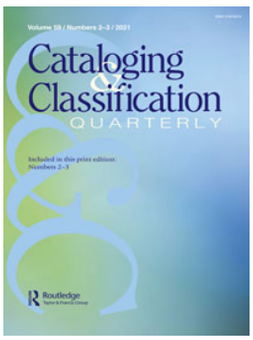

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Library Classification Systems in the U.S.: Basic Ideas and Examples

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ABSTRACT

This article offers a basic introduction to classification in the context of librarianship in the United States with an aim toward filling gaps in formal education and practical experience. The article defines the concept of classification and discusses the goals and purposes of classification, both functional and intellectual. Overviews of two common classification systems frequently used in U.S. libraries are presented: Dewey Decimal Classification (DDC), Library of Congress Classification (LCC), as well as an introduction to a group of classifications known as "reader-interest classifications."

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Classification is a fundamental component of knowledge organization work. Although classification appears in a variety of fields, librarianship draws heavily on classification to assist users and help them gain access to information resources. Therefore, a clear understanding of classification, both the actions of classifying resources and the use of existing classification systems, is imperative for librarians—both those who prepare, describe, and label resources as well as those who assist users in locating desired information. Although a great deal of literature exists on classification, covering various theoretical approaches and applications of various systems, the purpose of this article is to offer a basic introduction to classification in the context of library practice in the United States. The article begins by defining the concept of classification and discussing its goals and purposes, both functional and intellectual. It then presents overviews of the two most common classification systems frequently used in U.S. libraries: Dewey Decimal Classification (DDC) and Library of Congress Classification (LCC). Given recent trends, it also introduces a group of classifications known as "reader-interest classifications." The paper concludes with some recommendations for selecting and using classification systems in library work.

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Definition(s) of classification

Chan and Salaba state that "classification, broadly defined, is the process of organizing knowledge into some systematic order."[1] In the case of libraries, this traditionally referred to books and other physical materials, but principles and functions of classification can certainly be applied to digital and other non-tangible materials and have been in the contemporary environment. Notice that this definition describes classification as a *process*. The action may be classifying materials and resources, such as selecting the most appropriate DDC number to describe a particular item. The action may also refer to the creation of organizational systems, such as DDC, that are then used to classify materials. However, Chan and Salaba also define classification as "a logical system for the arrangement of knowledge."[2] This definition describes classification as a *thing*. To help alleviate confusion, this noun form of classification often uses additional words to clarify that we are referring to a system rather than a process. Common words and phrases used to differentiate the noun form of classification from the verb form include classification system[3] and classification scheme.

Some advocate that "classification is simply about grouping together things which are alike."[4] Classification does serve to bring like items together: this is called "collocation," and it may be physical, such as books on a shelf, or intellectual, such as concepts and ideas.[5] In the case of classification, these groups of similar objects or concepts are called "classes."[6] Classes are based on one or more characteristics, attributes, properties, or qualities held in common.[7] These characteristics held in common differentiate one class from another, so they are referred to as "characteristics of division."[8] A common example is the biological classification of animals into vertebrates and invertebrates. The former is a group of animals with backbones; the latter is a group of animals without backbones. In this case the presence or absence of a backbone is the characteristic of division. A simplified related example in libraries might be classes based on genre, such as fiction and nonfiction. One characteristic of division in this case might be whether the story is true or false. If the former, it would belong to the nonfiction group; if the latter, it would be grouped with other made-up stories.

Understanding classification as a grouping of objects into classes is a good first step. However, a fundamental mistake many people make is assuming classification is *solely* about grouping based on similarly. If this were the case, it would be no different than categorization: the function of grouping together like entities, concepts, objects, resources, and so on.[9] Categorizing into groups is certainly a common activity associated with organizing knowledge. However, unlike categorization, classification also organizes knowledge into *some systematic order*. Since categorization does not require order, an item or topic can be in many categories. For example, think about movie

genres: a movie can be categorized as both an action film and a comedy. However, in an ideal classification system, a movie can be in one and only one class. For example, a movie can be rated G or R by the Motion Picture Association of America, but it can't be rated both.[10] Order, created through the construction of classes, their arrangement, and relationships, is what differentiates classification and classification systems from other information organization tools and practices, such as categorization and indexing.

Principles of classification that support systematic order

There are many principles that underlie the creation of a robust classification system, more than can be discussed here. Of these numerous principles, I want to highlight those that support the concept of systematic order, specifically mutual exclusivity, joint exhaustivity, relationships among classes, and notation, since it is these concepts that help distinguish classification systems from other organization systems such as categories, taxonomies, and indexing languages. I note that the concepts presented here are theoretical ideals of the types of classification systems predominately used in U.S. libraries; in practice most systems will have anomalies and exceptions.

Mutual exclusivity

When creating classes based on characteristics of division, every class must be *mutually exclusive*. This means that groups must be distinct—characteristics of division used to create groups cannot allow any overlap between groups. For example, what if we were using the aforementioned characteristic of division to create classes of fiction and nonfiction, and we encountered the novel *Loving Frank*, by Nancy Horan, a fictionalized yet historically accurate account of the life of architect Frank Lloyd Wright and his mistress Mamah Borthwick? Theoretically, this book could be classed in both fiction (since it is a fictionalized account of events) and nonfiction (since it is an account of true historical events). In this case, our classes of fiction and nonfiction would not be mutually exclusive. The purpose of mutual exclusivity is so that no item may be placed in multiple classes. Each item can only be classified in one place within a classification system, thus ensuring that it always appears in the same order as well.

Joint exhaustivity

In addition to being mutually exclusive, classes must also be *jointly exhaustive*. This means that a class exists for each and every item being classified according to the given classification system. For example, imagine if we has the classes in Table 1 to describe genres.

Table 1. Hypothetical list of genre classes.

Crime
Fantasy
Horror
Mystery
Science fiction

Now imagine once again we are trying to classify Nancy Horan's *Loving Frank*, a work of historical fiction. Where would we class this book? There is no existing class available for items with the characteristics of historical fiction. In this case, our classification system is not jointly exhaustive, since it does not include all classes needed to describe each and every item in the collection. One easy way to remember these principles is the idea of "a place for everything (joint exhaustivity) and everything in its place (mutual exclusivity)," thus contributing to a systematic order.

Relationships among classes

One aspect that differentiates classification systems from some other systems of organization, such as categorization, is the articulation of relationships among classes. Perhaps the most common relationship is a hierarchical relationship, which means that classes may have subclasses (classes with narrower or more specific characteristics of division) and/or superclasses (classes with broader characteristics of division). This type of relationship is sometimes called genus-species relationship because of its close ties to Linnean biological classification, which exemplifies this hierarchical structure from broad to specific (see Figure 1).

We can see similar hierarchy in library classification systems, such as DDC. Figure 2 illustrates multiple hierarchical relationships, such as the superclass "700 Arts" and one of its many subclasses, "740 Drawing and decorative arts." A string of classes up and down a hierarchy is called a "chain," such as the chain from 700 Arts to 740 Drawing and decorative arts to 746 Textile arts to 746.4 Needle and handwork to 746.43 Knitting, crocheting, tatting to 746.432 Knitting. In addition to hierarchy, other relationships may exist in classification systems. Two subclasses may share the same superclass. In Figure 2, 746.43 Knitting, crocheting, tatting is a class that includes works covering all three of those topics. This class has three subclasses: 746.432 Knitting; 746.434 Crocheting; and 746.436 Tatting, for works covering each of those subjects independently. Such relationships are sometimes referred to as "sibling" relationships because they are subclasses of the same "parent." Instead of a chain, which moves up and down a class hierarchy, these side-to-side relationships are called "arrays." These relationships contribute to establishing a systematic order, as without the

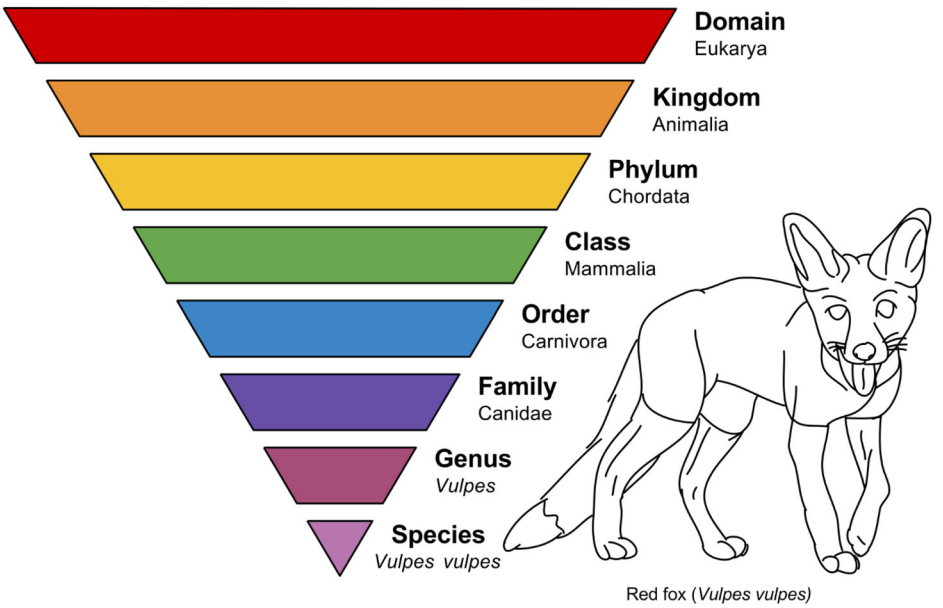

Figure 1. Taxonomic Rank Graph. Source: Annina Breen, Taxonomic Rank Graph, https://commons.wikimedia.org/w/index.php?curid=40559754.

relations among classes, we would merely be left with unrelated groupings, like piles stacked randomly on the floor.

Notation

Another aspect that differentiates classification systems from other systems of organization is the use of notation, or the "numerals, letters and/or other symbols used to represent the main and subordinate divisions of a classification scheme."[11] Notation is often what springs to mind when we think of classification systems, such as the decimal numbers in the DDC (illustrated in Figure 2) or alphanumeric combinations in LCC (e.g., TT505). Unlike other organizational tools such as thesauri, which express ideas, characteristics, and relationships via words, a classification scheme uses notation in an attempt to express these concepts in an even more explicit and precise way than words could accomplish. Notation is an attempt to reduce verbal vagueness and uncertainty, like synonyms, homonyms, and differing word use and connotations. In addition to such explicit definition, notation supports systematic order by providing what has been called filiatory order,[12] citation order,[13] or logical order.[14] In libraries, this typically manifests as physical arrangement of books on shelves, or intellectual arrangement of surrogate bibliographic entries in catalogs, indexes, or other information retrieval tools.[15] Such order not only provides location information for retrieval but also communicates the relationship between a particular item and those

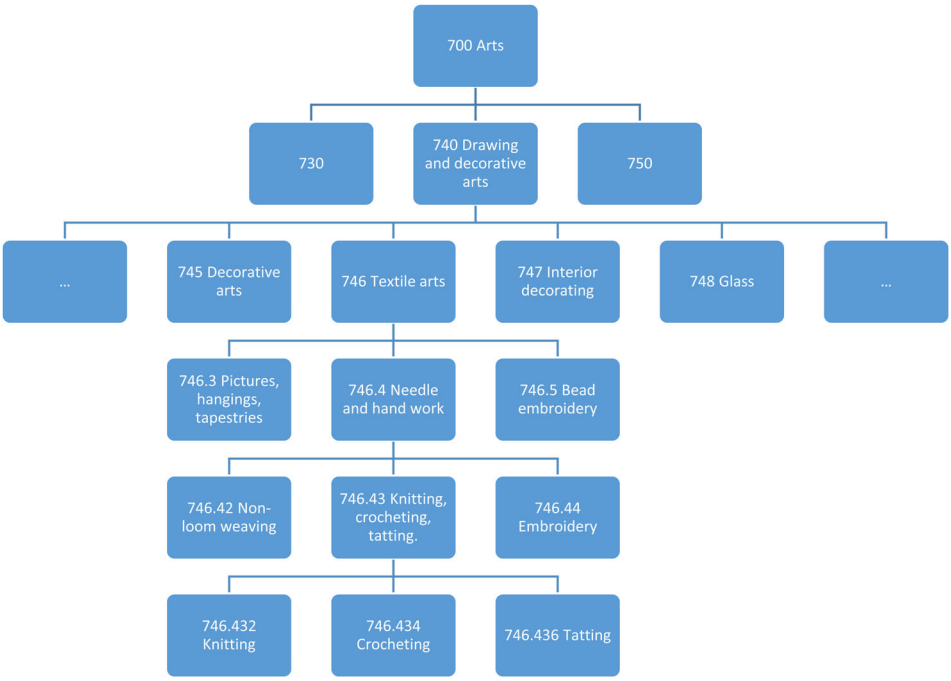

Figure 2. Visualization of hierarchy in the *Dewey Decimal Classification*.

around it. Such notation is exactly what allows for subject browsing and wayfinding in library collections. Ordering principles may differ among classification schemes: for instance, DDC is arranged in numerical order while LCC is first ordered alphabetically. Chan and Salaba specifically note that "logical order is not the same in every circumstance" and that classes and their order should be determined based on the needs of the collection.[16] Implicit in their statement is the idea that it is not only the needs of the resources within a particular collection that should drive such decision-making, but also the needs and approaches of the collection's users as well.

Practical functions of classification

Classification systems are highly specialized tools with unique characteristics. Why do we need classification systems when an abundance of other information organization systems exist? The characteristics that differentiate classification systems from other information organization systems offer useful practical functions and purposes, such as findability, browsing collections, physical and intellectual collocation, resource retrieval, etc.

Collocation

One of the major practical functions of classification systems is to group items together to promote browsing. This idea is called "collocation":

literally, locating things together. In libraries, collocation refers to the process of bringing together items (or representations of items, such as bibliographic records) by assigning them the same access point.[17] In the case of classification systems, items with the same notation are brought together so that resources on the same topic can be easily browsed. Since typical library classification systems use characteristics of division based on discipline or overarching domain (see the subsequent sections on DDC and LCC for more detail), classification enables browsing within the context of a discipline or domain in a way that other tools, such as subject headings, may not. For example, in Figure 2 we can browse resources about knitting within the discipline of art and the domain of handicraft, as opposed to browsing resources about knitting in the discipline of technology and manufacturing, which would be classed in 677.661. Such division by discipline can help users focus their inquiry by relegating items to contextual groupings, which can also prevent users from becoming overwhelmed and confused. Since classification facilitates browsing, and browsing helps users discover new items, classification also contributes to discovery of new resources through collocation. We typically think of classification systems as facilitating browsing of physical items, such as books on a shelf. It is easy to think that classification might be obsolete as digital collections become increasingly prominent. Although digital collections may not need one single linear material order, the relationships described explicitly via classification notation have the potential to improve digital information retrieval. Even now, some digital interfaces emulate shelf browsing and other browse-based interactions, which are made possible by classification data in bibliographic records.[18]

Contextual placement

Classifying a resource also fixes a topic or item at a particular location and context within a greater universe of knowledge. Unlike subject headings, which can exist independently, all items classified within a given system are placed in context with other items. The relationships inherent within a classification system reveal information about a particular topic or resource. To return to our knitting example, imagine that we have a book titled *The Fundamentals of Knitting*. If we see the book is classed in DDC 746.432, we can examine the hierarchical structure of that class number to glean contextual information. If the book is classed in 677.661, we can examine the structure and see that the book is likely about knitting in the textile manufacturing industry rather than home handicraft (see Figure 2). Such contextualization not only offers insights about information resources, but also how knowledge itself is understood. Although information from

Table 2. Examples of call numbers.

H62 .Y56 2014
NK1510 .D477 2009
Folio 636.6865 Sod
305.8 KEN

notation may be opaque to library patrons, it is certainly beneficial for librarians and library staff serving end users.

Location for retrieval

Probably one of the most common perceived functions of library classification is to facilitate retrieval of information resources, especially physical resources. Classification numbers usually comprise a substantial part of a call number, which is a unique code assigned to an item to support shelf arrangement and enable precise recall of a specific item.[19] Many people conflate classification numbers with call numbers, but they are not the same. Although call numbers usually include a classification notation describing the item, they also include additional information to help uniquely identify an item and distinguish it from other items in the collection. This includes (but is not limited to) author marks, Cutter numbers, work marks, publication dates, volume numbers, copy numbers, and/or location or collection information (see Table 2). Because multiple items might share a classification number (for instance, all the books about knitting craft would have the classification notation 746.432), this additional information is used to further arrange and organize those materials with the same classification notation (by author, title, date, etc.). Ideally, a call number will be unique so as to identify a specific, precise entity. Think of a call number as akin to a U.S. Social Security number, where each number is different and represents a unique individual.

Intellectual functions of classification

In addition to these practical purposes, classification also serves intellectual purposes, such as expression and domain representation. Because classification fixes a topic or item at a particular location and context within a greater universe of knowledge, it makes a claim or a statement about that topic or item. This may seem innocuous based on the knitting example described in the previous section, but numerous scholars have shown how the positioning of subjects via classification presents distinct perspectives, visions, and values. While neutrality and objectivity are often goals of classification systems, Feinberg convincingly argues that classification systems present rhetorical arguments that reflect non-neutral and subjective points of view.[20] All classifications communicate perspectives, regardless of

whether such expressions are inadvertent or intentional. For instance, Olson famously demonstrates how traditional library classification systems including DDC reflect patriarchal norms and marginalize women.[21] Others have shown how classification structures erase or bury particular perspectives. Furner describes changes to DDC that removed classes describing race and replaced them with classes representing ethnicity.[22] Although this change was intended to ameliorate issues such as the reification of racial categories and the use of outdated terminology, racial identity and ethnic identity are not synonymous concepts. The change erases race as a concept, meaning that the classification system itself essentially takes the position that race does not exist. In addition to the rhetorical implications, this also leaves anyone who self-identifies with a race-based identity in the lurch when searching for resources. Adler, Huber, and Nix deftly illustrate how library classification systems like LCC and DDC communicate pejorative and marginalizing perspectives about people with disabilities.[23] The relationships and order inherent in classification systems also contribute to communicating perspectives, such as how the class for Eugenics is adjacent to the classes intended to describe people with disabilities. Anyone working with classification systems needs to be aware of how and what these systems communicate in order to be more responsible when creating or changing systems, classifying resources, and accessing materials and helping others access them as well.[24]

Common contemporary library classification schemes

Many classification systems exist in our daily lives, and many classification systems are used in libraries. Classification systems are often developed in specialized settings. For example, the U.S. National Library of Medicine manages a classification scheme for the arrangement of library materials in the field of medicine and related sciences.[25] The U.S. Superintendent of Documents (SuDocs) classification scheme is specifically designed to describe and classify government documents.[26]

However, there are two major classification systems used to classify general collections in U.S. libraries (some of which are also used internationally, either as-is or with modifications). DDC is the world's most widely used library classification system, and used in the U.S. primarily by public, school, and some smaller academic libraries.[27] LCC is the most commonly used library classification system in academic libraries across the United States, in addition to use at the Library of Congress itself (the country's largest and de facto national library).[28] In addition to these two systems, recent years have seen increasing interest in alternatives to DDC and LCC, resulting in an emerging group of classification systems known as reader-interest

Table 3. Illustration of top level classes of *Dewey Decimal Classification*, ed. 23.

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

classifications.[29] This section will discuss each of these in turn, providing a general overview and discussion of the systems and their applications.

Dewey Decimal Classification (DDC)

DDC, originally developed by librarian Melvil Dewey, is a hierarchical classification scheme first published in 1876. There are two English language versions of DDC: the full version (currently in its 23rd edition) and an abridged version (currently in its 15th edition). Most recently, the printed version of DDC was published as a four-volume set of printed books that included introductory materials, a guidance manual, the schedules themselves (the actual lists of classes), tables for building more specific class numbers, and a subject index. Currently, many DDC users interact with the classification system through WebDewey, a subscription-based electronic version of the DDC from OCLC (the current copyright holder of the system) that offers additional features such as searching and browsing class numbers and mapping between DDC and other information organization systems such as Library of Congress Subject Headings (LCSH) and Medical Subject Headings (MeSH).[30] Due to its status as a universal knowledge system, DDC is one of the most comprehensive systems of library classification, and has been adopted now in more than 200,000 libraries in 135 countries around the world.

Satija observes that "the DDC is a general classification system which aims to classify documents of all kinds falling in any knowledge domain."[31] These divisions of knowledge are "at the broadest level […] divided into ten main classes, which together cover the entire world of knowledge."[32] These ten classes are represented with Arabic numerals from 0–9 (see Table 3). In DDC, no classification number can have fewer than three digits, so zeros are used in these main classes to complete the required number of digits.[33]

An important feature of DDC that is often overlooked by novices is that these main classes are based on disciplines, rather than subjects.[34] Like the knitting example earlier in this paper, any given subject may appear in

Table 4. Illustration of hierarchy in *Dewey Decimal Classification*, ed. 23.

700	Arts and recreation
710	Landscaping and area planning
720	Architecture
730	Sculpture, ceramics & metalwork
740	Drawing and decorative arts
741	Drawing and drawings
742	Perspective in drawing
743	Drawing and drawings by subject
744	[Unassigned—DDC will often leave openings in classes for future use]
745	Decorative arts
746	Textile arts
747	Interior decoration
748	Glass
749	Furniture and accessories
750	Painting
760	Graphic arts
770	Photography & computer art
780	Music
790	Sports, games & entertainment

multiple main classes based on the disciplinary aspect in which they are discussed in the resource. In DDC, main discipline—not specific topic or subject—is regarded as having priority.[35]

In the structural hierarchy of DDC, each main class is divided into nine subclasses (called "divisions") which are indicated by appending an additional numeral to the numeral for the main class, and those classes are subsequently divided into subclasses (called "sections") (see Table 4). After discipline and subject, classes are usually next arranged by geographic and/or time period, and then by form of presentation, with the exceptions of literature (which is arranged first by discipline, then original language, literary form, and period of composition) and history (in which individual continents are arranged by place, then period, topic, and form).[36] Because DDC is a hierarchical classification system, it uses the concept of hierarchical force: a principle in which all attributes of a superclass apply to all of its subclasses, meaning all class numbers in DDC will inherit the properties of all of the classes above it in the hierarchy.

Subdivisions can continue as needed by adding additional digits. If a classification number is longer than three digits, a decimal point will be placed after the third digit. "No other punctuation marks are used, and only one decimal point can appear in a class number. A three digit number will not have a decimal point."[37] Consistently placing the decimal point after the third digit ensures useful order when arranging physical materials on shelves. Treating the classification numbers as decimals and filing in ascending numerical order ensures that 746.432 will be placed between 746.43 and 746.44, thus helping to collocate materials on topics adjacent in the hierarchy.

Another useful aspect of DDC is the way in which its numerical notation expresses and communicates its hierarchical structure. Since the first digit

always represents the top-level class, a person can easily glean the discipline of any given resource just by looking at the first digit. They may not immediately recognize the full meaning of 512 but they know it will fall under the discipline of science because the first digit is a 5. Similar numerical patterns occur throughout the system. For example, 973 is the classification number for works about the United States. If someone encounters a number such as 746.4320973, they know that not only is the book about knitting, but it is about knitting in the United States due to the appending of 973 to the number for knitting. The schedules and manual offer in-depth guidance for both assigning classification numbers and appending digits to construct more specific numbers.

Some acknowledged limitations of DCC include the original placement of the main classes and concepts, the limits of base ten numerals, and the need to construct lengthy notation to represent granular subjects. Other critiques focus on the perspectives communicated by the classification system, such as those described in a previous section. In an attempt to address some of these issues, DDC is continually updated by an editorial team. The team works to ensure the classification system includes emergent topics, adjust classes to ensure they reflect current needs, and solicit user feedback on priorities for change.[38]

Library of Congress Classification (LCC)

The LCC was developed by Charles Martel, the Chief Classifier at the U.S. Library of Congress, who supervised its development from 1897–1910. LCC was created specifically to represent and cater to the existing collection at the Library of Congress as well as its future growth.[39] Because it is based on a preexisting collection, it is not expressly attempting to cover universal knowledge such as DDC attempts to do. The scope of LCC is limited to coverage of the disciplines, subjects, and topics represented in the Library's collection. Although it is designed specifically for use by the Library of Congress, it has been adopted by most large research and academic libraries in the U.S.[40]

Although it does include some aspects of hierarchy, LCC is essentially an enumerative system, meaning that each subject is listed explicitly in the schedules.[41] Although there are tables that allow for increased specificity, the enumerative nature of LCC means that there is relatively little building of classification numbers. Instead, every classification number is listed out, resulting in much larger and more voluminous schedules than most other systems.[42] This was especially noticeable when LCC was exclusively available in printed format—the latest printed edition comprises 41 volumes. However, printed schedules are no longer published. Instead, all schedules

are available online, both as PDF files as well as via the subscription service ClassificationWeb.[43]

LCC divides knowledge into 21 main classes, which may be further divided into more specific subclasses. Each main class has its own classification schedule and index based on the organization of the printed volumes. LCC uses an alphanumeric notation to represent classes, with letters of the alphabet representing the 21 main classes (see Figure 3). Specific classes within these broad classes are represented by multi-letter combinations (see Figure 4).

Some classes extend to three alphabetic characters, most notably Class K—Law. Within each main class or subclass, the integers 1–9999 are used for enumerated divisions of subclasses. Some divisions require even greater levels of specificity, leading to the use of decimal extensions of numbers and/or alphanumeric combinations (see Figure 5).

Since LCC class schedules were each "developed separately, following its own internal logic," there is not an overarching cohesion.[44] Additionally,

LCC	Main Class
A	General Works
B	Philosophy, Psychology, Religion
C	Auxiliary Sciences of History
D	World History and History of Europe, Asia, Africa, Australia, New Zealand, etc.
E	History of the Americas
F	History of the Americas
G	Geography, Anthropology, Recreation
H	Social Sciences
J	Political Science
K	Law
L	Education
M	Music and Books on Music
N	Fine Arts
P	Language and Literature
Q	Science
R	Medicine
S	Agriculture
T	Technology
U	Military Science
V	Naval Science
Z	Bibliography, Library Science, Information Resources (General)

Figure 3. Illustration of main classes of LCC.

LIBRARY OF CONGRESS CLASSIFICATION OUTLINE

CLASS Q - SCIENCE

(Click each subclass for details)

Subclass Q	Science (General)
Subclass QA	Mathematics
Subclass QB	Astronomy
Subclass QC	Physics
Subclass QD	Chemistry
Subclass QE	Geology
Subclass QH	Natural history - Biology
Subclass QK	Botany
Subclass QL	Zoology
Subclass QM	Human anatomy
Subclass QP	Physiology
Subclass QR	Microbiology

Figure 4. Subclasses of Q—Science in LCC. Source: Library of Congress, https://www.loc.gov/aba/cataloging/classification/lcco/lcco_q.pdf.

	Selling
5438	Periodicals. Societies. Serials
5438.2	Study and teaching. Research
5438.25	General works
	By mail see HF5730
5438.3	Telephone selling
5438.35	Data processing
5438.4	Sales management
5438.5	Sales promotion
5438.8.A-Z	Other special topics, A-Z
5438.8.A9	Audiovisual aids
5438.8.C6	Competitions. Sales contests
5438.8.K48	Key accounts
5438.8.M4	Meetings. Sales meetings
5438.8.P74	Presentations. Sales presentations
5438.8.P75	Psychological aspects
5438.8.R4	Reporting
5438.8.T54	Time management
5439.A-Z	By product or service, A-Z
5439.A4	Agricultural machinery
5439.A43	Air conditioning
5439.A46	Airplanes
5439.A5	Aluminum products
5439.A55	Antiques
5439.A8	Automobiles
5439.B3	Baked products
5439.B35	Banks and banking
5439.B56	Boats
	Including used boats

Figure 5. Enumeration of classes in LCC HF. Source: Library of Congress Classification PDF Files, https://www.loc.gov/aba/publications/FreeLCC/freelcc.html#About.

some classes and subclasses are specifically excluded from coverage in LCC, such as Class W, which is used by the National Library of Medicine classification. Although most schedules follow groupings from more general to more specific, individual order of topics and granularity varies from schedule to schedule. Common patterns of order in LCC classes are as follows:

1. General form subdivisions (e.g., periodicals, societies, dictionaries, etc.)
2. Philosophy
3. History
4. Biography
5. General works
6. Study and teaching
7. Logical breakdown relevant to the specific class

By arranging subclasses in this manner, LCC provides a logical order for its classes and subclasses, which translates to shelf order and arrangement as well. Within a given class, a library user could expect to see this pattern mirrored on a shelf when browsing materials.

There are multiple additional aspects of LCC. For example, the range of its notation. The use of alphabetic characters allows for the possibility of up to 26 main classes, unlike Arabic numerals, which are limited to ten. The enumerated nature of the schedules can reduce the cognitive load of the classifier since there is minimal opportunity or need to construct complex classification numbers. The accessibility of the schedules themselves is a benefit: as products of the U.S. federal government, the schedules are not entitled to domestic copyright protection under U.S. law and are therefore considered to be in the public domain.[45]

Others have identified some limitations of LCC. Because the classification system was expressly designed for use by the Library of Congress and based on the content of the Library's collections, the scope and coverage of the classification is not only limited to areas of the Library's interests and use, but also reflects a U.S. government bias in focus and terminology. Additionally, the enumerative structure of LCC presents more of a challenge when the need to add or revise classes occurs. Classes representing new topics may not be able to be added where they would make the most sense in the logical order, leading over time to a structure and grouping that does not reflect contemporary conditions or perspectives (such as some of the examples discussed by Adler et al.).[46] Despite these challenges, continuous revision of the schedules is carried out by the Policy, Training and Cooperative Programs Division of the Library of Congress, with input from LC catalogers and others from affiliated organizations.

Reader-interest classifications

Although DDC and LCC are the most widely used classification systems in U.S. libraries, there is also a history of interest in alternative approaches to these traditional systems. This is due to some of the limitations of each of these systems outlined above, as well as general perception that these traditional systems are not intuitive to library users.[47] Many alternative systems exist and have been implemented in libraries around the world, and have been referred to as "alternative arrangement," "user-oriented arrangement," "bookstore arrangement," "reader-centered classification," and other similarly evocative terms.[48] The term "reader-interest classification" seems to be the most representative of these and thus is used as an umbrella term to describe these classification and arrangement systems.

Because of the wide variety of systems under this umbrella, it is difficult to establish a specific historical origin of reader-interest classification systems. Several large U.S. public libraries created "popular reading" sections and divided large collections into subject-based departments in the early 20th century.[49] However, a division of departments in and of itself cannot be considered a classification scheme. The first actual reader-focused classification system is generally agreed to be the one developed by Ralph A. Ulverling at the Detroit Public Library in 1936,[50] in which the intent was to "classify not by subject but by patron's reading inclinations."[51] As part of a pilot experiment, in 1941 a section of the main branch was arranged according to classes based on reading interests (see Figure 6), making it the first application of a reader-interest classification.

The scheme at the Detroit Public Library left a legacy that inspired other U.S. libraries as well as libraries in Europe.[52] Reader-interest schemes became especially popular in libraries in the 1970s, as libraries increasingly moved away from a focus on systems and standards toward a user-centered paradigm.[53] Yet in the 1980s and 1990s, reader-interest classifications lost appeal

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Background Reading (Classics, Art, Music, Belles Lettres)
Everyman's Affairs (Current national problems)
World Today-World Tomorrow (The international scene)
Personal Living-Home and Family (Family relations, maintenance of house and home)
Work and Play (Crafts and hobbies)
Adventure (Mostly travel, geographical and scientific exploration)
Bright Side (The light, the gay, the humorous)
Industrial Era (Men, machines, mass production and its effects)
Human Experience (Biography, and some types of travel and history)
Other Places (Travel)
Exploring Science (Application of modern science)
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Figure 6. Top level classes from Ulverling's classification at the Detroit Public Library.
Source: Encyclopedia of Knowledge Organization, s.v. "Reader-Interest Classifications," by Daniel Martínez-Ávila.

due to ongoing debates about their effectiveness to classify large nonfiction collections, especially in contrast to systems like DDC.[54] At the same time, however, bookstores were using reader-interest classification to organize their large nonfiction collections in an arguably effective way. The turn of the 21st century saw several U.S. public libraries switch from traditional library classification systems like DDC to the Book Industry Standards and Communication (BISAC) Subject Codes List. This standard is used by the U.S. book industry to categorize books based on topical content.[55] There is some debate about whether BISAC should be considered a classification system or a subject headings list due to its character and rules of application; however, since it has been used to replace other classification systems (e.g., DDC) and used as a classification system, it has been treated as such.[56] Additionally, although it may not strictly adhere to the characteristics that define classification systems and delineate them from other knowledge organization tools, BISAC does create classes based on characteristics of division that are related to one another through hierarchy and filiatory order. For instance, the top-level class HISTORY is divided into a number of subclasses based on geography, time period, and other topics (see Figure 7).

Subclasses may be two, three, or four levels deep in each of the 54 top level classes.[57] Each BISAC class includes a nine-digit alphanumerical notation (called a "code") that begins with three alphabetical characters reflecting a mnemonic for the class (e.g., "HIS" for history; "SCI" for science) followed by six Arabic numerals. In early editions of BISAC, the notation reflected the hierarchy, but this is no longer the case.[58] Although these codes could be considered a form of notation, they are used mainly to ensure consistency and facilitate machine and computer data parsing, rather than being presented to the user for browsing. This is especially apparent since the codes no longer reflect hierarchical placement or class relationships and thus cannot be used to order and arrange books or other physical resources. In fact, BISAC has been critiqued for its lack of systematic and logical order since many classes and subclasses are arranged alphabetically. For example, the alphabetical arrangement of subclasses in history in Figure 7 arranges ancient history between African history and Asian history, arguably not as logical as placing all geographic subclasses together and then all chronological subclasses together. The first public library in the U.S. to use BISAC was the Perry Branch Library in the Maricopa County (AZ) Library District in 2007. The trend inspired conversion at additional branches in the Maricopa system and at least 14 additional libraries to adopt BISAC, or a local adaptation of the system.[59]

Other libraries use reader-interest classification systems developed in-house to serve the specific needs of the local community. For example, Markham Public Library in Ontario, Canada, developed C3: Customer Centered Classification to support a "customer perspective"—specifically

HIS000000	**HISTORY** / General
HIS001000	**HISTORY** / Africa / General
HIS001010	**HISTORY** / Africa / Central
HIS001020	**HISTORY** / Africa / East
	HISTORY / Africa / Egypt *see* Middle East / Egypt *or* Ancient / Egypt
HIS001030	**HISTORY** / Africa / North
HIS001040	**HISTORY** / Africa / South / General
HIS047000	**HISTORY** / Africa / South / Republic of South Africa
HIS001050	**HISTORY** / Africa / West
HIS056000	**HISTORY** / African American
HIS038000	**HISTORY** / Americas (North, Central, South, West Indies)
HIS002000	**HISTORY** / Ancient / General
HIS002030	**HISTORY** / Ancient / Egypt
HIS002010	**HISTORY** / Ancient / Greece
HIS002020	**HISTORY** / Ancient / Rome
HIS003000	**HISTORY** / Asia / General
HIS050000	**HISTORY** / Asia / Central Asia
HIS008000	**HISTORY** / Asia / China
HIS017000	**HISTORY** / Asia / India & South Asia

Figure 7. Illustration of BISAC classes and subclasses. Source: "BISAC Subject Headings List, History," Book Industry Study Group, accessed September 16, 2020, https://bisg.org/page/BISACFaQ.

the prominent patron behavior of browsing for resources on particular topics, rather than seeking out specific known items.[60] Studies revealed that library users found it easier to locate resources using C3 vs. DDC, and staff saved significant time when retrieving items, increasing efficiency and productivity.[61] Another similar system is Presentatiesysteem Informatieve Media (PIM), a classification system developed in the Netherlands for classifying small library collections. One unique feature of PIM is its use of colors and iconographic symbols as classification notation.[62]

Most reader-interest classification systems, both historical and contemporary, were designed to reflect a library user's perspective and be intuitive

for a library patron to navigate and use, offering a perceived benefit over traditional systems that were designed to represent the entirety of human knowledge (e.g., DDC) or the scope of a specific collection (e.g., LCC). Additionally, some reader-interest classification systems, like BISAC, are available online at no cost for basic access (more robust access, such as Word, PDF, Excel, or interactive database, is offered for a fee). However, the localized nature of reader-interest classifications also presents some limitations. While BISAC benefits from standardization and centralization by the Book Industry Standards Group, other systems must be maintained locally, which requires an investment of personnel and other resources. Reader-interest classifications have also been critiqued for lacking the coverage to classify large collections, especially due to the lack of depth in the hierarchical class structure.

Conclusion

Confusion surrounding classification is rife, and problematic for everyone who works in a library. This article attempts to offer a basic introduction to classification in the context of U.S. library practice. Readers have hopefully come away from this piece with some basic fundamental knowledge about classification as well as details about some specific library classification systems that they may be likely to encounter in their career. I have also tried to highlight various benefits and shortcomings of these systems so that readers might consider when and in what situations a particular system might be useful.

This article's treatment is limited in scope, but that does not limit its importance. Classification is critical to libraries, since it facilitates the organization of library resources for searching, browsing, and retrieval by patrons and librarians. Without classification, library collections might be nothing but disorganized chaos, preventing users from finding and accessing the materials they need most. Because classification systems project points of view—intentionally or otherwise—they also carry great power to shape the worldview of library staff and users. Thus, it is imperative to pay attention to which classification systems are being used and what those systems may be communicating.

Although this article focused on classification within U.S. libraries, classification exists in other spaces and places, both within libraries as well as other settings. There is much more to be said and discussed about classification in general and library classification in particular than can be included here. Readers who have been intrigued by ideas or points raised in this article are encouraged to pursue further reading and references, since the writings on classification are vast.

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