques introduced in DDC from 1965 expand its possibility to express higher specificity, but in spite of this, it remains a system suited for medium-sized and small libraries. Nonetheless, some large research libraries have begun to use it, probably for economic and administrative reasons disregarding its unfitness for this purpose.

2.12 A well supported and frequently updated system

DDC is supported by OCLC and the Library of Congress (LC), which means, among other things, that all books catalogued by LC contain DDC class marks.⁴¹ This fact motivates many libraries to adopt the DDC because most of their English-language books thereby are pre-classified when bibliographical records are exchanged. As Broughton (2015a, p. 199) wrote: “DDC is quite exceptionally well supported institutionally, and this is undoubtedly one of the reasons for its tremendous success.”

Today there is a continuous updating of DDC in the electronic WebDewey. Formerly, one was able to compare the printed editions and follow their updating, for example, the DDC23 full English edition from 2011. However, it is important to consider, that the updating only occasionally includes subject matter, and that all disciplines are not fully updated at the same time (following a plan for revisions quoted in Section 4.3). Therefore, from a subject point of view this updating does not ensure that the system does not provide obsolete knowledge. Examples are provided in this article, including a quote from Blake (2011) in Section 4.

In relation to updating two issues are important (a) Who are the persons doing the updating, what are their qualifications, and conditions for doing the task?⁴² (b) How are the changes documented?⁴³ This includes the question of which principles and sources are used for updating some subjects. An update

should ideally be done by listing changes to the DDC including arguments for the changes as well as sources used.

The DDC23, for example, has a rather detailed classification of fishes (vol. 2: 1243-1252) using their Latin names with common English names in brackets. The system reflects biological principles, but there are many alternatives, and the classification of fishes is rapidly evolving (see Nelson, 2006).⁴⁴ It should be communicated from which sources (and the sources choice of underlying principles) this part of the classification has been made. (This should be the case in spite of Melvil Dewey's principle to avoid scientific accuracy, cf., Section 2.13).

One of the points where the updating seems to work reasonably is by including new concepts in the system due to the literary warrant (see Section 2.10). This means that the DDC is reasonably updated with new concepts from the monographic literature (despite the occasional failure to do so reported in Section 2.10).

2.13 A narrow pragmatic system

DDC can be characterized as a practicalist system, which prioritizes narrow pragmatic goals at the expense of philosophical or scientific accuracy (not to be confused with a system based on pragmatic philosophy, which considers scientific accuracy to be based on the functions served).⁴⁵ Dewey (1891, p. 7) declared in the introduction to DDC4: "Practical utility and economy are the keynotes of the entire system, and no theoretical refinement has been allowed to modify the scheme, if it would detract from its usefulness or add to its cost."

This concerns in particular the updating of the system. Although in the beginning, Dewey did ask subject specialists for help,⁴⁶ from the second edition (1885) he vigorously defended the principle "integrity of numbers."⁴⁷ (A principle conflicting with the principle of "keeping pace with knowledge,"⁴⁸ or, by Custer's (1965, p. 43) principle termed "subject integrity" or "subject relationships"⁴⁹). This meant that it was more important for Dewey to avoid changes in the meaning of DDC numbers, than to keep the system updated and to respect logical rules. Put to the extreme, this principle implies that the DDC

should not be properly updated according to changes in the universe of knowledge.⁵⁰ Dewey's reason for this was not just a lack of resources, but it was a principle, that he held. Csiszar (2013, p. 445), citing Dewey, wrote:

Dewey himself warned the Royal Society against getting carried away with their classifications: Science will never stand still and a classification is only a great series of pigeon-holes in which to file papers. The man who insisted on tearing his desks and study to pieces every few years and grouping the pigeonholes over again would be looked upon as a little lacking in balance. If our friends could recognize that a classification for practical use by a great body of people was really like a great set of pigeon-holes, and not try to have it meet all their philosophical theories, we should get over the greatest difficulty, for my study long ago convinced me that the philosophical side of the classification was a minor consideration.^[51]

The way Dewey uses the term “pigeon-holes” has also been called “slotification” (Custer, 1965, p. 43)⁵² and obviously introduces an element of arbitrariness in classification: It is not important that it corresponds to some external reality or consensus as long as the index can show the place of a given concept in the DDC. The term “pigeon-holes” and the principle “integrity of numbers” is related to what is known as “mark-and-park,”⁵³ which was a term used by Ranganathan to criticize the DDC.⁵⁴ Dewey is here clearly deviating from other library classificationists and theorists such as Henry Bliss⁵⁵ and Jesse Shera. Thereby, of course, the DDC also introduces semantic incompatibilities with other KOS: If different KOS reflect updated knowledge rather than just its own internal world, there is a higher probability that they are compatible.

However, during the history of the DDC, the balance between stability and innovation has changed. The 17th edition, for example, clearly broke with Dewey's principle. The editor of that volume, Benjamin A. Custer (1965, p. 46), wrote:

5.132 Numerous factors now lead the editors and the members of the Decimal Classification Editorial Policy Committee to the conclusion that a reasonable amount of continuing change thru relocation is not only desirable but inevitable. 5.132 1 First, in a world where knowledge is growing and changing at a rate increasing by geometric progression, where as a result demands on libraries and information services become increasingly pressing and exacting, it is easy enough to see that a static and inflexible, "leave-well-enough-alone," system for the subject organization of book collections will in a short time

lose most and eventually virtually all its utility, except perhaps as a vestigial system of addresses or "slots," in which case arrangement of books by author or size would commend itself as equally if not more satisfactory.

As an overall evaluation, New (1996, p. 386) found:

When it comes to facing the issues of innovation versus stability in knowledge organization, the Dewey Decimal Classification has been on three sides of the question. That is, Dewey has blindly pursued stability at the sacrifice of all innovation other than straightforward expansion, Dewey [i.e., the DDC] has tried innovation in a manner that got it all wrong, and, judging by its present viability as the most widely used universal system for classifying knowledge, Dewey [DDC] finally found the right approach to innovation.

However, New's claim that the DDC "finally found the right approach to innovation" is based on its commercial and managerial success rather than on scholarly arguments. The principle of the integrity of numbers is still with us today, as Satija and Kyrios (2023, p. 4) wrote:

It [the principle of the integrity of numbers] continues to influence every revision and is a weighty consideration, though not the overriding one Dewey had envisioned. Keeping pace with knowledge and subject integrity is now the transcendent policy.

However, it is not possible fully to satisfy both principles. The question is therefore how the balance between the two conflicting principles of integrity of numbers versus "keeping pace with knowledge" is reflected in the DDC today. Is Dewey's practicalist view this still a fair criticism? Is the "mark and park" function the explanation of DDC's managerial success? We shall look further into this in Section 4.3 on the relation between DDC and updated knowledge. Here we can just say that at least Dewey's own philosophy and influence on the DDC clearly reflected a narrow pragmatism.

2.14 A proprietary, toll-access based system

DDC was from the start developed from a business perspective (see Miksa, 1998, p. 42-45, entitled "Practicality, Dewey's Business Perspective, and the DDC" and Miksa, 1983). This has advantages and disadvantages. The main advantage is that

this ensures that a motivated company maintains the system as long as it can generate a profit.

Among the disadvantages are that the business perspective facilitates a narrow pragmatism (cf., Miksa 1998, p. 44) and that this may limit its use compared to systems without toll-access. For example, the Library of Congress in 1899 made a request to Melvil Dewey to use, revise and update the system, which was turned down (see further in Miksa 1998, 42-45). As Miksa (1998, p. 10, footnote 7 wrote) “[...] it leaves all of us with a continuing case of pondering ‘What if ...’ had the situation turned out differently.”

The commercial aspects of the DDC may also limit the possibility for research-based and user influence of the system, such as, for example, by using linked open data (LOD) technology, because this technology assumes that everyone has free access to the system (this is the meaning of the term “open” in LOD.) In this regard, the DDC faces problems similar to other proprietary systems, such as the UDC, which has been described by Slavic, Siebes and Scharnhorst (2021). However, in Section 3.4 below we shall look further into the DDC in the digital context, including the systems use of linked data and its license model.

3 Historical developments and editions

A detailed description of the first eighteen editions of the DDC is given by Comaromi (1976). A list of the editions of the DDC can be found in Furner (2021, p. 4-6), ⁵⁶ Satija and Kyrios (2023, p. 181-186) provided “A Broad Chronology of the DDC, 1851-2022,” and a fine overview of the history of the DDC is given by Miksa (1998, Part 1). Here, just a brief overview is given. This section contains four subsections, the first three first follow Miksa’s (1998) division 1: Beginnings, 2: Conflict, and 3: Recovery; then we add 4: DDC in the digital environment.

3.1 Beginnings: Editions 1-6 (1876-1899)

The first three editions (1876, 1885 and 1888) were edited by Dewey himself. The first edition of the DDC was published in 1876 as a 44-page pamphlet (Dewey, 1876), which already had a “relative index.” Miksa (1998, p. 6-7) pointed out that

this index contained many terms, which pointed to classes in the schedules, but were not listed there. Disregarding synonyms, Miksa estimated that the total number of unique categories contained in DDC1 is greater than 2,500, and “[...] quite possibly [was] one of the largest library classification systems ever devised.” Another surprise for the present author was to discover that Dewey from the beginning recommended the principle of “request-oriented indexing/classification” (without using this term), here documented from Dewey (1891, p. 26): “Practical usefulness is the chief thing. Put each book under the subject to the student of which it is most useful, unless local reasons ‘attract’ it to a place still more useful in your library.”⁵⁷

Dewey did not, however, use it consequently because it was contradicted by his view of determining “subject of a book” at the same page, which was document-oriented as opposed to request-oriented. (Request-oriented classification seems to have been forgotten or abandoned since it is not mentioned in DDC23, Dewey, 2011).

Already the second and the third editions grew to 314 and 416 pages respectively. From DDC2, the principle of “the integrity of numbers” was established. This means that the schedule is not revised in ways which demand extensive reclassification by libraries when new editions are published (see Section 2.13).

The first three editions mark the period in which the DDC developed to a full-blown library classification system, which was widely accepted.

From DDC4 (1891) until DDC10 (1919) May Seymour served as the editor. However, Seymour’s name was not mentioned either on the title page or in other places in the volume (this information about her editorship is here taken from Comaromi, 1976, p. x).

DDC4-DD6 continued to be improved, but no important new principles were introduced. Of importance for the DDC in this period was the agreement in 1895 between Melvil Dewey, Paul Otlet and Henri La Fontaine to use DDC5 (1884) as the basis for the catalog in the Institut Internationale de Bibliographie (IIB) in Brussels (i.e., the Classification Décimale Universelle (CD), now known as the Universal Decimal Classification, UDC).

3.2 Conflict: Editions 7-15 (1911-1952)

Miksa (1998, p. 10-11) wrote about this period:

The second period in DDC development extended over half-century and is notable for conflict related to its purposes and objectives. [...]. Besides personal issues of authority and loyalty, the conflict turned on a variety of interrelated issues: the size of libraries that the system should serve (medium or large), the subject orientation of the libraries that the system should serve (general or special), the bibliographic purpose of the system (shelf classification or catalog access), and a variety of opinions as to the degree of theoretical or scientific accuracy the system should have. Each of the editions of the DDC in this era expressed something of these issues.

One of the central issues in this period was an increasing pressure to expand the DDC to be more suitable for large libraries and for specialists, and the wish to coordinate with the newly founded “Brussels” system (i.e., the UDC). The editions from DDC7-DDC10 (1911-1919) edited by May Seymour and DDC11-DDC13 (1922-1932) edited by Jennie Dorkas Fellows grew greatly, but very unevenly in scope. Among many other changes and expansions, chemistry was greatly expanded in DDC7 (1911), agriculture in DDC 10 (1919), and psychology in DDC13 (1932).

In this period, efforts were made to coordinate the developments of the DDC with the UDC, and in 1924, Melvil Dewey sent Godfrey Dewey (Melvil’s son) and Dorcas Fellows to a conference in Geneva to plan further cooperation with the UDC. A plan to publish three different kinds of editions of the DDC were formulated by Godfrey Dewey and Paul Otlet:

- (1) An abbreviated version for small libraries,
- (2) A “standard” version for shelf classification in middle sized libraries, and
- (3) A “bibliographic edition,” to be used for documentation purposes for specialist and primarily as a tool in classified catalogs. The bibliographic version should correspond to or be identical with the UDC.

In the following years, Fellows tried to coordinate the revisions of the DDC with the UDC, however, after some years, she found this task increasing impossible and gave it up. Fellows also came in conflict with the people behind the UDC and with Godfrey Dewey, who supported the cooperation with the UDC.

She found it impossible, not just to cooperate with the people behind the UDC, but also with subject specialists, who have suggested improvements to the DDC. She felt that such cooperation was impossible to fit into Melvil Dewey's original vision of the DDC. Godfred Dewey resigned his position as the administrator of the DDC (and thereby the superior to Fellows) in October 1931, and Melvil Dewey again came in charge of the system. Unfortunately, he died in December 1931, which allowed Fellows to follow her own principles. DDC12 and DDC13 were therefore published according to Fellows own principles disregarding advice from both subject experts and from the American Library Association's (ALA) Advisory Committee. These editions did, nonetheless, contain expansions, in addition to some tables from the UDC and other improvements.

With DDC14 (1942) edited by Constatin Mazney and especially with DDC15a (1951) edited by Milton J. Ferguson the growth of the system changed to a dramatic reduction in size⁵⁸ (the DDC15b, 1952, edited by Godfrey Dewey and published shortly after, tried to repair the damage by expanding the index and improving the typography, but without much success). The 15th edition faced serious criticism for its reduced size and, according to Comaromi (1976, p. 414), "[...] sent many librarians into the arms of the Library of Congress Classification, an exodus referred to as the 'flight from Dewey'." It thus marked an existential crisis for the DDC.

3.3 Recovery and advance: Editions 16-21 (1958-1996)

DDC16 (1958)-DDC19 (1979) were edited by Benjamin A. Custer, whom New (1998) considered to be the most important person in the development of the DDC after Melvil Dewey. The primary motivation to label this period "recovery and advance" is that DDC succeeded in reestablishing confidence among librarians, and avoided "the flight from Dewey" by improving the size from the dramatic reduction of DDC15. (DDC14 contained more than 31.000 entries, DDC15 about 4,600 entries and DDC16 nearly 18,000 entries). The DDC continued to grow after DDC16, but as Miksa (1998, p. 23-24) writes, this is to a high degree caused by the introduction of synthetic features:

Beginning with the 17th edition, however, a count of the total number of enumerated entries in the system could no longer be used as an indicator of the actual size of the system. This is because of the growing use of synthesis in the system. Synthesis allows parts of class numbers or numbers for categories in special tables to be combined with enumerated class numbers in the schedules in order to create still more class numbers, thus leaving much of the system unenumerated. Thus, a count of only the enumerated entries in the system does not reveal how large the system really is. That the system has grown is evident, of course. As to its ultimate size, it is sufficient to say that the synthesis makes the present size of the system exponentially larger than any edition in the past.⁵⁹

However, when considering whether the DDC today is suitable for very large and specialized libraries and bibliographic databases, some measure of its degree of granularity (or the degree of specificity of simple terms) is important to consider. Therefore Miksa's "exponentially larger" is an insufficient characteristic. Overall, DDC never reached the same overall⁶⁰ level of granularity as, for example, the UDC, the Library of Congress Classification (LCC), or the Bliss Bibliographic Classification (BC2).⁶¹

Beside the reversion of the catastrophic reduction of the DDC15 and the returning to growth, Custer made many additional improvements. We have already mentioned the formation of classes by synthesis, which is due to the introduction of facet-analytic principles and modern classification techniques. The improvement of these techniques has continued until today. In this connection, Custer also edited the system in order to ensure that the hierarchies fulfilled the principle of "subject integrity." The third major improvement made by Custer was to abandon Dewey's principle of not trying to let the system reflect development in the sciences (in DDC often called "development in knowledge"). In this connection, he introduced a plan for updating DDC, which on the one hand over time would make the system up-to-date, but on the other hand would introduce the changes gradually so libraries could better handle the changes. DDC16 introduced the so-called "Phoenix schedules" (i.e., completely revised schedules) to replace outdated schedules with updated ones.⁶²

DDC20 (1989) was edited by John Philip Camaromi, DDC21 (1996) – DDC23 (2011) by Joan S. Mitchell and DDC2022-DDC2024 by Alex Kyrios. Section 3.4 below describes some of the developments in this period.

3.4 DDC in the digital environment

The digital development has had various influences. One of these is about developments in the library environment in which the DDC exists (presented in 3.4.1). A second is how the digital development influences the characteristics of the system itself (see 3.4.2); while a third perspective is about what internal developments in the DDC mean for the users (see 3.4.3).

3.4.1 DDC in the digital context

Digital developments have meant increasing centralization of library cataloging (descriptive cataloging as well as subject cataloging), and it has meant that many libraries have turned to systems like DDC and LCC. The reason is that libraries hereby can save their own cataloging personnel and just rely on bibliographical records imported from others (in particular from LC and OCLC). Such decisions are typically made without examining the quality of the systems being adopted.⁶³ Either the quality of systems like the DDC are just assumed, or it is felt that better cataloging and classification are not worth their extra cost.⁶⁴ Therefore, libraries generally save many resources by accepting bibliographical records made by others. An additional bonus for libraries is, as emphasized by New (1998, p. 145-146), that the problem that libraries formerly had to reclassify their books whenever the classification is updated, becomes much less pressing. It may even turn upside-down: it may be more costly assigning the library's own old numbers for new material compared to use the latest update of the DDC.

An implication is that research efforts in LIS for developing improved classification systems face almost insurmountable obstacles to develop new systems, which have the prospect of being used in practice (see e.g., Broughton's, 2024 description of the BC2). Of course, from the perspective of the DDC, this is a happy development.

In this new context, the DDC has been suggested as a common gateway for Cross-browsing European subject gateways via a common classification system (cf., Koch; Neuroth; Day, 2003) and here it is an option to use the OCLC's "Connexion" service (formerly CORC), which facilitates the creation, managing,

and downloading of high-quality bibliographic and authority records⁶⁵ (cf., Hickey, 2000).

Automatic classification and indexing methods are now available and sometimes there are trends towards considering the DDC the target classification for such efforts. Golub *et al.* (2024) is a comprehensive study examining the use of automated classification methods to assign DDC numbers to bibliographical records. The study examined a sample of over 230,000 bibliographical records of Swedish documents. It showed that the algorithmic procedures were very bad at classifying fiction, but proved better on non-fiction. It does not discuss, however, what is “good enough” in relation to specific purposes.⁶⁶ The article points to a number of underlying difficulties, such as:

- a) rather low inter-rater agreements;
- b) whether human indexing is a good evaluation standard;
- c) the value of automated classes in the context of subject searching and browsing.

A question not asked by Golub *et al.* is why the DDC should be the target classification for automated procedures. Automated methods work on very large number of documents or records; therefore, the fact that a large number of documents are already DDC classified, is rather unimportant in this perspective. We have not yet seen serious studies of how the ideal target classification should look like given automated classification. We saw in Section 2.2 that the BISAC classification is beginning to challenge DDC status on the market. In the future automated classifications is probably an even more obvious threat. So far, however, the DDC continues to uphold a very strong dominance for library classification.

3.4.2 Digital influences on the DDC

Since 1992, DDC is published in an electronic form, and since 2000 in the form of “WebDewey.”⁶⁷ Today this is the primary product and printed versions are now derived products, which are yearly printed in four volumes on-demand basis. According to Kyrios (2022): “There is no edition 24, and no plans to designate one,” just to update the 23th edition. At the time of writing, the newest print

edition is Dewey2024 (Dewey, 2024). The web-based version clearly provides much better facilities for both the producers of DDC and for the libraries applying it. For example, formerly the index was abbreviated because of printing cost, today many combined concepts can be found in the index. In addition, today information about updating is cumulated, where it formerly was just about updating since last edition. Searching and number building is also much easier on WebDewey.

We wrote in Section 2.14 that the proprietary nature of the DDC constitutes an obstacle utilizing the linked open data (LOD) technology.⁶⁸ However, DDC has utilized linked data technology. Mitchell and Panzer (2013, p. 188-9) wrote:

Institutions such as Bibliothèque nationale de France, the British Library, and Deutsche Nationalbibliothek have made use of Dewey linked data in bibliographic records and authority files. FAO has linked AGROVOC to our data at a general level. We are also exploring links between the DDC and other value vocabularies such as VIAF, FAST, ISO 639-3 language codes, and MSC (Mathematics Subject Classification).” (Ibid., p. 191 New York Times Subject Headings⁶⁹ and GeoNames⁷⁰ are also presented.).

Many of these possibilities look exciting, indeed. One example from Mitchell and Panzer (2013, p. 190-195), demonstrates the benefits of combining DDC and GeoNames links. Rather than just searching in DDC hierarchical relations, the combination with GeoNames makes it possible to list (and graphically display) neighboring states (with DDC codes) to a given state (e.g., Niger, DDC 6626). This is but one of extremely many possibilities that the linked data technology enables.

How all these possible utilizations of the linked data technology in practice can be applied must show with time. A practical limitation is how much time the editorial staff on DDC can use for this purpose, or if they will obtain further grants for specific projects. At the present, most developments have been on linking editions of DDC in different languages, with the Library of Congress Subject Headings (LSCH) and with the FAST (Faceted Application of Subject Terminology) topical headings, and in some countries linking their translated DDC with other national vocabularies. We have not yet seen ambitious scientific

projects corresponding to the Unified Medical Language System (UMLS), which involve the DDC, and probably we never will.

We saw in Section 2.14 that DDC is a proprietary classification. Copyright problems may have three kinds of implications:

- a) other data providers, for example subject classifications, may encounter restrictions in linking to DDC. When Mitchell and Panzer (2013) wrote: “FAO has linked AGROVOC to our data at a general level,” is this much less important than if the linking had been to the detailed level and this restriction may be due to copyright problems;
- b) the DDC may encounter restrictions in linking to other data providers if these data are not in an open access-license. Many of the databases mentioned by Mitchell and Panzer (2013), such as MSC, New York Times Subject Headings and GeoNames are open access, and these examples may have been chosen for this reason rather than for their relevance;
- c) users, who do not subscribe to the WebDewey, may be severely restricted in utilizing Dewey linked-data (see below Section 3.4.3).

Ideally, the application of the LOD technology is a cooperation where different partners contribute an integrated system, and such an ideal cooperation is not possible if one or more of the partners do not provide open access to critical parts of their data. Mitchell (in O’Neill and Žumer 2014, p. 123-4) expressed another concern:

The format in which we make our data available is machine actionable and flexible: that is the exciting part. The challenging part is that the Web is outside the principled application of our controlled vocabularies. In the Semantic Web, our data have potential for use by people who don’t know the application rules and perhaps don’t even understand our data.

This is the well-known concern about all social media. It came as a surprise to the world, that Wikipedia, an encyclopedia that anybody can edit, according to several investigations, turned out to be highly trustworthy (and, for example, in line with Encyclopaedia Britannica, cf., Giles, 2005). DDC therefore must make a choice whether to apply the LOD technology or not, and for now its copyright license do not make more than a small part of the system open.

3.4.3 Implications for users

WebDewey is available only via subscription, and according to Bowman (2005, p. 123) subscribers have to resubscribe annually, otherwise they lose access to it. This means that the search facilities as well as linked data etc. only are available through toll-access (except for “a base set” of Dewey linked data in English, German, French, Italian, Norwegian and Swedish).⁷¹ Furthermore, in contrast to other commercial databases, such as Web of Science or PsycINFO, which library users can search online via their library’s subscription, this is generally not the case with WebDewey due to copyright and licensing constraints.⁷² This means that that most of WebDewey’s enhanced facilities are not available to end-users (nor to researchers including the present author). This is a very severe limitation, which makes WebDewey of limited interest.⁷³ Texts such as Satija and Kyrios (2023, Chapter 16) did not address this question, but stated (p.152): “The core purpose of WebDewey is to make the full classification accessible and navigable via the web,” which is misleading. What is true (and what the authors probably meant) is that WebDewey makes the full classification accessible and navigable by use of hypertext, linked data and semantic web technologies *for subscribers*. However, some libraries provide access to limited parts of it, (see, e.g., Aagaard; Conradi; Mengel, 2016).

In spite of the missing end-user access to WebDewey, some services are available (but it is difficult to see precisely from the public sources, which are available),⁷⁴ see further Tomoyose and Simionato Arakaki (2020). The general impression is, however, that WebDewey predominantly serves as a tool for the part of the library staff who handle Dewey cataloging.⁷⁵

4 Theoretical issues and criticisms

In this section some theoretical issues, which were not addressed above, are considered. Subsection 4.1 discuss some general criticisms, 4.2 considers logical issues in the DDC, 4.3 the relation between DDC and updated knowledge, and finally 4.4 considers if the DDC is a natural classification reflecting real relations between its classes.

4.1 Some general issues

Furner (2021, p. 6) found:

Despite or perhaps because of its global popularity, the DDC has been criticised increasingly heavily on two fronts: (a) for its complexity and thus for its difficulty of use, both for classifiers and for readers; and (b) for its bias in favour of certain topics and thus for its violation of codes of ethics.¹⁶ While its editors have made statements recognising the problems and committing to making improvements, progress has been slower than some commentators have desired.

These criticisms are not, however, the ones to be emphasized here. In many ways, the DDC is a user-friendly system, and while the criticism of its bias is relevant and important,⁷⁶ it is linked to the deeper problem of “keeping pace with knowledge.” The central perspective in this article is rather how the DDC relates to KO as a field of study.

Broughton (2015a, p. 200-201) wrote:

It would be silly to pretend that Dewey was a marvellous theorist or that any great philosophic principles of classification underlay the original scheme – it was just a sensible, pragmatic arrangement for books, suitable for a general library. It shows an indication of some of the principles of classification theory that were rationalized later on (such as the principle of general-before-special and an implicit sense of inversion) but these are mainly based on common sense (of which Dewey had a good deal), and suggestions that there is a philosophical basis to the scheme have been largely superimposed retrospectively.

A dominant criticism in the history of the DDC has come from the facet-analytic school and concerns enumerative systems in general, but also the lack of logical principles of classification. Ranganathan (1951, p. 87) wrote:

An enumerative scheme with a superficial foundation can be suitable and even economical for a closed system of knowledge ... What distinguishes the universe of current knowledge is that it is a dynamical continuum. It is ever growing; new branches may stem from any of its infinity of points at any time; they are unknowable at present. They cannot therefore be enumerated here and now; nor can they be anticipated, their filiations can be determined only after they appear.

Ranganathan's view was discussed by Hjørland (2013, p. 548), who argued that fundamental theory in KO is shared by both enumerative and faceted classifications, and that although faceted systems are more flexible, they cannot

represent all new subjects as combinations of a basic set of preexisting elements. Nonetheless, the facet-analytic criticism has greatly influenced library classification, and over the years, it modified the DDC. Still, the DDC is not a logical consistent system, which from the start was designed on facet-analytic methodologies, such as the Bliss Bibliographic Classification 2nd ed. (BC2).

Another major criticism was expressed by Bliss (1912), and is implicit in Bliss's (1929, p. 16) principle of basing library classification on "the scientific and educational consensus." Contrary to Dewey's view that classes are just "pigeon-holes" and that their mutual relations are rather unimportant, Bliss argued that the library user was best served, if he encountered a library classification that reflected what they encountered in scholarly literature. Although the DDC has been updated throughout its history, it still not in accordance with Bliss' intention.

Shera (1951, p. 77) discussed various classifications, but dismissed the DDC from consideration along with other systems which he termed "purely utilitarian and without philosophical foundation." Shera's ambition was clearly, like Bliss's, to go beyond Dewey's "pigeon-holes" to base a classification on philosophical principles. For this, he advocated pragmatic philosophy and coined the term "social epistemology" which today is recognized as an important term. Shera (1951, p. 72-73) found that existing theories of knowledge organization has built on the wrong assumption that "there exists a universal 'order of nature' that, when discovered, will reveal a permanent conceptual framework of the entirety of human knowledge". This is closely related to the view that the DDC represents a natural classification reflecting "real" relations among classes and concepts, which is further discussed in Section 4.4. Some classifications provide alternative classifications for different libraries. In particular the BC2 is known to do so (see Broughton, 2024, Section 6.1). Recently the DDC has provided optional arrangement to religion, class 200 (cf., Thornton, 2024a). The introduction of such alternatives represent a step away from the view that Shera is criticizing. It must be considered, however, that the provision of alternatives is not a way to omit the justifications of the chosen relationships. Also alternative arrangements need to be justified.

Other theoretical issues involve the basis for the main structure of the DDC and its philosophical roots.⁷⁷ Wiegand (1998, p. 182) found, based on Leidecker (1945):

That Dewey largely tapped [William Torrey] Harris's structure as the broad blueprint for his own decimal scheme (in order—philosophy, theology, sociology, philology, natural science, useful arts, fine arts, literature, and history) is hardly debatable.

Moreover (1998, p. 182):

Harris had built his scheme on two sources: (1) ideas of Sir Francis Bacon, who had argued that the three faculties of the human mind—memory, imagination, and reason—produced three categories of learning—history, poetry, and philosophy—each of which could be further subdivided; and (2) the ideas of G. F. W. Hegel, who inverted Bacon's order to give a more prominent role to philosophy, and from which the rest of the structure follows.

This has given rise to the claim that the DDC was inspired by Hegelian philosophy. However, as argued by Kislev (2021), this is a harmful thesis: “Because Hegel's work bears a promise of a completely different organizational philosophy and because this different organizational philosophy cannot be probed until Hegel's ties to the DDC are severed.” The main structure of the DDC is therefore not an indication of an underlying Hegelian philosophy.

Today, the main structure of DDC lacks a defensible principle. Subscribers to the theory of integrative levels have criticized this structure for not reflecting the basic order of reality (such as, for example the main structure of the Bliss Bibliographical Classification, BC2, which partly reflects the theory of integrative levels cf. Gnoli, 2005).

4.2 Logical issues in DDC

Concerning the hierarchical structure of the DDC, Dewey (2011, p. xlvii) claimed:

4.18 Structural hierarchy means that all topics (aside from the ten main classes) are part of all the broader topics above them. The corollary is also true: whatever is true of the whole is true of the parts. This important concept is called hierarchical force. Certain notes regarding the nature of a class hold true for all the subordinate classes, including logically subordinate topics classed at coordinate numbers.

Frické (2012, p. 175) found, however, exemplifying by the DDC: “A common pattern often used by librarians in shelving classification is similar to the Revisable Aristotelian Classification Hierarchy, but it is not exactly the same.” He called such systems “Librarian Aristotelian” and wrote (p. 177):

The Librarian-Aristotelian Classification has disadvantages, ambiguities, or differences, when it comes to Searching for a Class or Category. In an ordinary Aristotelian Classification, any node (or the label of any node) can be used to launch a Search, and the process consists of following all the branches that go through that launch node down to their leaves, which is where the items are, and collecting together the items of the leaves.⁷⁸

Members of ontological communities often claim that ontologies, contrary to classification systems and thesauri are machine processable. The case is probably that library classifications and thesauri do not always strictly follow logical principles (again, Dewey’s practicalism may act counter to the strict maintenance of logical principles). However, the intellectual rigor of the DDC has varied between different editions. In 1956, the new editor Benjamin A. Custer decided to impose intellectual rigor on the DDC structure, implying that this was not the case with all former editions. However, as Frické (2012, p. 175ff) demonstrates, this is still not fulfilled.

4.3 The relation between DDC and updated knowledge

In Section 2.13, we saw that Dewey himself, despite comprehensive expansions of the DDC, was strongly against revising it in ways that changed the meaning of the class numbers, or following advances in the sciences.⁷⁹ Alex Csiszar has brought forward relatively unknown knowledge about Dewey’s view on this matter, writing (2013, p. 444): “Dewey’s classification was not ‘scientifically accurate,’ but what stable system could ever be so? A usable standard was needed, and Dewey would do well as the basis for an expanded universal classification of all knowledge.” Further (p. 445), Csiszar wrote that Dewey himself warned the Royal Society against getting carried away with their classifications, and quoted the text about pigeon-holes, quoted in Section 2.13 above, and continued: “Dewey’s advice was that keeping science in order was basically like keeping the

desk of a man of business organized, so that whatever they did, they should avoid getting philosophical.”⁸⁰

Dewey’s attitude in this regard was extremely bureaucratic considered from a scholarly perspective. One cannot imagine, for example, that textbooks or encyclopedias such as Encyclopaedia Britannica should not aim at providing updated and accurate knowledge. The library movement generally understands itself as an instrument for enlightenment. KOSs, beside serving IR, should also be considered an enlightenment instrument and aim to provide updated knowledge for users. Dewey’s warning against being philosophical is in reality the same as a declaration that knowledge organization shall not aim at being a scholarly field in its own right, because theoretical/philosophical knowledge is an unavoidable part of all fields of knowledge (see Hjørland, 2023).

In Section 2.13 and 3.3, we saw that later editors of the DDC tried to balance the two conflicting principles of “integrity of numbers” and “keeping pace with knowledge,” and specific decisions have often be considered carefully by the Editorial Policy Committee (EPC).⁸¹ Recent editorial rules recognize different levels of revision (here quoted from Green; Martin, 2013, p. 12):⁸²

- a) complete revision - Base number remains unchanged, but most subdivisions are changed. (See also about “Phoenix schedules” in Section 3.3);
- b) extensive revision - Base number and overall outline retained, but many subdivisions change;
- c) moderate revision - Regularization of structure, expansions, and reductions undertaken as needed.

In principle, the DDC thus acknowledges the need for revisions according to those editorial rules, and it allows these, as long they do not affect the base number. However, these rules do not indicate what the status of the DDC is today. Mitchell and Vizine-Goetz (2017, p. 1256) wrote, “The Dewey Decimal Classification (DDC)⁸³ system is a general knowledge organization system that is continuously revised to keep pace with knowledge.” Although this claim is partly justified by DDC’s good institutional support that enables regular updates, it is wrong as a general statement. Rather, we must ask to what degree the DDC

keeps pace with knowledge. This must be examined field by field, since not all fields are completely revised in each edition,⁸⁴ and because each field demands different qualifications.

Unfortunately, very few researchers are available and motivated to do the necessary domain-specific studies, and therefore very few studies exist. Blake (2011, p. 469-470)⁸⁵ represents an exception from this state of matters. He examined DDC's classification of mammals:

At present, many, perhaps most, current bibliographic classifications for mammals reflect quite outdated science. The latest edition of DDC, for example, arranges mammals in essentially the same way as the second edition of 1885. Revisions since DDC2 have mainly focused on adding detail and giving more guidance to users about where to place certain taxa. New (1996) and New and Trotter (1996), in their accounts of the changes introduced to the zoology schedule in DDC21, emphasise pragmatic concerns such as avoiding the re-use of numbers, rather than keeping up with developments in zoology. Indeed, some of the changes made in DDC21, such as moving the monotremes to a position between the marsupials and placentals [Dewey 1996, vol. 2: 1181], represent a move away from scientific accuracy in the interests of practical concerns such as the efficient use of notational space.⁸⁶

This is a strong indication that DDC conveys outdated knowledge, and that updates tend to emphasize technical issues rather than subject knowledge. In order to illuminate the present condition of DDC's representation of knowledge fields, the field of LIS as represented in the newest print edition, DDC23 (Dewey, 2011), is presented in Appendix A. This example shows that DDC does not present LIS in an updated way, although some newer terms, such as "Folksonomies" and "Metadatata" have been included. (Compare other classifications of LIS, e.g. the one in Järvelin and Vakkari (2022, p. 73) and the table of contents in Handbook of Information Science, Stock and Stock (2013).

The literature has been concerned about DDC's representation of issues such as religion, gender, and race, for example that the majority of the top categories in the religion section pertain to Christianity (cf., Igwe; Ayandokun, 2024; Mai, 2011, p. 724). Another example is that the placement of topics related to women shows implicit bias (cf., Olson, 1998; Olson, 2002, p. 8; Fox 2015⁸⁷), and a third about the treatment of race and ethnicity in classifications (cf., Thornton, 2024b; Furner, 2007). Such examples are important, but they represent

a class of problems of which the editors seem to be aware and try to put right (cf., McIlwaine; Mitchell, 2006; Béthery, 2003).⁸⁸ Changes in DDC21 and DDC22 included an optional arrangement for world religions. However, such problems in the DDC should not be taken as an indication of the view that just some few biases need to be corrected in the system to make it perfect.

Martens (2015, p. 339) summarized the missing connection between the DDC on the one hand and classification efforts in the sciences and in general on the other hand. He wrote that Miksa (1998) dismissed the notion that library classifications like Dewey's have historically had anything more than a tenuous connection with direct classification efforts in the sciences or knowledge in general. Martens also wrote, referring to Feinberg (2007), Mai (2010, 2011), and Szostak (2013b) that there has been growing concern that such representation must inevitably fail to accurately reflect the wide range of relevant world views on actual content and should be completely rethought. This supports Shera's (1951) pragmatic philosophy and social epistemology.

The field of knowledge organization should develop resources from which to update classification systems in all domains of knowledge, drawing on developments in the subject fields as well as in the philosophy of classification, which can be used for construction and updating all kinds of KOS, including the DDC.

4.4 Is the DDC a natural classification reflecting “real” relations?

This issue is reflected in a very long discussion between “natural classification” (realist position) on the one hand versus “artificial classification” on the other hand. There is a comprehensive literature about natural kinds and classifications, including Kendig (2016). There is no one who denies that artificial classifications exist (e.g., classifying books according to height or color), but idealist/constructivist minded persons deny that any classification can be “natural.” There has been - for example in biology - a long history of different ways of classifying the (living) world. Often classificationists thought that they, in contrast to their predecessors, have made “a natural classification,” just for it later to be replaced by new suggestions. It has even been difficult to say what the

meaning of a natural classification is. Today, there are different ways to classify the living world, and correspondingly different ways of understanding a fundamental concept such as “species.” The best example of a seemingly robust natural classification seems to be the Periodical System of chemistry and physics, but for controversies even here, see Channon (2011) and Bradley (2011).

Information scientist Jason Farradane (1961, p. 121) expressed a position in the fundamental philosophical issue about realism versus idealism (or constructivism) in classification: “Classification is not some part of an external ‘reality’, waiting to be discovered; it is an intellectual operation upon mental entities or concepts.” This quote represents the idealist position, but Farradane (1961, p. 121) also wrote: “The closer a classification approaches to the true structure of knowledge, the more useful it will be,” which represents the realist position. Perhaps we could say that the concern of our field of knowledge organization is only secondarily involved in the question of whether scientific knowledge is natural or artificial, as long as we follow Bliss’s goal to reflect the scientific and scholarly consensus. The primary question for us is whether our KOSs reflect constructions which are not commonly agreed in science and the rest of the surrounding society.

Ashikuzzaman (2014) found the DDC to belong to the artificial classifications, as opposed to natural classifications, which he defined as “[...] grounded in the inherent relationships and characteristics of the subjects or entities being classified, aims to reflect the true affinities and evolutionary connections within a system.” DDC is, however, sometimes considered based on the idea, that there is one best, “natural” way to classify “the universe of knowledge” and that the DDC reflects real concepts and relations. This is probably a widespread implicit assumption, which is explicated by Miksa (1998, p. 87), who wrote:

Another even more profound implication for the future of the DDC arises from the epistemological issues raised by the idea of a post-modern age. If there is no one best approach to take when organizing the subjects of the universe of knowledge, what should be the role of a system like the DDC (or for that matter any other modern library classification or knowledge classification system) with establishing a distinct order and structure of subjects? This role has been paramount

in the history of the DDC, which is, after all, a system that supplies libraries with classification copy so they might more efficiently organize their collections.

Here, Miksa assumes that the idea of “real” relations has been influential through the history of the DDC, but that it today is challenged by “post-modern ideas”. Miksa is wrong, however, in relation both to the existence of “one best approach,” and to attributing this point of view to Melvil Dewey. In general, the broad consensus is that a classification serves a given purpose and that different purposes requires different classifications. A special case are concepts that are defined by human conventions, such as countries (e.g., Niger, DDC 6626). In such cases, a classification such as DDC seems to be reasonably updated and reflecting real relations.

The idea of “real” relations was never Dewey’s view, on the contrary, his practicalist position implied, as we saw, a warning against trying to accommodate library classifications to developments in scientific classification. However, implicit in many ideas on how to apply the DDC for new contexts lie in this wrong idea, that a system such as the DDC reflects some objective relations between concepts. Miksa himself (1998, p. 89) suggested that a future function might be “for teaching, learning, and memorizing knowledge categories, and for discovering relationships not previously imagined among diverse areas of categories and resources.” However, DDC classifies LIS apart from the social sciences, while LIS is today mostly classified along with the social sciences. What advantage is there for a student to learn about DDC’s idiosyncratic and arbitrary relations? Probably just a waste of time. To learn about concepts and conceptual relations is to learn about subject matters. Biologists learn about living organisms, and their genealogical, ecological and structural relations. To the degree that this is incorporated in bibliographical classifications, these may teach relevant knowledge and conceptual relations, but otherwise, they provide their own arbitrary knowledge.

Miksa’s idea on how to accommodate the DDC to “the post-modern age” is based on the idea that this system contains conceptual relations that reflect “the universe of knowledge” (a universe inhabited by librarians, who apparently are separated from the rest of the academic world). This idea must be reversed. The

production of knowledge in society creates many special classifications in constant development, a general classification like the DDC must learn from them, and it must be based on them and cooperate with them. Miksa (1998, p. 87-90) suggests a very different perspective: to accommodate DDC to individual users. He concludes: “even modest efforts to accommodate such changes would ensure that the DDC has a future of enormous potentialities.” The future of LIS depends, however, not on supporting a given system like the DDC, but on developing knowledge and approaches to developing KOS, which represent updated knowledge, as recognized by the broader community.

5 DDC in the perspective of the development of LIS

Any knowledge organization system (KOS) needs to relate to the contents of what is being classified. Unfortunately, LIS as a field of research and teaching has gradually been decoupled from subject knowledge. Dewey and his classification probably play a role in this development.

Classification in the DDC class “Library economy” (as LIS was called in DDC until, and including, DDC14, 1942) ⁸⁹ is placed in class 025.4 in which it was stated (here citing DDC10): “For philosophic classification of knowledge, see 112 Methodology. This [025.4] is for practical classing of books, pamphlets, and notes, rather than theoretic speculation.”

In other words, not just the DDC itself, but also the classification as a LIS discipline should, according to the DDC, be practicalist and atheoretical. This also meant excluding consideration of the principles behind scientific classification, and the study of concepts and their classification in the different domains, on which a general classification is composed. Other LIS researchers such as Bliss and Shera contrast Dewey’s attitude. Despite Dewey’s attitude and his influence on LIS-education, the field has formerly had a better focus on subject knowledge, than it has today. A few examples of its decoupling are:

- a) Encyclopedia of Library and Information Sciences 4th ed. (McDonald; Levine-Clark, 2017) includes articles on Business Literature, Economics Literature, Engineering Literatures and Their Users, Geographical Literature, Humanities Literatures and Their Users, and Social Science

Literatures and Their Users. However, all these are reprints of older articles, indicating that research about subject literatures has disappeared from LIS (bibliometric studies of domains being an exception);

- b) the American Library Association published in 1986 *Sources of Information in the Social Sciences. A Guide to literature* (Webb; Beals; White, 1986). This guide, and similar ones, have not since been updated, which is part of a trend where LIS has lost interest in specific knowledge domains and special bibliography;
- c) schools of LIS used to offer courses in, for example, humanities information, science information, etc., which have been discontinued. Examples of textbooks for such courses are Foskett (1974) *Classification and Indexing in the Social Sciences*, Langridge (1976) *Classification and Indexing in the Humanities*, and Vickery (1959) *Classification and Indexing in Science*;
- d) studies of classification and indexing in the social sciences, and related LIS studies of the social sciences have disappeared as a topic (see Szostak, 2024, Section 8);
- e) people in KO may overestimate their own competences for classification and underestimate contributions of other disciplines. Beghtol (2003) claimed, for example, that the classifications developed in different disciplines are “naïve,” in contrast to classifications developed by information professionals, which are called “professional”.⁹⁰ This terminology reflects a grotesque misunderstanding (see further in Beghtol, 2003, 2004; Hjørland; Nicolaisen, 2004; Nicolaisen; Hjørland, 2004.)⁹¹;
- f) classifications, such as the UDC, used to have international panels of subject specialist (“special sub-committees”) to work with updating of various parts, but this almost stopped when the *Fédération Internationale d’Information et de Documentation*, FID, was shut down in 2002. (The DDC did not use similar panels). The Danish “DK5” (corresponding to the DDC) used to have subject specialists in a broad spectrum of disciplines updating the system until about 1980. At that time, a common feeling was that computer developments would make it redundant, and

although DK5 development continued, this was with much reduced costs and ambitions;

- g) Broughton (2024) wrote: “[...] formal reviews of the published classes [of the BC2] were unfortunately rather few and far between. This phenomenon caused some disquiet to the BCA Committee, but perhaps reflected the lack of persons able to provide a critical assessment rather than a failure to distribute volumes for review”.

These are just a few examples, but the development is unfortunately very clear. Although there exist fields, such as chemical informatics, geographical informatics, legal informatics and medical informatics, which seem to thrive, these are separate fields, mainly disconnected from LIS, and these fields do not consider overall classification of their research fields. The necessary subject qualifications to provide for quality KOS, to evaluate specific parts of systems like the DDC, to write and review research papers implying subject knowledge. To teach knowledge organization and information retrieval in a way, that considers the subject specific qualifications, seems to have decreased dramatically.

An important exception is Green and Martin (2013), an article written by then two editors of the DDC about classification of angiosperms (flowering plants) in biology, and its implication for the revision of the DDC. This article provided the following kinds of information of importance for classifying flowering plants and revising the DDC:

- a) information about the sources for the existing classification of angiosperms in DDC, including that its structure is based on the arrangement found in the article “Angiosperms” in The New Encyclopedia Britannica (Cronquist 1989);
- b) information about the editorial principles of the DDC, including how these editorial principles balance the demand about “integrity of numbers” and “keeping pace with knowledge.”;
- c) information about the major sources of current knowledge about the Angiosperms, including the APG III (2009);

- d) attention to the conflict in biological taxonomy between traditional, Linnaean classifications based on the morphology of the species versus phylogenetic classification (Genealogical classification), based on shared derived characteristics (features inherited from a common ancestor). A conflict which involves different nomenclatures, the rank based (hierarchical), Linnaean nomenclature versus phylogenetic nomenclature not expressive of rank;
- e) an evaluation of the conflicts versus consensus and stability in biological taxonomy, and the implication for revising the DDC.

Green and Martin's article seems a model of how bibliographic classifications should consider scientific and scholarly taxonomies. Unfortunately, it is "a lonely swallow" and it represents an exception that confirms the rule that LIS-classifications neglect deeper involvement with relevant subject knowledge.

The task of "keeping pace with knowledge", that is, following the development in different fields of knowledge in order to update any KOS, whether general or special, is, in the opinion of the present author, the most important as well as the most demanding and difficult task. It is obvious that DDC have looked into the work of the UDC (see Green; Martin, 2013) and it is obvious today that access to qualified resources for this task is scarce, and should be shared with all attempts to design new or revise older KOS. The implication of this is that the focus of KO as a field of research should not be on individual KOS, such as the DDC. It should not even be on the category of KOS (such as classification systems or thesauri). It should be on the concepts and their relations that are relevant to implement in any kind of KOS, including the principles behind such relations (e.g., Genealogical classification, cf. Gnoli, 2023). This is the core idea behind the domain-analytic approach to KO (Hjørland, 2017a, 2023).⁹²

The idea is not that the whole burden of "keeping pace with knowledge" should fall on the developers on KOS alone, but should be shared with university teachers and the KO field as a whole, in interaction with external domain experts. The ISKO Encyclopedia of Knowledge Organization (Hjørland; Gnoli, 2016) contains articles about classification of specific domains, e.g., art studies,

astronomical objects, mental diseases, and musical instruments, written by external domain experts or researchers from the KO-community. It is the idea that such articles, together with others, including methodological articles, may be useful for constructing and updating KOS and provide useful information for all involved with KO and information science. Such knowledge should form the basis for research and teaching of KO.

6 Conclusion

Throughout this article, the DDC has been presented as the world's most successful library classification measured by its use of libraries around the world. At the same time, the criticism raised against it has been presented and discussed. Newer classification systems, such as the Bliss Bibliographic Classification, 2nd ed. (BC2) have better theoretical foundations and are better integrated in the KO as a research field (see Broughton, 2024), but face existential problems. This is not a problem for the DDC, of course, but it is a problem for KO as a research based practice. As Hjørland (2023, p. 163) wrote:

For two reasons it is a problem if systems and processes used in practice are obsolete [or simply bad] from a research perspective:

- a) it may imply that research-based education is less relevant for practice because practice ignores new systems not in use;
- b) it may imply that education reflecting current practices may not have a proper academic level and may be less relevant for tackling new developments.

In many ways, a classification like the DDC may be “good enough” for much practical classification in many libraries (especially when just the “mark and park” function is considered). However, this attitude, to try to provide what is “good enough” (or worse, what one can get away with), is poison for academic studies.⁹³

An information professional should be able to work at the forefront of developing knowledge organization systems. This implies learning concepts, theories and methods of relevance for KOS. Traditionally this involves learning

about semantic relationships such as generic relations, part-whole relations, instance relations etc. More seldom, it involves considering less used semantic relations. However, as Faber and López Rodríguez (2012, p. 115) wrote:

[R]esearch results in this area [terminological studies] indicate that knowledge acquisition requires simulation of human interaction with objects, and this signifies that non-hierarchical relations that define the goal, intended purpose, affordances, and result of the manipulation and use of an object (e.g. *has_function*, *affects*, *has_result*, etc.) are just as important as hierarchical ones, such as *type_of* or *part_of*.

This quote challenges most work in KO today. Another challenge is that it is also necessary to know that semantic relations are theory-dependent (contrary to the myth that they are “context-free, definitional, and true in all possible worlds,” cf., Hjørland, 2015). As Kuhn (1962) demonstrated, astronomical terms changed their meaning following the Copernican revolution, beginning about 1543, which changed the view of the solar system from having the Earth as the center (the geocentric model) to having the Sun as the center (the heliocentric model). Kuhn understood the geocentric model, represented by Ptolemaic astronomers, as one paradigm, supplanted by a new paradigm, the heliocentric model, represented by Copernican astronomers:

- a) in paradigm one, Ptolemaic astronomers might learn the concepts “star” and “planet” by having the Sun, the Moon, and Mars pointed out as instances of the concept “planet” and some fixed stars as instances of the concept “star”;
- b) in paradigm two, Copernicans might learn the concepts “star”, “planet” and “satellites” by having Mars and Jupiter pointed out as instances of the concept “planet”, the Moon as an instance of the concept “satellite” and the Sun and some fixed stars as instances of the concept “star”.

Thus, the concepts “star”, “planet” and “satellite” got a new meaning and astronomy got a new classification of celestial bodies. This realization is not just of historical interest, but is today visible, for example, in competing schools of biological classification.⁹⁴

In order to be qualified as editors of classification systems, information professionals need to know about such problems in relation to concepts, semantic relations, and the theories or perspectives they support or counteract.⁹⁵

It is not that editors of the DDC have been unaware of such problems. As mentioned Green and Martin (2013), “A Rosid Is a Rosid Is a Rosid . . . or Not” represents exactly the kind of research which here is requested. However, as this article has shown, Melvil Dewey’s approach was explicitly a narrow pragmatism, which thwarted the ambition to provide a proper academic basement of library classification. Despite opposite tendencies during the history of the DDC, this article has argued that the system and most of the textbooks reflecting it still is dominated by a narrow pragmatic point of view.

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Appendix A - The representation of library and information science (LIS) in DDC23 (2011)

Below is analyzed how the newest print edition, DDC23 (2011) represents the field of LIS. This is done in order to illuminate the DDC's representation of knowledge fields. Today DDC class 20 is named "Library and information sciences,"⁹⁶ and it includes "information science" and "documentation." There is, however, no entry "Library and information sciences" in the index (nor "Library and information science" or LIS, thereby neither no terms for LIS-education, LIS-research, or LIS-theory).

The term "Information theory" refers to 003.54, in 003 "Systems". Class 20 refers to this class, but DDC thereby confuses "information theory" in the Shannon (1948) meaning with theories of library and information science. LIS theories are not represented at all, even widely known theories such as facet-analysis or the cognitive view, not to speak of the systems approach, social epistemology or domain-analysis.⁹⁷

According to Järvelin and Vakkari (2022, p. 73-74) the main research fields in LIS are:

S&PC [Scientific and professional communication with bibliometrics] is the most popular major research topic (37.4%)⁹⁸ followed by IS&R [information storage and retrieval, including classification and indexing] (22.9%), L&I service activities [including administration, planning and automation] (13.9%) and information seeking (13.9%). The four most frequently published major topics cover 88.1% of all scholarly articles.

Of these fields in LIS, the largest one is not represented. Terms like "Scientific and professional communication," "Scientific communication," or "Scholarly communication") are missing in class 20. The same is the case of the dominant subfield "bibliometrics" (or near synonyms such as "altmetrics," "infometrics"/"informetrics", "scientometrics," and "webometrics"). It must be considered a serious mistake that such fields are not considered part of LIS, but classified in sociology. (There are many books on, e.g., bibliometrics in the Library of Congress, and they are assigned DDC codes. Christine L. Borgman (1990) *Scholarly Communication and Bibliometrics* is assigned DDC class

302.2/244/01, i.e., sociology rather than information science; although Borgman is a well-known researcher, who is primarily associated with information science.)

The next largest LIS field, according to Järvelin and Vakkari, is “IS&R”, which is represented in DDC in 025.4 “Subject analysis and control”, which is a subclass in 025 “Operations of libraries, archives, information centers.” This field is also known as “knowledge organization,” “information organization,” “knowledge representation,” and “information representation.” However, none of these terms are in the scheme or in the index classified in 20, although “Knowledge representation” refers to a class 006.323 in computer science, and “Information architecture” refer to 006.7 (“Peripherals”). The term “Information retrieval” refers only to information science (class 025.524) although this research field has mostly migrated to computer science, which today produces the overwhelming majority of the publications using this term. It should be said, however, that some newer terms, such as “Folksonomies” and “Metadata” are represented in DDC 025.4.

The third largest field, L&I service activities, includes circulation or interlibrary loan, collections, information or reference service, user education, buildings and facilities, administration or planning, automation, other L&I service activities, and several interconnected L&I activities. Most of these fields seems to be well represented in DDC23 in the classes 022 “Administration of physical plant,” 023 “Personnel management (Human resources management,” 024 “Operations of libraries, archives, information centers,” and 025.1 “Administration”.

The fourth largest field, information seeking, is not represented by this term in the index (nor by “Information behavior,” “Human information behavior” or “Information need”). However, “Library use studies” is in 025.58 and “Information sources use” in 028.7, “Use of books and other information media as sources of information”. This field is therefore not represented in its broadness, but just by two narrower topics.

In conclusion, the classification of LIS in DDC23 is deficient and obsolete. In addition to missing terms/classes, DDC also has a focus on institutions and

their services, rather than on the study of information seeking and knowledge organization processes and systems, reflecting an outdated view of LIS. The class number 20 has been kept since the second edition from 1885 fulfilling the principle on integrity of numbers. However, in the outside world, LIS is today mostly classified with the social sciences.

Classificação Decimal de Dewey (CDD)

Resumo: A Classificação Decimal de Dewey é atualmente o sistema de classificação bibliográfica mais amplamente utilizado no mundo. Este artigo apresenta as características básicas da DDC e as discute no contexto de suas alternativas e das pesquisas na área. Fornece uma breve visão geral de seu desenvolvimento histórico e aborda as questões teóricas e as críticas levantadas contra ela. Argumenta-se que há uma discrepância entre, de um lado, o sucesso mundial da Classificação Decimal de Dewey e, de outro, suas qualidades acadêmicas. Alguns dos problemas da DDC estão relacionados à filosofia de seu fundador, Melvil Dewey, caracterizada por um pragmatismo estreito que enfatiza a função de "marcar e estacionar" em detrimento do acompanhamento do desenvolvimento do conhecimento. Henry Bliss desenvolveu uma filosofia e classificação alternativas baseadas no princípio de que uma classificação bibliográfica deve representar o consenso científico e educacional, promovendo uma conexão mais estreita entre a classificação bibliográfica e o estudo dos domínios do conhecimento. Por fim, Jesse Shera desenvolveu uma "epistemologia social", que enfatiza um pragmatismo mais profundo ao reconhecer desacordos fundamentais no conhecimento e em sua organização, implicando em uma conexão ainda maior com os domínios do conhecimento (que hoje formam a base da abordagem analítica de domínios). Nenhuma dessas alternativas posteriores alcançou a mesma popularidade da Classificação Decimal de Dewey, mas argumenta-se que elas fornecem uma base mais saudável para a organização do conhecimento como campo de estudo. É fundamental que a comunidade de ciência da informação considere tais questões filosóficas e como elas influenciam os sistemas e os processos de organização do conhecimento.

Palavras-chave: Classificação Decimal de Dewey; classificação de assunto; teoria e princípios da classificação

Authorship and Responsibility Statement

Conception and design of the study: Birger Hjørland

Data collection: Birger Hjørland

Data analysis and interpretation: Birger Hjørland

Writing: Birger Hjørland

Critical review of the manuscript: Birger Hjørland

Corresponding author

Birger Hjørland

Birger.Hjorland@hum.ku.dk

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¹ The DDC editions are in this article named DDC1 - DDC23 although, for the earlier editions, this name is a retronym. (DDC23 is the latest edition, but it is currently updated online. On 01 August 2017, the Dewey blog wrote: “The Dewey Decimal Classification (DDC) is frequently updated by the Dewey editorial team. These changes are available in WebDewey the next day. Consequently, print editions, with their multiyear publication cycles, became obsolete very quickly. In an effort to provide libraries with the most up-to-date information available, OCLC has decided to discontinue publishing English-language print editions of the DDC.” However, printed editions were reestablished from 2018, as “on demand” publications, named DDC2018, DDC2019, DDC2020, DDC2021, DDC2022, DDC2023 and DDC2024, but these are officially abbreviated versions of the online DDC23).

² Shera (1951) mentions the DDC, but presents no specific criticism of it, just dismissing systems from consideration, which he (p. 77) termed “purely utilitarian and without philosophical foundation.”

³ An anonymous reviewer wrote: “One obvious problem is that most of these shortcomings are held in common with other big general schemes of comparable age, and not specific to DDC at all, and this should be made more explicit. For example, the general difficulty of accommodating new knowledge without changes which overly inconvenience existing users has been a major concern for all editors, as is the problem of maintaining integrity of the notation, and the ever present matter of political incorrectness in class names and descriptions. There is a literature on problems associated with maintaining and revising classification schemes (Curwen, 1978; Foskett, 1989) which demonstrates this.”

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- ⁴ Unfortunately, debates on the proper theoretical foundations for library classifications have not always been done in a proper academic spirit. For example, some of Dewey's disciples had hostile feelings towards Henry Bliss, cf., Campbell (1976, p. 139).
- ⁵ The term "library classification system" is synonymous with "library classification schema," sometimes abbreviated "library classification," "classification system," "classification," "system" or "scheme".
- ⁶ Other bibliographical systems may be designed without considering shelving of physical documents. Examples are the classification systems used in bibliographical databases, for example, PsycINFO. The Universal Decimal Classification, UDC, was originally constructed as a bibliographical classification system for the Mundaneum, which was a bibliographic registry, not a library, but UDC later became influential as a library classification system for large research libraries.
- ⁷ The number of classes in BC2 is compared by Broughton (2024) with other library classification systems. It is said that BC2 exceeds the DDC, the UDC and the LCC, and that its literary warrant is based on the *British National Bibliography*, but that the level of granularity varies among its classes.
- ⁸ What OCLC here calls "classification schemes" does not include (all) faceted classifications or other multidimensional classifications, although a faceted system like *Bliss Bibliographical Classification*, 2nd ed. (BC2) is adapted for linear arrangement of concepts and items. Broughton (2015c, 8) wrote: "The difficulty arises because we're trying to put all of these subjects (and potentially the whole of knowledge) into a straight line: the single sequence, or linear order, can't take account of the variety of relationships that exist between subjects."
- ⁹ W.C. Berwick Sayers (1955, p. 6) differentiated between the "bibliothecal" and the "bibliographical" use of classification in the same way that we use for respectively "library classification" and "bibliographic classification".
- ¹⁰ Hyman (1980, p. 39), citing a range of studies, wrote: "Current research predominantly reflects acceptance of a dichotomy of classification for shelf and information retrieval. There emerges a consensus that the same scheme-or, at the very least, the same notation-cannot fulfill adequately bibliographical and bibliothecal and locational functions," while Williamson (2010, p. 22) wrote: "The multidimensionality of subjects has always been one of the problems that shelf classification has been unable to overcome." Markey (2006, p. 20) wrote: 'Gorman [1981] asserts that "[t]he problem with classification lies in the attempt to carry out its two conflicting purposes—subject retrieval and the arrangement of individual items—using only one instrument. The solution requires separating the two purposes [and] [i]ntelligent use of computers is the key to the separation and the solution.' The need for a single relative physical position for library materials on bookshelves will diminish over time as print collections yield to electronic collections in size, currency, and convenience to the user, making it possible for faceted classifications to come into their own." Finally, Pollitt (1998, p. 181) found that library classifications would have to refrain from the function physical arrangement in order that a proposed view-based searching interface could take hold.
- ¹¹ Martínez-Ávila (2017, p. 234) wrote: "The term 'reader-interest classification' has been used to describe various approaches to library classification. In general, this umbrella term—and several of its near-synonyms—refers to alternatives to traditional library systems such as the *Dewey Decimal Classification* (DDC). According to its advocates, reader-interest classifications provided a more suitable arrangement for the reader because it gathers related terms scattered across the system and is more intuitive to use."
- ¹² As Hyman (1980, p. 35) wrote: "In the broadest sense, all classification schemes aim to match the interests of the particular library's readers." Further, Hope Olson has pointed out (1997, p. 62): "All systems have a limit that excludes and/or marginalizes something or someone. Replacing the old system with a new one may change the limits, but it does not eliminate them. And Satija (2004, p. 182) wrote: "It is true to say that reader's interest classification adopted so far are not always satisfactory and sometimes correspond to ephemeral vogues. It reflects a middle level of ambition in knowledge organisation. It is a compromise between ad hoc classification and rigorously scientific classification."

- ¹³ Saracevic (2012, p. 51) wrote: “Bibliographic classifications, subject headings, and indexing languages were used for organizing information or information records for a long time, some schemes and practices going back centuries. All are based on the notion of aboutness. Choice of a given classification code, subject heading, or index term denotes what a document, or part thereof, is about. They assume but do not address searching at all. Searching is taken for granted. In other words, all deal with inputs and take outputs as a given. No attempt was ever made to define searching related to any classification or subject heading scheme, be it formally or pragmatically.”

It is beyond the scope of this article to discuss Saracevic’s quote further, but it points to an important difference between research in information retrieval and KO, where users’ relevance criteria has dominated in the first, while KO has tended to assume that a proper classification by itself provides the optimal tool for searching.

- ¹⁴ Glushko *et al.* (2013, p. 294): “Faceted classifications are especially useful in web user interfaces for online shopping or for browsing a large and heterogeneous museum collection. The process of considering facets in any order and ignoring those that are not relevant implies a dynamic organizational structure that makes selection both flexible and efficient [...]. If a department store offers shirts in various styles, colors, sizes, brands, and prices, shoppers might want to search and sort through them using properties from these facets in any order. However, in a physical store [corresponding to a physical library], this is not possible because the shirts must be arranged in actual locations in the store, with dress shirts in one area, work shirts in another, and so on.”
- ¹⁵ Although LCC is designed to classify only books in the Library of Congress (LC), it is used by many other libraries. LCC is found useful because the collections of the LC are very broad and extensive why the LCC covers many disciplines at a high level of granularity.
- ¹⁶ Remark, that all Dewey quotes may contain strange spellings, because Dewey was a strong advocate for a spelling reform.
- ¹⁷ As Mai (2010, p. 635) wrote: “Designers and editors of classification systems have an *administrative authority* qua their positions. The editorial team at Dewey possesses an administrative authority that is given by their positions and the role the Dewey system plays. Some body has chosen the editors to design and edit the system; to ensure that the system is good, successful, adheres to the standards, and is within budget. Designers and editors have “a recognized right to command others, within certain prescribed limits” (Wilson, 1983, p. 14) and we will trust these administrative authorities with respect to certain technical tasks. However, designing and editing classifications is not merely a technical task; it is a task that involves making ontological statements about the world and the relations among entities of the world. While administrative authorities can be trusted with the technical aspects of designing and editing classifications, only *cognitive authorities* can be trusted to make ontological statements.”
- ¹⁸ This is a point, which is also discussed by Miksa (1998, p. 84-90) as a consequence of what he considers “the post-modern point of view”.
- ¹⁹ Taube (1951, p. 63-64; italic in original): “At the risk of paradox, we may say that the excellence of a general classification system derives from its special purpose, namely to serve the general reader with regard to the totality of knowledge which is his heritage. I need not remind this audience that the great development of library classification systems in this country occurred concurrently with the great development of the public library and the open-shelf system. The patron of the public library was the ‘common man,’ the citizen of the republic of letters to whom all knowledge was to be made available. To be sure, there have always been attempts to classify knowledge; but library classification became a major factor in bibliographic organization only when it became a specialized tool for the modern *public* library. This conclusion is reinforced when we note that Europe, which had an older tradition of scholarly and specialized libraries, did not in general adopt the classification systems developed by the great American general librarians.”
- ²⁰ It is unclear whether Taube considered, for example, the Library of Congress (LC), a public library, which is not the common meaning of the term. Reitz (2004) defined “public library (PL): A library or library system that provides unrestricted access to library resources and services

free of charge to all the residents of a given community, district, or geographic region, supported wholly or in part by public funds.”

- ²¹ Concerning the concept discipline, see, Hammarfelt (2020).
- ²² Fishes, for example, classed in 597.2-597.7, occupy 62 classes on nine pages in the DDC23, which seems rather large for a system of its kind, but which must be related to the 32.500 species of fish estimated living today, classified in 4500 genera, 515 families and 62 orders according to Nelson (2006).
- ²³ It should also be considered that many disciplines are defined by the phenomena they study (e.g., entomology is the study of insects, ornithology the study of birds, organology the study of musical instruments, etc.). To the degree that this is the case the difference between classifications organized by disciplines (also called “aspect classifications”) versus classifications organized by phenomena (also called “one-place classifications”) becomes unimportant. It is also the case that disciplines and fields of knowledge are changing dynamically. This means that a multidisciplinary field can be formed to study a phenomenon, but may over time develop to a monodiscipline in its own right. Tengström (1993, p. 12) found that this is the case with LIS.
- ²⁴ It should be recognized that the distinction between disciplines versus phenomena as the basic organizing principle is only important for KOS needed to present classes in one linear order. Systems that provide multiple ordering dimensions (e.g., thesauri and ontologies) does not have to choose.
- ²⁵ The structure of the main classes of the DDC is basically unchanged since the first edition in 1876, when it was:
- (GENERAL)
PHILOSOPHY
THEOLOGY
SOCIOLOGY
PHILOLOGY
NATURAL SCIENCE
USEFUL ARTS
FINE ARTS
LITERATURE
HISTORY
- ²⁶ The term “subject” is mostly used in the DDC rather than “concept.” It is generally recognized, however, that knowledge organization systems (KOS), which include library classifications, are organizing concepts (see, e.g., Dahlberg, 2006). The difference between indexing concepts and subjects was pointed out by Bernier (1980), who found that subject indexes are different from, and can be contrasted with, indexes to concepts and words. Subjects are what authors are working and reporting on. A document can have the subject of “chromatography” if this is what the author wishes to inform about. Papers using chromatography as a research method or discussing it in a subsection do not have chromatography as subjects. Indexers can easily drift into indexing concepts and words rather than subjects, but this is not good indexing.
- ²⁷ Custer’s observation should not be confused with the concept of granularity. A superordinate concept has subsidiary concept (hyponyms). If the hyponyms are listed the classification are more granular than if they are not. A class representing a superordinate concept does not represent different subjects, it just does not specify the sub-concepts.
- ²⁸ About notations in general, see Gnoli (2018).
- ²⁹ Frohmann (2004, p. 38-39) wrote about Otlet’s view of the notational system: “Otlet was inspired by the Dewey Decimal Classification (DDC) as the basis for a truly scientific organization of elementary facts. He was attracted not to the verbal categories of the system, but to what he regarded as its ‘scientific’ notation. Theoretically, Dewey’s system of ten basic categories generates, by means of its nested sets of ten subcategories capable of being repeated *ad infinitum*, an infinitely expandable system of subject division and subdivision. Otlet writes

that it 'provides for human knowledge a nomenclature which is stable and universal and can be expressed in an international language - that of numbers' [Otlet, 1990, p. 26]. He goes on to describe it in a manner very foreign to Melvil Dewey's practical way of thinking: 'the *Decimal Classification* actually constitutes an international scientific language, a complete system for representing science which one day perhaps may bring help to intellectual workers analogous to that which they received from Latin in the Middle Ages and during the first modern period' [Otlet 1990, p. 34]. Otlet sees in Dewey's notational elements a rigorous language for designating concepts: 'they express abstractions, pure scientific categories ... they translate ideas absolutely common to the entire scientific world and express them in universally understood signs - numbers' [Otlet 1990, p. 39]."

This view seems naïve. Whether a concept is expressed by a word (e.g., "psychology") or by a number (e.g., "150", which is the notation for the psychology class in DDC), it has the same degree of ambiguity. It does not provide a nomenclature, which is stable and universal (although it does not favor one particular natural language, but its own artificial one).

³⁰ Dewey (1920, p. 152) wrote: "With aid of professors in each department and cooperation of librarians interested, in 1872-76 I worked out the 10 classes and their 100 divisions and 1000 sections, following the inverted Baconian order, but they were not published till 1876. Many promptly ridiculed the idea of 1000 divisions in a library as wholly impracticable in use, but when they found with delight that the relative index, referring not to accidental page number of a catalog or to a certain inch or more on some wooden shelf, but to permanent class, division, and section to which a book belonged, made closer classification easier than the old way, they began asking for more minute divisions."

³¹ Mitchell (1995, p. 44) asked: "What is literary warrant in the future? As the type and volume of materials grow, what is the appropriate basis of literary warrant for the Classification? Will the monographic literature remain its importance? What is the role of electronic information?" The author did not provide any answers or suggestions to these questions. One preliminary answer is that already in 1995, the monographic literature played a minor role in scientific communication, and that the UDC from the start included articles as its basis for the classification. There are therefore good reasons to believe that monographs are insufficient as the basis for classifications beyond books.

³² Because the Manual to DDC23 (Dewey 2011, p. 119) writes, "Taxonomic schedules usually follow the arrangement accepted in *The New Encyclopaedia Britannica*, 1989," we might suspect that a list of bird taxa has been taken from this or a related source rather than from the books classified by the DDC, hereby violating of the principle of literary warrant. A violation of the principle of literary warrant is not necessarily a bad thing, in that it provides classes for future documents.

³³ Mitchell (2001, p. 217) writes about DDC: "Since the DDC is developed on the basis of literary warrant, associative relationships are often treated as equivalence or hierarchical relationships because that is how they are treated in the published literature". This is a strange claim. Since Mitchell distinguishes associative relations on the one hand, and equivalence and hierarchical relationships on the other hand, she implicitly acknowledges this classification of relationships, and it makes no sense to say that the DDC should not follow this classification because of "literary warrant." Perhaps Mitchell finds that these relations are often confused in the literature, but that is still not a reason for DDC to confuse them too.

³⁴ A secondary meaning of literary warrant also implies that conceptual relations should be determined by how documents are related to each other. While Hulme (1911) argued that the *Periodical Table* of physics and chemistry should not be used in library classifications because no books have been published about gold, this is not an argument to dismiss the structure of the *Periodical Table*, for instance to organize chemical elements in "alkali metals," "alkaline earth metals," "the lanthanides," and "noble gases."

³⁵ Although the Manual 302-307 vs 150, T1-019) states: "Use 302-307 for works that focus on group behavior, including those that discuss the role of the individual in group behavior. Use 150 for works that focus on the individual, including those that discuss the influence of group behavior. If in doubt, prefer 302-307."

³⁶ In standard contemporary encyclopedias, such as *International Encyclopedia of the Social and Behavioral Sciences* (Wright, 2015) and *Wikipedia*, the entries “social psychology” are about the psychological discipline, with special articles for the sociological subdiscipline. Wikipedia has two articles on social psychology: “Social psychology” (with a redirection from “Social psychology (psychology)”) at https://en.wikipedia.org/wiki/Social_psychology and “Social psychology (sociology)” at [https://en.wikipedia.org/wiki/Social_psychology_\(sociology\)](https://en.wikipedia.org/wiki/Social_psychology_(sociology)). In the view of the present author, DDC would do well to refer to such sources in the Manual as a guide to distinguish these two social psychologies.

³⁷ Miksa (1998, p. 18-20) discusses the concept “standard edition” in relation to the DDC.

³⁸ Miksa (1998, p. 80) found: “Ultimately, the information needs of scientists and specialists, the realm of which prompted library classification theory discussions, remained undiscovered by librarians in general until after World War II.” In the view of the present author, library science – as distinct from documentation and information science – has tended to focus on public libraries rather than scientific and scholarly communication. DDC’s focus on books rather than on journal articles as the basis for its literary warrant is one indication of this difference. Another indication is the relative superficiality with which DDC tries to “keep pace with knowledge.” For updating taxonomic groups in biology, for example, the DDC2024* writes “Sources of taxonomic information. “Taxonomic schedules usually follow the arrangement accepted in *Encyclopaedia Britannica Online*. Other works that often prove helpful are the *Tree of Life* web project (tolweb.org), *Wikipedia*, and *Wikispecies*”. (In DDC23, 2011, *Encyclopaedia Britannica* (EB) is obviously an insufficient source for scientific databases, which are rather supposed to provide input to EB than to use its output. (All EB’s references to “galliform”, for example are quite old, and have thus missed the important changes in taxonomy due to DNA studies since 1990’s).

*https://web.archive.org/web/20240426224443/https://www.oclc.org/content/dam/oclc/webdewey/help/full_manual.pdf

³⁹ It can be mentioned, for example, that the bird collection in the *American Museum of Natural History* according to Morony, Bock and Farrand (1975, p. vii) “[...] require frequent reference to a source of names of avian species and their taxonomic position. Moreover, the demands of museum curating and of many other ornithological activities require ready access to the primary systematic literature used in compiling the list of species”. It should be said, that the classification needed to classify objects like birds, should basically correspond to the classification used to classify knowledge and information (e.g., on birds). Knowledge organization, as practiced by information scientists is not separate from the domains of knowledge practiced by subject specialists. Research institutions, such as the *American Museum of Natural History* needs updated taxonomies for classifying their collections as well as research publications, which have a much high granularity and are better updated compared to classifications such as the DDC. Library classifications (and other KOS) that do not reflect updated scientific knowledge, are obsolete, and this is not just a matter for researchers, but also, for example, for amateur ornithologists, and in the end for the society at large. It is also important to consider that such updated classifications are not just about details low in the hierarchy, but important changes occurs also on the higher levels of the hierarchy, for example, on the level or orders of birds (Gill; Donsker; Rasmussen, 2024; Orders of Birds) and in their naming. Advanced library/information services, e.g., at the *American Museum of Natural History* or at *Chemical Abstracts Service* (CAS), are not just users of classifications made outside the organization, but are also producing KOS used by the scientific community, e.g., *CAS Registry Numbers*.

⁴⁰ The UDC has 72,000 subdivisions according to UDC Fact Sheet (2013); Koch, Neuroth and Day (2001, §5.2.3) wrote that UDC with 61 000 classes is three times larger than the DDC. (But these figures vary from source to source).

⁴¹ About the Dewey Program at the Library of Congress see Library of Congress (2025).

⁴² Fox (2019) wrote: “While previously, only discussion papers were shared with Dewey users, as of February 2019 we’ve made all our research public and we now invite comments on proposals for changing Dewey before they’re implemented. We’re also inviting subject specialists and librarians around the world to help us by contributing proposals to revise Dewey.” This is not enough, of course. Subject specialists and librarians around the world must actively participate

and be motivated to contribute. The people responsible for making the decisions and the actual work must have the necessary competencies. All this presupposes that there is an active research community in knowledge organization on which classifications including the DDC can draw.

- ⁴³ The printed versions present changes since the last edition, and the WebDewey is cumulating information about changes. In the period 1959-1997 changes were updated in the bulletin *Dewey Decimal Classification Additions, Notes, and Decisions* “(also called “DC and,” and “DC&.”)” From 2005- information can be found at 025.431: *The Dewey blog* at <https://ddc.typepad.com/025431/>. These sources seem, however, too fragmented for research purposes.
- ⁴⁴ Nelson (2006) wrote: “Most ichthyologists adopt a cladistics methodology of classification, which classifies strictly according to recency of common descent. In this system, the goal is to have each taxonomic unit contain all species sharing a common ancestor. This often results in a very different classification than would result from the approach commonly used up to about 1980. In the older approach, evolutionary or synthetic systematics, the inferred amount of divergence among groups was considered, as was the history of their evolutionary relationships, and a given taxon might not contain all the descendants from the inferred ancestral species.”
- ⁴⁵ Miksa (1998, p. 11-12) described the difference between “a practical classification” and a “theoretical classification,” in which the first term corresponds to Dewey’s practicalism, while the second to a higher degree corresponds to systems such as the UDC and Henry Bliss’ classification (BC1).
- ⁴⁶ Wiegand (1996, p. 114) wrote: “Dewey continued to consult experts for their opinions of particular parts of the classification, but most of this was done by form letter and handled through the Bureau.”
- ⁴⁷ New (1998, p. 134) wrote about Dewey’s policy regarding integrity of numbers: “No number once established for a subject should ever be abandoned so as to require that books classed in it had to be reclassified. The policy was inspired by legitimate concern about the ability of libraries (especially ones building permanent collections of research value) to undertake projects of reclassification. From Edition 3 published in 1888 through Edition 14 published in 1942, this policy prevailed. There was enormous expansion (much of it quite uneven), but practically no relocation, and very little updating of terminology.” Curwen (1978, p. 25) wrote: “Notwithstanding Dewey’s assurance of 1885, numbers *could* be reused with different meanings, but only after they had been cancelled and left unused for a ‘starvation’ period of twenty-five years; this is still official practice. In Edition 16, however, while the library community was sighing with relief over what was regarded as the restoration of common sense following the madness of the ‘Standard’ edition, the editors printed two sections with entirely recast schedules, reusing many numbers with totally different meanings without any intervening starvation period. These sections for inorganic and organic chemistry, 546 and 547, were the first of what came to be known as ‘phoenix’ schedules.”
- ⁴⁸ The expression “keeping pace with knowledge” is a standard expression in the DDC also used, for example, in DDC23 (Dewey 2011, p. xxi). As emphasized by Comaromi and Satija (1988, p. 18), “keeping pace with knowledge” also means keeping pace with the *restructuring* of knowledge, “for not only do new facts present themselves to our senses but they give rise to different ways to view our world.” It is better to say that developments in knowledge give rise to new theories about how the world is structured, and thus to developments in concepts as well as in conceptual relations. New (1998, p. 134) wrote about DDC’s policy in relation to this term: “The other policy emphasized keeping pace with knowledge, an important point with libraries that keep their collections current by weeding obsolete material, and also indispensable if the DDC was to remain an attractive option for new libraries in this or any other country. This policy was introduced with a vengeance in Edition 15, which appeared in 1951. Although Edition 15 hit the profession with a jolt, it had a long and interesting history (Comaromi 1976, p. 377-414), and set one useful precedent followed ever since. It (like Edition 2) was edited as a whole, and every schedule was carefully reviewed. No longer would changes be made in one part of the schedules without considering the effect on the whole or the need for corresponding changes in other parts.”

- ⁴⁹ Custer's "subject integrity" and "subject relationships" emphasized, however, logic of division rather than developments in the fields of knowledge.
- ⁵⁰ Satija and Kyrios (2023, p. 4) "The Second Edition [1885] contained many changes. To ward off fear among users that the scheme was unstable and that each new edition might entail reclassification, thus displaying no net gain over fixed location systems, Dewey promised in the introduction that the numbers and their meanings were linked forever. Henceforth there would be no changes in the existing numbers, only numbers added for new subjects. The promise relieved classifiers and was the basis of an important policy, the well-known *integrity of numbers policy*, the ghost of which haunted the revision of the first 14 editions and still lingers today." *Ibid.* p 181: "1965 17th Edition. [...] Subject integrity preferred over number integrity."
- ⁵¹ Csiszar (2013), endnote 2: "Letter from Melvil Dewey to Henry Armstrong, 26 June 1896. Archives of the Mundaneum (Mons), HLF 140."
- ⁵² Custer (1965, p. 43) wrote: "Other features of Edition 17, some of them described below, show up more obviously as new departures from preceding editions, but none is as fundamental as the new or renewed emphasis on subject integrity and subject relationships, on the fundamental process of classification as distinct from what has been called 'slot-ification.' Encouraged by Melvil Dewey's notable preference for practicality over theory in all activities, misled by the common American view of classification as little more than a system for assigning each book a convenient address or "slot" at which it can be stored and from which it can be retrieved, influenst by the failure of earlier editions of the DDC to provide under every discipline an expansion as full as was warranted by the literature acquired by libraries, classifiers of the past many times unwittingly abandoned the most fundamental feature of the system [...] that of arrangement of subjects by discipline."
- ⁵³ "Mark-and-park," is a term that is discussed by Hider and Harvey (2008), who wrote (p. 112): "Many have argued that the primary use of classification schemes in libraries is to provide locations for information resources so that the user can quickly find the information resource on the shelf. As Taylor states, 'Classification provides formal, orderly access to the shelves' (Taylor 2000, p. 271). When this is the main purpose of classification, it is sometimes referred to as the 'mark and park' approach, with the subject access aspect of classification considered (if at all) as a secondary, albeit useful, by-product. The 'mark and park' approach has thus usually relied on alphabetical indexing languages for subject access, rather than classification schemes." Miksa (1998, p. 3) expressed a different view of DDC in relation to "mark and park." He wrote: "With only few exceptions, practicing librarians and students alike often seems to be at loss when confronted with the dual nature of the system, with its ability to provide both an inventory control system (sometimes called its 'mark and park' function), and a system to classify books." However, the core of the criticism is the system to classify books was been downgraded by Dewey, in particular by the principle of integrity of numbers. In general, Miksa seems to put other ambitions in DDC than the atheoretical, narrow pragmatism that Dewey clearly defended.
- ⁵⁴ Satija (2017, p. 292) wrote: "At the same time, practical classification by the *Dewey Decimal Classification* (DDC) did not satisfy his [Ranganathan's] orderly mind. That being a 'mark and park' system without any professed theory [...]."
- ⁵⁵ The most inimical writer on the DDC was Bliss (1933), who (p. 199-201) argued sharply against the view that the classification itself is of minor importance as long as it is accompanied by a good index.
- ⁵⁶ Furner (2021, p. 4-6) contains "Table 1: English-language print editions of the DDC, 1876-2012," informing about 23 full and 15 abridged editions, providing printing years, edition numbers, compilers, titles, publication places and publisher names.
- ⁵⁷ Request oriented classification should not be considered an expression of Dewey's narrow pragmatism, because it involves a deep and fruitful philosophical position in relation to the concept of subject (see Hjørland, 2017b).
- ⁵⁸ Eaton (1952) provided a table counting the number of entries in DDC14 and DDC15 counted by superclasses and in total. In total, DDC14 contains 31,434 entries and DDC15 contains 4,621 entries, that is DDC15 contains 14% of the entries in DDC14. (The table is reproduced with a correction in Comaromi, 1976, p. 396.)

- ⁵⁹ In footnote 15 Miksa here provides some calculations justifying his conclusion.
- ⁶⁰ The word overall is important because DDC may have more classes in certain topics compared to the UDC, the LCC and the BC2 (all these classifications have an uneven level of granularity, which has to do with the difficulties to keep classifications updated).
- ⁶¹ Synthesis only works on the combination of concepts, but the simple concepts must be represented in the classification. For example, one cannot construe names for biological species, if the system does not enumerate them, but one can construe combined concepts such as American Trochilidae (hummingbirds). Therefore, Miksa's "exponentially larger" number of classes cannot be used to decide if the DDC is sufficiently detailed for large libraries. (Broughton, 2024, section 3, estimates that in the BC2, Fine Arts have 7,500 classes and Chemistry 6,400 classes. These can be compared to DDC14 – the largest edition for which numbers are available – had only 2,879 entries in 700, Arts and recreation and only 3,697 in 500 Pure science).
- ⁶² In reality, however antecedents to "Phoenix Schedules" can be traced to what was formerly called "alternative schedules", such as the alternative schedule for psychology placed at 159.9 in the thirteenth edition, 1932; cf., Comaromi and Satija (1988).
- ⁶³ Sweden was for a long time using its own classification system, Klassifikationssystem för svenska bibliotek (SAB), but in 2008 replaced this with the DDC. Hansson (1997, 2023) presented the long debate about this.
- ⁶⁴ The general trend seems not to be favorable towards manually produced hierarchical classifications. For example, Yahoo! (acronym for "Yet Another Hierarchically Organized Oracle") was in beginning very successful but closed its directory on December 31, 2014. The commercial bookstore (now general store) Amazon.com do classify its books in broad categories, but has not deemed it profitable to invest in a high-quality classification or indexing system.
- ⁶⁵ OCLC's "Connexion," see OCLC (2025e).
- ⁶⁶ Although the abstract of Golub *et al.* (2024) claims: "It demonstrates the value of applying semi-automated indexing in operative information retrieval systems."
- ⁶⁷ See further Bowman (2005, p. 123-126) and Satija and Alex Kyrios (2023, p. 151-162) about WebDewey.
- ⁶⁸ See further OCLC (2025a), Dewey Linked Data.
- ⁶⁹ New York Times Subject Headings is licensed Creative Commons Attribution 3.0. "The New York Times uses approximately 30,000 tags to power its Times Topics Pages. These tags (categorized into 'people', 'organization', 'place', and 'descriptor') are published as Linked Data and are mapped to Freebase, DBpedia, and GeoNames." (Isaac *et al.* 2011, Section 4.3).
- ⁷⁰ "The GeoNames geographical database is available for download free of charge under a creative commons attribution license. It contains over 25 million geographical names and consists of over 12 million unique features whereof 4.8 million populated places and 16 million alternate names. All features are categorized into one out of nine feature classes and further subcategorized into one out of 645 feature codes. (more statistics ...). The data is accessible free of charge through a number of webservices and a daily database export." GeoNames (2006).
- ⁷¹ OCLC (2025b) wrote: "Anyone is free to view and access a base set of Dewey linked data and can begin integrating Dewey URIs into their local data management and discovery systems today. Libraries that subscribe to WebDewey have access to the full range of Dewey linked data by signing in with their WebDewey credentials, as well as two new APIs that enable them to easily integrate Dewey linked data into other systems and services." Mitchell and Panzer (2013, p. 185) wrote: "Finally we needed an appropriate license model. We make data on dewey.info available under a Creative Commons BY-NC-ND license." However, dewey.info was an experimental site, which is now closed down. The main part of Dewey linked data are not published as open data.
- ⁷² One exception is in Germany, where WebDewey is available in a German version with campus licenses, cf. OCLC (2025c).
- ⁷³ Tomoyose and Arakaki (2020, [p. 13]) remarked that there has not been much discussion of Dewey Linked Data by the LIS community.

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- ⁷⁴ OCLC wrote: “Sign in to Dewey Linked Data to view additional information not available to unauthenticated users.” (OCLC, 2025d).
- ⁷⁵ According to information obtained, no Danish libraries subscribe to WebDewey. This may indicate that it is not considered an important database for search purposes.
- ⁷⁶ Wiegand (1998, p. 190) found, “[...] it is probably also fair to say that for the past century the scheme itself [DDC] has quietly – almost invisibly – occupied an influential position as one of the forces sustaining the discursive formations of a Eurocentric patriarchy.”
- ⁷⁷ There has been a lot of interest in the overall structure of the DDC. Miksa (1998) relates library classification including the DDC to the broader movement to classify knowledge and the sciences. However, Dewey himself was not interested in this broader perspective (apart from recognizing the influence from Francis Bacon’s classification). Dewey (1920, p. 152) wrote: “With aid of professors in each department and cooperation of librarians interested, in 1872-76 I workt out the 10 classes and their 100 divisions and 1000 sections, following the inverted Baconian order, but they were not publisht til 1876.”
- ⁷⁸ Frické (2012, p. 547) wrote: “It should perhaps be noted that many library classifications do not satisfy the JEPD condition [Jointly Exclusive Pairwise Distinct condition], and thus they should not be regarded as pure Aristotelian classifications that either were, or might have been, produced by logical division. For example, in the Dewey Decimal Classification (DDC), a work like John Keats’s *The Works of John Keats* (complete Poetry and selected Prose) is classified as English & Old English Literatures 820. This class, 820, is an internal class with children, but the Keats’s work is not a member of any of the children of 820, i.e. the subclassing at this point is not exhaustive (see Frické 2012, Section 5.4 for a discussion).”
- ⁷⁹ Dewey (1927, p. 14) wrote: “[T]he only real test of any skeme is its helpfulness to its uzers,” whereas Farradane (1955, 1987) wrote: “[T]he system of order required must be not just helpful but an accurate, even though necessarily simplified, representation of the state of knowledge.” Farradane (1961, p. 121) concluded “The closer a classification approaches to the true structure of knowledge, the more useful it will be,” thus denying the conflicting nature of these two goals.
- ⁸⁰ Csiszar (2013, p. 445) continued the quote: “But Dewey was not optimistic; could a summit stocked with eminent European scientists hold themselves back from the metaphysical temptations that had foiled so many classifiers? “I am fearful from some of the discussion I have seen, that the conference may be led off on questions of philosophical or scientific accuracy,” he wrote to the Society, “[...] and that the experiments and corrections will develop a degree of impatience, if not actual disgust, that will lead to wrecking the entire plan.”* Dewey’s prediction turned out to be at least partly correct: the question of classification was the focus of countless disputes for years, not simply between advocates of the rival projects, but internally among adherents of each project as well, and nearly led to both projects’ premature demise on several occasions.” * Csiszar (2013), endnote 3: “Letter from Melvil Dewey to Henry Armstrong, 26 June 1896. Archives of the Mundaneum (Mons), HLF 140.”
- ⁸¹ For example, New (1996, p. 389) found that “too much emphasis was given to specific kinds of organisms, and too little was given to biological processes that are the focus of most current research.” Further (p. 390): “Mr. Custer was very open-minded when he received a memorandum the next day urging that, contrary to his recommendation, priority for complete revision should be given to 570, including a reversal of preference between organism and biological process, while taxonomic revision was much less important. He asked me to write a think piece elaborating upon my views, and extracted the substance of them in EPC Exhibit 67-37 on 24 September. EPC responded favorably, and by November 1972 I was drafting a revision for biological processes under the supervision of Margaret Warren, the assistant editor. The result of our work was submitted as EPC Exhibit 70-21 on 4 April 1974. That draft was rejected largely on the advice of consultants from the United Kingdom led by Marjorie Jelinek, and work on biology revision stopped for Edition 19.” This rejected draft seems to contain an important argument about the relative importance of facets in biological classification.
- ⁸² Green and Martin (2013) is, by the way, itself a very fine example on how editors of the DDC have tried to keep pace with developments in scientific taxonomy, we shall return to this article in Section 5.

- ⁸³ Mitchell and Vizine-Goetz (2017, p. 1263; endnote 1): “Connexion, DDC, Dewey, Dewey Decimal Classification, WebDewey, and WorldCat are registered trademarks of OCLC Online Computer Library Center, Inc: Dublin, OH.”
- ⁸⁴ New (1998, p. 140): “The following are the completely revised disciplines:
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|------------------|---|
| Edition 17, 1965 | 150 Psychology |
| Edition 18, 1971 | 340 Law 510 Mathematics |
| Edition 19, 1979 | 301-30 Sociology (no reuse of numbers) |
| 1985 separate | 004-006 Data processing (no reuse of numbers) |
| Edition 20, 1989 | 780 Music |
| Edition 21, 1996 | 350-354 Public administration 570, 583 Life sciences” |
- ⁸⁵ An anonymous peer-reviewer wrote about Blake’s criticism that “it is essentially about the difficulty of reconciling taxonomic and bibliographic systems and not necessarily a criticism of any given scheme.” While this may be right, it does not weaken Blake’s argument that the DDC is obsolete concerning the classification of mammals. Very few researchers or librarians have compared the existing library classifications with developments in scientific and scholarly fields. There seems to be a serious lack of people within LIS who are qualified or motivated to do this. Green and Martin (2013) demonstrate that DDC editors are aware of the need of reconciling DDC with biological taxonomies.
- ⁸⁶ Green and Martin (2013) represent a fine discussion of the need to update the DDC based on developments in botanical taxonomy, but seems to be a lonely example. See further the present article Section 5.
- ⁸⁷ Fox (2015) is a dissertation that explored discourses about women, intersex and trans people in four periods of the history of the DDC. It examines the developments the medical and legal discourses and the DDC in these periods and contrasted DDC’s professed epistemology with what is practiced in reality, which the author found can be self-serving.
- ⁸⁸ Béthery (2003) wrote about changes in DDC class 200, and described DDC21 as a turning point, citing Mitchell’s preface: “One of our continuing concerns is to pay special attention to users from all over the world and to collections that include works of non-Christian and non-Western traditions.” Béthery welcomed these changes, but found them not to represent a fundamental change of the architecture of this class. She also referred Mitchell’s preface (in Dewey 2021, p. xxiii), stating that this was “a project to diminish the preponderant place given to Christianity, a change that would take place over the course of several editions.”
- ⁸⁹ In DDC23 classification and shelflisting is placed in 025.42 with the note: “Class use of classification for search and navigation in formation storage and retrieval systems in 025.04.
- ⁹⁰ Beghtol found that the functions of classifications made by information professionals is information retrieval (IR), while the functions of the “naïve” classifications is knowledge discovery. However, biological taxonomy and nomenclature, for example, also serve IR. Precise naming and classification is also developed in fields like biology and chemistry in order to facilitate professional communication and IR. Still, we can say that loosely, the classifications developed by information professionals focus on bibliographic classification, whereas classifications developed by scientists focus on scientific objects. However, bibliographic classifications can benefit by being based on updated classifications of scientific objects, with some modifications. Basically, the conceptual structures of bibliographical and scientific classifications should be the same.
- ⁹¹ LIS researchers seems absent in classification of all specific domains of knowledge, although such research has some degree of interdisciplinarity. About the classification of birds, for example, Bruce (2003, p. 35), wrote “The objective has been to demonstrate the multi-faceted nature of how naturalists, philosophers, anatomists and ornithologists have used their studies of birds to find how they can be grouped and classified in the quest to find a ‘natural system’ or, more correctly a classificatory system.” To Bruce’s list can be added biological taxonomists, but unfortunately no LIS researchers.
- ⁹² The author has – successfully – used parts of Richards (2016) *Biological Classification: A Philosophical Introduction*, as part of the syllabus for a course on knowledge organization. Its

philosophical perspectives are important for general classification theory, not just of relevance for classification in biology.

- ⁹³ This is also reflected in Garfield's (1974) comparison of the two classificationists, Henry Bliss and Melvil Dewey, which concluded: "His [Bliss'] goals and aspirations were different from those of Melvil Dewey, whom he certainly surpassed in intellectual ability, but by whom he was dwarfed in organizational ability and drive. Dewey was a businessman, but he was in no sense as profound in his accomplishments." It can be added that Garfield himself was, as Dewey, a very successful businessperson with *his Science Citation Index* and many other commercial products.
- ⁹⁴ Szostak's (2013a-) *Basic Concepts Classification* (BCC), for example, is based on a version of "Cladism," according to which classes of animals, such as birds, cats, fishes, mammals, are not recognized as concepts, and therefore are not part of the BCC (but are listed in a page "FH. Hypothesized Species," <https://sites.google.com/a/ualberta.ca/rick-szostak/Basic-Concepts-Classification/the-classification-of-things-phenomena/f-flora-and-fauna/fh-hypothesized-species>).
- ⁹⁵ Compare Taylor's (2006, p. 108) opinion: "Teaching and learning about classification in general and Dewey Decimal Classification in particular is an exercise that is well worth the effort, because human beings have a basic need to categorize, and DDC is a satisfying way to categorize recorded knowledge." However, the claim that "DDC is a satisfying way to categorize recorded knowledge" is a very general claim, which certainly is not true for medical databases, and the claim disregards the fact that there are many approaches to the organization of knowledge, which are not equally effective. Taylor's article (abstract) also claims, "The Dewey Decimal Classification (DDC) system is a logical approach to a hierarchical categorization of recorded knowledge." However, many other systems deserve the label "logical approach" more than does the DDC. This is, for example, the case with the *Bliss Bibliographical Classification*, 2nd ed. and with many ontologies. It seems better to say that DDC is not based on a logical approach, but that it represents a practicalist system without a solid theoretical foundation.
- ⁹⁶ In DDC1 (1876) the term "Library economy" was used for class 19. From DDC2 (Dewey, 1885), and all subsequent editions was LIS placed in class 20, using the labels "Library economy", "Library science", "Library and information science" and "Library and information sciences."
- ⁹⁷ Smiraglia (2015) is an English-language book on domain analysis, but it is not in the catalog of *Library of Congress* July 16., 2024 (although the copyright-page says: Library of Congress Control Number: 2015935167)
- ⁹⁸ % in Järvelin and Vakkari's (2022) study refer to the proportion of journal articles on the subfields of LIS.