A Reconsideration of Enumerative Classification for Current Information Needs*

Phyllis A. **Richmond**
School of Library Science
Case Western Reserve University
Cleveland, Ohio, USA

ABSTRACT

Enumerative classification is considered in terms of two of the most readily available systems: the Dewey Decimal Classification and the Library of Congress system. These are discussed first in terms of needs in libraries without automation. Then possibilities using machine-readable cataloging copy are considered in more detail. It is suggested that the computer makes it possible to revise the schedules of both classification systems continuously, radically where necessary, and faster with less confusion than in the past. It is also suggested that for augmented cataloging, exhaustive indexing and some types of automatic indexing the use of both should no longer be an "either-or" situation, but a matter of employing both at once, using class descriptions and class indexes combined with subject headings. To the whole should be added chain, rotated and permuted indexing to give the maximum number of entry points for the user. Emphasis is on exploiting the full potentialities of the content of book and other cataloged materials.

INTRODUCTION

For some time, there has been questioning as to whether enumerative, pre-coordinated, universal classification systems can meet modern information needs. The relationship of any system to such needs is largely dependent upon the nature of the needs. As yet, no existing universal classification system satisfies needs, for example, in a very new, recently developed branch of a subject field, one in which the area to be covered is not yet stabilized in content or vocabulary. When such a subject's stature in the intellectual community and the quality and quantity of its body of knowledge reach the point where a book can be written about it, its vocabulary is reasonably settled. Then it may be regarded as a subject literature and then it usually finds a place in classifications, thesauri, indexes, subject heading lists, dictionaries, encyclopedias and the like. By this time, there is an established subject matter and a potential clientele ready to make use of it.

Many research scholars will argue that this is too late in the intellectual process, that a classification system should be able to cover a subject earlier and change as it changes, regardless of its highly unstable content and vocabulary. Subject analysis in abstract journal and index organization does change relatively quickly. It is, however, harder to use material where every year it is organized under different headings. It is even harder when terms do not yet have established meanings. It becomes downright difficult when there are wide variations in the use of the same term.

For the purposes of this paper, classification and the subject analysis involved in it will be considered only in application to books and such other formats as are available in fully cataloged form (music, maps, phonorecords, etc.) For such materials and using computers, changes in classification and similar subject analysis are possible without the agony of manual methods. Computerized catalogs and indexes allow for wholesale changes, multiple usage of subject analysis methods, and considerable latitude in cross-referencing.

One may argue that a dynamic type of classification capable of handling some kinds of changes may be developed from existing enumerative classification systems if the auxiliaries used with the Universal Decimal Classification are applied elsewhere. Such

* This paper is a revision of one delivered at the American Library Association Pre-Conference on Subject Analysis, Atlantic City, 1969.

a procedure would entail a greater willingness to make major alterations in a classification system than has ever been entertained before. Also it probably would mean phasing out, altering, and re-defining a large proportion of existing main classes. These possibilities will be considered. Discussion in this paper will be limited to two of the most used systems, the Dewey Decimal Classification and that of the Library of Congress. This is not to minimize the importance of the Universal Decimal, Bliss Bibliographic or Colon Classification systems. It is based instead on the fact that Dewey and Library of Congress are at present readily available in machine-readable cataloging format, in printed catalog cards, in book catalog form, and in at least two national bibliographies.

GENERAL USAGE OF DEWEY AND LIBRARY OF CONGRESS (LC)

Assuming for the moment, that full computer application in most major libraries is at least five years away, there are several points to be considered in the usage of Dewey and LC in their present configurations. Both systems, as they exist today, are highly relevant to certain types of needs which are very difficult to fill otherwise. These are: *first, the need for an operational, on-going, general classification to cover the whole universe of knowledge.* With the exception of the LC schedule for law (K), which is just now being published, both systems cover the universe of knowledge. *Second, the need for constantly updated schedules for all fields of knowledge.* Both systems offer this feature in different ways. LC is updated regularly with quarterly additions and corrections, and by issuance of new editions of main classes periodically. With Dewey, there are some corrections between editions, but new total editions are now published fairly frequently. The Bliss Classification is a fine system that has suffered badly because it has not been updated regularly and has fallen badly behind. The Universal Decimal Classification is updated by a comparatively slow process on an international scale. *Third, need for a balanced general classification.* The Universal Decimal Classification is highly developed in some areas and relatively primitive in others. Bliss is (or was when published) balanced, but is now outdated. LC and Dewey are both timely and reasonably well-balanced in coverage. *Fourth, the need for ready and immediate availability of a classification for books and material other than reports and journal articles.* This is satisfied by both Dewey and LC as part and parcel of centralized cataloging coming from the Library of Congress. *Fifth, the need for a classification which is obtainable in multiple formats, to suit multiple needs.* Here again, both Dewey and LC are obtainable easily in the United States as part of centralized cataloging. The types of formats from Washington include printed cards, proof sheets or slips, and magnetic tape (Machine Readable Cataloging-MARC). Outside of Washington, both systems are available in bibliographic tools such as the *American Book Publishing Record* (BPR), and from various regional centers which use MARC tapes to provide catalog copy to a goodly number of libraries, via a cooperative network. The Ohio College Library Center (Columbus, Ohio) is an example of the latter. Outside of the United States, the Dewey Decimal Classification is available via the British National Bibliography. *Sixth, the urgent need for fast classification (and cataloging) of new materials.* This is satisfied by the Shared Cataloging Plan (National Program for Acquisitions and Cataloging-NPAC) implemented under Title IIC of the United States Higher Education Act and eventually reaching the MARC tapes as languages other than English begin to appear. *Seventh, the need for a classification that will serve both as a classification and as a shelf location device for open stacks in a library.* This requires a notation that is short enough to be marked on the backs of books, a feature of both systems, LC because of its mixed notation and vertical enumeration possibilities, and Dewey because it can be shortened at designated places. This seventh need should diminish as the convenience of the cathode-ray tube terminal, or similar arrangement, becomes available for the use of all library patrons, and browsing in the catalog via these consoles replaces the inconvenience of looking among the shelves for books. In the future, one may expect some type of classified catalog to become more popular than the dictionary catalog augmented by browsing in the stacks as at present. This likelihood is especially promising if automatic retrieval of physical volumes becomes less expensive, thus making it possible to replace open with closed stacks.

These seven needs are all needs existing now, and they all apply to library usage with or without automation. Such usage will now be discussed in more detail, first without and then with automation.

DEWEY AND LC FOR LIBRARY USAGE WITHOUT AUTOMATION

The standard American library, which has scarcely begun automation, is very much dependent upon the use of Dewey or LC for its classification and shelf arrangement. The chief factor here is cost. With centralized cataloging or centralized processing, some agreement has to be reached as to what kind and level of classification is to be used.

Since most regional processing centers or computer-based networks cannot function at a reasonable cost rate by doing their own classification, they are dependent primarily upon the Library of Congress for their source material. Therefore, the choice to their clients is Dewey, LC or do-it--yourself. The ready availability of Dewey and LC is the prime factor in keeping classification costs down.

There is, however, one additional factor that should be mentioned in this connection. No library, whether it does its own classification or whether it gets its work from a central source, can afford *not* to verify the classification provided centrally against the local shelf list. Networks overcome this obstacle by making a "profile" of each member library's preferred style, thereby performing a part of this verification automatically. There can be major differences, however, that are not caught by this procedure. Sometimes the classification provided on an LC card is outdated, especially if the card is more than four or five years old, and the more recent class number must be found and substituted. Sometimes the local library differs in classification of monographs in series so that each new volume in such a series must be classified to fit the rest. Ownership of the British rather than the American edition of a work has to be indicated in the class number. Sometimes the Library of Congress catalogs both, but often it does not. Since each is a separate bibliographic entry, often varying as to title, paging and size as well as imprint, or since the library may have both editions, it undoubtedly will want to indicate which is which. In some libraries, a different system of book (author) numbering is used for the LC Classification, so that only the classification number *per se* can be accepted. One cannot always be sure that the final "Cutter" number is the book number in the LC copy. For certain types of material, conferences, government body publications and the like, this is not the case. With the Dewey Classification, all book numbers must be supplied locally. In any case, it is important to remember that one is describing the content of one's own library, not that of the Library of Congress.

Centralized cataloging from the Library of Congress has two advantages. The classification has been done by experts in the subject, and this fact, coupled with the remote source of the data, can be used to advantage in maintaining consistency in classification, that is, as a basis for *not* making local deviations. No library except the very largest can afford subject specialists for every subject literature the library contains. Many settle for such experts in hard-to-handle areas: Russia and Cyrillic East Europe, East Asia, South Asia, Southwest Asia, Arabic Islam, the Middle East and various African divisions, where language is a barrier. The use of subject experts, however, is not without its pitfalls. It can lead to difficulties with inadequate Dewey and LC schedules. If the Library of Congress has not cataloged the material, which very often is the case, there is no classification for it. In some areas, this means that a local system has to be developed in self-defense. There has been no shortage of articles recently, pointing out the deficiencies of the LC classification, in particular, in such areas.[1] For exotic fields, one may expect that as Shared Cataloging is extended, improvements will be made in both classification systems.

Parenthetically, one might comment at this point that research libraries in the 1960's took a tremendous step forward in acquisition of materials from non-Western cultures, to support teaching programs that were global in orientation. Compared with air the noise accompanying techniques of information science and proposed automation, this was a very quiet revolution. It greatly broadened the scope of both technical and reader services. Unfortunately, the financial problems of the 1970's have ended, at least temporarily, many of the programs.

A second advantage to taking classification from a centralized source of the caliber of the Library of Congress lies in the position of strength it gives in dealing with irascible patrons. It is very convenient to be able to say that the classification was done by extramural experts and suggest the patron take his quarrel to them. In most cases, this person has second thoughts when it turns into a matter of arguing with his peers. Since opinions on classification vary considerably, it is usually possible to avoid making local deviations by such a course. Again, at this point, it must be emphasized that we are discussing libraries without automated catalogs.

As mentioned earlier, updating and corrections are available for both LC and Dewey systems. Any library can and should get these additions and keep its classification current with them. This is all the more important because such corrections virtually position a subject in the general sum total of human knowledge, remembering that a BOOK on a new subject is very often a good five to ten years behind discussion of that subject in the periodical literature. The old joke about it taking ten years to get a new idea into a *text* book and another ten to get it out again after it has become outdated also applies to catalogs.

In summary, for use without computerization, the Dewey or LC class numbers should be accepted from a centralized source as much as possible. In addition, it is highly desirable, even obligatory, that the corrections to the schedules be made at the earliest possible time.

DEWEY AND LC FOR USE WITH AUTOMATED CATALOGS

A significant advantage in using the Dewey and LC systems *with* automation is that it is possible to have *continuous* updating with new additions, corrections and deletions. When a catalog is in machine-readable form, these changes can be received and made wholesale at any time. As more and more material becomes available in machine-readable form, with both on-going and retrospective cataloging, it may be that library catalogs will become at least twice as modern in their subject terminology as they are now. If all catalogs were in machine-readable form, there would be no need for new *printed* editions of either LC or Dewey since the schedules could be held in computer memory. In addition, each library could contribute its share to the total computer storage, supplying cataloging and classification for its unique items.

The factor of computerization makes some difference in the way each classification system is used and, in corollary, the way each classification system is used makes some difference in the degree to which automation will be effective. For this reason, the two systems will be considered separately in this connection.

DEWEY

The first question that arises in considering the Dewey Decimal Classification in connection with library automation is, "Why Dewey instead of UDC?" The reasons for preferring Dewey are several. The Universal Decimal Classification is only partly fully expanded. While these expansions are admirable for special collections, special libraries, and for some report and periodical literatures, as a rule they are of limited usefulness in a general library because they are so out of line with the rest of UDC. The general library's collections are usually strongest in the humanities and social sciences, whereas UDC's great strength is mainly in science and technology. Another point is that in the administration and operation of the Dewey system, it is easier to make additions and changes. Since a large portion of libraries throughout the world use Dewey, changes to the present classification are less time-consuming and costly than reclassification to another system which is only practically in modern fullness.[2]

The second question in connection with Dewey and automation lies in the possibility of using Dewey with a faceting process. Actually all of the faceting procedures (auxiliaries) introduced with the Universal Decimal Classification — the theory, signs, symbols, and methodology — may be used practically without change and with great advantage in Dewey. In fact, since Dewey is generally more modern throughout, these procedures could be more satisfactory with Dewey than with UDC.

An attempt to do this had been made. The auxiliaries (in English) are given in Figure 1.[3] The *Guide to the Universal Decimal Classification (UDC)* issued by the British Standards Institution gives an example of the use of these auxiliaries taken from the UDC. Figure 2 shows the same example, using numbers taken from the 18th edition of the Dewey Decimal Classification. In this particular field, the two systems are almost identical except for the last three items in the sample where Dewey had class numbers and UDC did not. So far no one seems to have used the auxiliaries developed for UDC with other classification systems, though there is no reason why this could not be done. With the availability of computers, such a faceting procedure is more attractive than it is as a manual operation.

A third question has to do with computer applications using Dewey. Obviously the Dewey numerical-type notation is highly amenable to computer manipulation. The positional features of the notation, which follow hierarchy as a rule (with the notable exception of "centered headings"), make it possible for a searching procedure using Dewey to be primarily a logical one rather than a terminological operation. In other words, thanks to the organization, one would deal mostly with surrogates for hierarchies and hierarchical relationships in preference to words. Those areas of imperfect hierarchy would have to be corrected, but otherwise the computer could work entirely with logical division, Boolean algebra, and other relational formats applied to notational symbols, with translation to class descriptions only in the final printout if desired. Before planning to use this possibility freely, it probably would be advisable to make a study of the logic in the present schedule to be sure that it is as tight as it appears.

The nineteenth edition of Dewey is to be made in machine-readable form. This edition could conceivably be the last in printed form, at least for those libraries using machine-readable cataloging. One may expect more phoenix schedules eventually. Also most of the recent work of Freeman and Atherton on the mechanization of UDC[4] has application to Dewey.

When the majority of library catalogs are in machine-readable form, the old bugbear of relocation could at last be laid to rest. Changing numbers would not be the traumatic experience it has been in the past. One would have the computer produce new labels and book cards in the process of making new bibliographic entries to replace old ones. Thus the classification, subject headings (or PRECIS, if this is to be adopted) and the new International Standard Bibliographic Description (ISBD) could all be added at once or in easy stages, as the library preferred. The physical book would still have to

AUXILIARIES IN UDC
(1963)

a) Aggregation signs + (Connector for non-consecutive classes)
/ (Connector for consecutive classes)

b) Relation signs : (link for two separate classes covering related concepts)
[ ] (for subordinate concepts or to intercalate facets)

The following arc all determined from tables:

c) Language = . . .

d) Place, region, county (1/9)

e) Race and nationality (= . . .)

f) Time "...."

g) Form and presentation (0...)

h) Alphabetical and numerical A-Z, No....
(non-decimal division)

i) Point of view .00. . .

j) Special (meanings differ with each class)

-... .0... '...

Fig. 1. Facet indicators used in Universal Decimal Classification. British Standards Institution. *Guide to the Universal Decimal Classification (UDC). B.S. 1000C:1963.* London, British Standards Institution [1963] (F.I.D. No. 345). p. 10-32. 52-57.

UDC AUXILIARIES
USED WITH DEWEY NUMBERS
(18th edition)

651	Office services
651 + 657	Office services *and* Accounting
651/653	Office services *and* Professing of written communication *and* Shorthand
651:338.644	Office services in large scale enterprises
651.5	Office services — Records management
651[332.1].5	Office services in banks — Records management
651 = 82	Office services (documents in Russian)
651(73)	Office services in U.S.
651(=9)	Office services of/by blacks
651"1973"	Office services in 1973
651(03)	Encyclopedia of office services
651IBM	Office services in the IBM Company
651.008	Office services from the point of view of organization and management

Fig. 2. Facet indicators with Dewey numbers. Based on p. 31-32 of the British Standards Institution. Guide *to the Universal Decimal Classification* (UDC). In the class area, UDC and Dewey vary very little.

be handled, but reclassifying at least should not be the major chore it is now.

Dewey class numbers and LC subject headings are united in the machine-readable format of MARC, so that in addition to the regular index to the Dewey Decimal Classification, one could add subject headings for each class number, much as has been done in part with the LC Classification and subject headings, making an augmented approach possible, especially if a chain-indexed form of class description were made available, perhaps in preference to the present 'relative' index. A chain index would probably provide much of the logic for the type of "broader term", "narrower term", "related term", "see" and "see also" organization used in a thesaurus. One can conceive of public libraries contributing to automation through the development of a Dewey thesaurus, to be used by patrons via computer-console.

In addition, the PRECIS automated subject analysis system developed for use in the *British National Bibliography* has great potential. It could be adopted and operated in parallel with a Dewey thesaurus, or as a supplement to it. It is possible that each of these innovations is needed for a different type of clientele.

In summary, the possibilities for computerization with the Dewey Decimal Classification look so good that, if carried out properly, the old question, "Is Dewey dead?" quite obviously would be ridiculous. The next question is, "Are the possibilities for the Library of Congress Classification as good?"

LIBRARY OF CONGRESS

The Library of Congress Classification has its own peculiar features which make it attractive for use in computerized catalogs. It handles more information in a single unified system, and does so successfully, than any other general classification, even though it did not undertake to describe the universe of knowledge until the Shared Cataloging Program began.[5] So far it covers about sixteen million separate entries (out of a global population estimated at about thirty million works.6) It has the advantage of not being arranged logically or hierarchically for the most part, which makes it easier to add or delete classes at any point than with a logical system. In fact, it is readily open at almost any point for major additions and changes if these prove needed, as well they may. It operates by literary warrant so that if a small field suddenly becomes a big field, the classification takes it right in stride. Relocations are rarely necessary, but when they are, they can be really major and yet made apparently without hesitation. In practice, precedent is used for placing new material, where possible. One looks for like material rather than reasoning through class levels. There are few hard and fast hierarchies of any size except in the P (language and literature) schedules. Small hierarchies of a few levels, such as those found in modern thesauri, are abundant, however. The breakdown of subclasses by A to Z is extremely helpful in making additions, a feature which in some instances would give slightly different numbers in languages other than English. The classification is tremendously diffuse; if a subject can go in ten places, it goes in ten places, according to emphasis.[7] The extent of this spread will not be fully apparent until a unified index is made.

In the process of schedule-making, LC emphasizes both similarities and differences, not being logically bound to one approach or the other. Its notation is almost purely ordinal and rarely reflects the internal arrangement of classes. To the neophyte, this can be very confusing because the format of the printed schedules does not necessarily employ bold face type or blank areas to show the arrangement. This is especially true of the most recent editions issued in typescript (N = Fine Arts, T = Technology, Q = Science), which are difficult for even an experienced classifier to follow.

At first glance, LC looks like a dubious proposition for automation, but actually it is not. The various indexes to individual classes are very good. Using a word approach rather than a logical approach, one may unite subject headings, indexes and class descriptions into a single large body of subject analysis,[8] One could not work very well with notation alone, as is possible with Dewey, UDC, Bliss or perhaps even Colon. This makes it necessary to separate the classification proper from its notation right at the start. For obvious reasons, the LC Classification is not limited by its notation, as appears to be the case with most hierarchical systems, and this has been all-important in making great changes easily.

The class numbers and subject headings together are already available in machine-readable form in MARC copy. It remains to add the full LC class *descriptions* and indexes in machine-readable form and one has the makings of a super-thesaurus, or for an augmented index. John Phillip Immroth has utilized class description and class indexes to create a chain index.[9] In any case, the emphasis, of necessity, is on a *word* approach to subject knowledge: analysis by words.

Word approaches vary with each language and therefore at present an augmented approach to LC is no advantage for non-English-speaking users. The feasibility of translation, with rearrangement as national interests dictate, should be studied. In the process, some improvements of benefit to all users could be made in the schedules. Some of these will have to be made in order to convert LC class schedules to machine-readable form. For example, material that is now implicit will have to

be made explicit. The differences that would cause an item to be classified in PN rather than PQ, PR, PS, or PT should be described. Works on general optics will have to find a home-currently lacking. The problem subjects arising from area studies, subject mixtures, changes in political boundaries and so on will have to be met and solved. Directions that would appear in a manual on how to use the classification, non-existent at present, would have to be determined. These would include fine points which are now learned only by doing. The problems are serious, but not insurmountable. Compared with those of making class positions in a hierarchical classification logical, they are relatively mild.

The Library of Congress Classification can be used with faceting devices, such as the auxiliares of the Universal Decimal Classification. The same example used to demonstrate the applicability to Dewey is shown in Figure 3, converted to LC. With LC, however, more actual numbers exist for the relationships expressed with auxiliaries than was the case with Dewey. Either these should replace the results of the faceting procedure or else they should be eliminated, probably the former.

Mechanization of the notation of the LC system (up to the book number) has been covered previously [10] and will not be repeated here. Suffice it to say, the notation could not be used without special formatting, And the logical features of LC, being rare, would not be a part of computer manipulation. On the other hand, *word* approaches, such as those employed in programs like IBM 360/Document Processing, would be very useful. Though slower in computer time, this type of approach would be directly accessible to the patron with a minimum of translation as no surrogates are involved.

For automation purposes, the two classification systems offer radically different approaches — the advantages in speed and logic lie with Dewey; the advantages of a vast pre-coordinated system of class descriptions expressed primarily in word form lie with LC. Both need further work to be fully satisfactory as a key index to any information retrieval system.

With computers, as a matter of fact, there is no longer any need for a library to use classification on an either-or basis. One could use both Dewey and LC, making use of hierarchical and word approaches. The common mechanism that permits such a course is the MARC tape. Furthermore either one could be used on the shelf, and both in a computerized catalog. Or one could use Dewey on the shelf and LC in a classified catalog, for maximum browsability in each case. Before elaborating further on these suggestions, it is advisable to consider what is required from classification in various kinds of library automation procedures.

UDC AUXILIARES
USED WITH LC CLASSIFICATION

HF5547 + HF5667	Office management *and* Auditing
HF5546/HF5549	Office management, equipment, personnel
HF5547: HD2351	Office management in large-scale enterprises
HF5547.A2	Office management — Periodicals
HF5547[HG1886].A2	Office management in savings banks - Periodicals
HF5547=82	Office management (documents in Russian)
HF5547(73)	Office management in U.S.
HF5547(=9)	Office management of/by blacks
HF55471973"	Office management in 1973
HF5547(Q3)	Encyclopedia of office management
HF5547IBM	Office management in the IBM Company
HF5547.008	Office management from the organization and management point of view

Fig, 3. Facet indicators with LC numbers. Based on *the Guide to the Universal Decimal Classification* (UDC) of the British Standards Institution. The faceting process is more difficult to apply to LC because it already has specific numbers which cover the same territory as the auxiliaries, in some cases, and wholesale coverage by faceting procedures would be wasteful in such instances.

GENERAL CONSIDERATIONS

In considering the use of any classification system for library automation, one should first review the purposes for which the library has been created and the types of patrons it will be serving. Is it desirable to have a broad, general classification at an intermediate intellectual level, serving adults and children? Is a special classification needed for younger children? Does one want a general classification beginning at the university level reader as the *least* sophisticated reader? LC and Dewey have been compared many times with respect to these questions and no consensus reached. In the future, much depends upon human willingness to make use of computer capability for accepting rapid change. In the case of either Dewey or LC, unwillingness to accept change as a constant and unwillingness to rebuild each system can negate the longevity of the system. To continue both systems *as* is in machine-readable form would be to ignore the advantages inherent in computerization. The purpose in putting them into machine-readable form should be to start new developments, to catch up with modern organization of knowledge, and to accelerate the rate at which alterations are made as subject literatures require. *What is past literally is prologue.*

With computers, librarians are freed from the inhibiting view that a subject analysis system cannot be changed overnight. It can be. Radical changes can be tried out without losing the older system in the process. One can run several systems in parallel. There is no reason, if conflicting terminology is turned into cross-references, why each item could not have classification numbers and descriptive terms from many systems simultaneously. Dewey could not only rise like phoenix in all its schedules, but could change to a pure letter notation instead of the pure numeral one used now. It would still retain all of its many good features. notably its mnemonics and number-building capability. With letters it would even be possible to add sixteen more main classes, sixteen new subdivisions every place where there are now ten, and in the process tighten its logic considerably. Such prospects are quite exhilirating. Also, as mentioned above, with computers there is no reason for not starting to use Dewey and LC together or alternatively according to the type of methodology preferable for the subject, situation or problem. The only real dichotomy is in people's minds.

Automation of any classification can produce very interesting results. The type of library automation/ classification problems which are amenable to solution with machine-readable cataloging, besides updating class descriptions automatically and continuously, would be lists of accessions by class, subject access to material on a much broader base than that of present subject headings, bibliography compilation in subject literatures by classes, sets of classes, subsets of classes, intersects of classes, selected parts of classes and so on, statistics by classes for various departments in the library — such as circulation by classes, acquisition by classes, serials listed by classes, usage of departmental library collections by classes, intramural and extramural borrowing by classes (i.e., what does an engineering student borrow from an art library'?), and collection of certain kinds of information valuable for management but difficult to obtain now. In other words, one can get a much more exact picture of many library functions by using the classification data available with machine-readable catalog copy.

DEWEY AND LC FOR USAGE IN INFORMATION RETRIEVAL

The discussion to this point has been in terms of libraries. Turning to the use of classification for information retrieval opens a different line of thought and different angles of approach. For the most part, the application of Dewey and LC for information retrieval has been limited to document retrieval rather than data (fact) retrieval. There are better ways of finding factual data than via a general or universal classification system and many of the bibliographic tools developed have little to do with classification. The two classification systems will be considered in terms of document retrieval primarily, and then according to other approaches, such as augmented cataloging, exhaustive indexing and automatic classification.

DOCUMENT RETRIEVAL

So far as information retrieval is concerned, universal classification systems are mostly used for basic bibliography gathering. One can define a subject area in either broad or narrow focus and dredge up book materials about it. Neither system digs deep enough to cover journal literature and the coverage of report literature is very skimpy, so that classification as a technique tends to leave a total literature search incomplete, unless one is using a system of depth classification such as that developed by the Indian School. [n] The catalog of a good library has always been a productive place to begin the compilation of a bibliography for a new research topic, but then one tends to proceed further through citations and such.

To carry the argument a bit further, Dewey and LC are not suitable for information retrieval, even in the sense of document retrieval, in all the areas of knowledge which they cover. Which system is preferred depends on the level of information being sought and the up-to-dateness of the schedule in

that area. For example, the 18th edition of Dewey is probably the most modern for law. The language and literature sections of LC are most comprehensive, though in a few decades the 20th century should be reworked completely. On the other hand, fact retrieval with either would not be very satisfactory, partly because they are not sufficiently detailed and partly because books are not analyzed deeply enough.

AUGMENTED CATALOGING

LC could be greatly improved for purposes of both document and data information retrieval if subject cataloging were augmented[12] to include section headings, chapter headings and back-of-the-book indexes for each entry (see Figure 4). Since more and more books are typeset by computer processes, this is not as unrealistic as it seems. One would, however, have to retain and edit the tapes. In theory, with computerized typsetting one could have every word in the book available as input for automatic indexing and automatic classification, not to mention linguistic, stylistic and other research analysis. Some cataloging in connection with the MARC program has already begun to augment the record in that there is more in the MARC record than is available on the printed cards.
This data could not be handled as any ordinary bibliographic entry. It would have to be added off-line to MARC, SUPERMARC[13] or the International Standard Bibliographic Description. However, computer-output compilations of bibliographic data such as COM {Computer Output on Microfilm) could surmount this hindrance. With augmented cataloging, and with the added subject data classified, LC could become highly suitable for information retrieval in the humanities and social sciences.

Title of book Medicine in America: Historical essays (Richard Harrison Shryock)

Section headings
Period pieces
Personal and public hygiene
The medical profession
Medical thought and research
Historiography

Chapter headings
Medical practice in the Old South
American indifference to basic science during the nineteenth century
A medical perspective on the Civil War
Sylvester Graham and the popular health movement, 1830-1870
The early American public health movement
The historical significance of the tuberculosis movement
The American physician in 1846 and in 1946: a study in professional contrasts
Women in American medicine
The advent of modern medicine in Philadelphia, 1800-1850
Benjamin Rush from the perspective of the twentieth century
Early American immunology: as formulated by the Reverend Cotton Mather of Hoston, 1725
The strange case of Wells' theory of natural selection (1813): some comments on the dissemination of scientific ideas
Medical sources and the social historian
The need for studies in the history of American science
The interplay of social and internal factors modern medicine: an historical analysis

Fig. 4. Augmented cataloging. Using all the above material as sources of classification, entries would give considerably broader coverage of a book than is now the case. For even wider subject coverages, the book's own index of 14 pages should be converted to a controlled vocabulary and included. "Period pieces" appears to be a non-descriptive title and either would be omitted, or given a rather general class number.

EXHAUSTIVE INDEXING

Considerable experimenting should be done with indexing procedures in connection with both Dewey and LC. Dewey lends itself well to chain-indexing. It is more difficult to use this kind of indexing with LC because of the structure of the system.[14] LC does have extensive synonym development in its indexes and its classes are already tied to some degree to its subject headings. At the risk of being redundant, one may insist that a combination of Dewey and LC class descriptions, Dewey and LC classification index terms, and LC subject headings makes a more effective base for a comprehensive index or thesaurus. In addition, every significant term in each class description, classification index and subject heading may be rotated, and, where possible, permuted to give much greater access,[15] The results of such a procedure for the words "computer" and "computers" have been combined into a single alphabetical list, given in Figure 5, The procedure was done by hand, which is a very tedious job. There was surprisingly little overlap among the various sources. What overlap there is should be reconciled in the interests of clarity for the user. The combination of class descriptions, classification indexes and subject headings is very much less effective without chain, rotated and permuted indexing. The latter two kinds of indexing are particularly effective. The whole combination gives a rate of increase that is almost geometrically proportional in points of access as compared with any of these systems alone. It might be desirable to turn this raw index into a thesaurus for the user, since a full index would be very lengthy and unstructured. A thesaurus re-introduces a factor of classification.

AUTOMATIC CLASSIFICATION

The successful forms of automatic classification[16] to date start with some kind of classification system as a base and seek to fit new material into it. Automatic classification of this type does not produce new classes, but it does develop means for recognition of existing ones so that unclassified items may be added if they match existing classes. Classification is automatic to the extent that recognition is made by machine rather than by humans. It is more consistent than that done by humans, but where it does not find a recognizable pattern, humans have to step in and create new classes and add them to the system. Either LC or Dewey may be used as a base for automatic classification since the methodologies are not dependent upon the nature of the system used.

CONCLUSION

In discussing information retrieval in terms of classification, it may be said that both Dewey and LC will have to be greatly expanded if augmented cataloging, exhaustive indexing and automatic classification are developed as they should be. To do this, a data base in machine-readable form is prerequisite. This feature is now being produced all over the world.

The classification schedules must be easy to change and easy to change in a major fashion frequently and quickly. Even if the classification systems remain tied to books, the expansion must take place. This could be done for both systems at once, especially as it seems desirable to use both, rather than one or the other.

So far, present practice in subject analysis barely scratches the surface. Book content has not yet been described as thoroughly as it should be. Much data has been missed or deliberately overlooked. There is a whole information field yet to be developed, separate from that of unpublished reports and published journal literature. The content of works in this area is firm in semantics, sound as a rule, more easily understood than its flighty predecessors in reports and articles, non-ephemeral, and, in fact, amounting to the sum total of human knowledge in relatively permanent form, including, one might point out, not only what is assumed to be correct today, but also what was assumed to be correct yesterday, and the rudiments of that which will be assumed to be correct tomorrow. Furthermore, for the ideal of the non-circulating library — the library of the future where every item needed is always in and available — a much broader data base in individual book content is vital. The patron must have a much wider field to choose from for his needs, whether research or personal. With expansion, both Dewey and LC can supply these needs for information in books. It is time to unlock the doors to these vaults and let subject analysis into the depths so that the information resting (literally) in books shall not languish for lack of airing.

CODE FOR 1973 COMPOSITE LIST OF CLASS DESCRIPTIONS, INDEX TERMS, SUBJECT HEADINGS, ETC. FOR THE WORD "COMPUTER(S)"

CD = Chain-indexed Dewey 18

CLQ = Chain-indexed Library of Congress class Q (5th ed.)

CLT = Chain-indexed Library of Congress class T (6th ed.)

D = Dewey Decimal classification, 18th ed., classes 001, 029, 338, 621, 629, 651, 658

DI = Index to Dewey 18

LQ = Library of Congress class Q

LT = Library of Congress class T

LQI == **Index** to Library of Congress class Q

LTI — Index to Library of Congress class T

PLT = Permuted Library of Congress class T

PS = Permuted Library of Congress subject headings

RD = Rotated Dewey class terms

RDN = Rodated Dewey scope notes

RLQ = Rotated LC class Q terms

RLT = Rotated LC class T terms

RS = Rotated subject headings

S = Library of Congress subject headings through 1972

Computer animation (S)
Computer arithmetic and logic units (S)
Computer-assisted film making *see* Computer animation (S)
Computer-assisted instruction (S)
Computer-based instruction *see* Teaching machines (S)
Computer centers *see* Computation laboratories, Data centers, Electronic data proeessing centers (S)
Computer circuits *see* Computers — Circuits (S)
Computer combinations (D)
Computer combinations — Electronic engineering Production economics (DI)
Computer combinations - Marketing *see* Marketing (DI)
Computer combinations — Other aspects *see* Computers (DI)
Computer combinations — Technical and manufacturing (DI)
Computer combinations, Computer-like machines, Computer-related equipment (D)
Computer composition (S)
Computer control (D)
Computer control — Automation engineering — Production economics (DI)
Computer control — Automation engineering — Technology (DI)
Computer control (Analytical chemistry) (LQI)
Computer department security measures *see* Electronic data processing department — Security measures (S)
Computer drawing (S)
Computer engineering (LQI, LTI, S)
Computer engineering — Programmed instruction (S)
Computer engineering. Computer hardware (LT)
Computer engineering. Computer hardware — Analog computers (LT)
Computer engineering. Computer hardware — Dictionaries and encyclopedias (LT)
Computer engineering. Computer hardware — Digital computers (LT)
Computer engineering. Computer hardware — Digital computers — Circuits (LT)
Computer engineering. Computer hardware — Directories (LT)
Computer engineering. Computer hardware — General works (LT)
Computer engineering. Computer hardware — History (LT)
Computer engineering. Computer hardware — Input-output equipment (LT)
Computer engineering. Computer hardware — Input-output equipment — Analog-to-digital converters. Digital-to-analog converters (LT)
Computer engineering. Computer hardware — Input-output equipment — General works (LT)
Computer engineering. Computer hardware — Input-output equipment — Special — Data tape drives (LT)
Computer engineering. Computer hardware — Juvenile works (LT)
Computer engineering. Computer hardware — Maintenance and repair (LT)
Computer engineering. Computer hardware — Periodicals, societies, congresses, etc. (LT)
Computer engineering. Computer hardware — Popular works (LT)
Computer engineering. Computer hardware — Printout equipment (LT)
Computer engineering. Computer hardware — Special computer components (LT)
Computer engineering. Computer hardware — Special computers. By name, A-Z (LT)
Computer engineering. Computer hardware — Symbols and abbreviations (LT)

Computer graphics (LT, LTI, S)
Computer hardware (LTI)
Computer hardware. Computer engineering (PLT)
Computer industry (S)
Computer input-output equipment (S)
Computer input-output equipment — Programmed instruction (S)
Computer input-output equipment, Class optical scanning devices as (RDN)
Computer leases (S)
Computer-like machines (D)
Computer-like machines, computer-related equipment, computer combinations (RD)
Computer-mathematics *see* Numerical analysis applied (DCI)
Computer memory systems *see* Computer storage devices (S)
Computer music (S)
Computer-operated equipment — Printing composition *see* Automatic equipment — Printing composition (DCI)
Computer output microfilm devices (S)
Computer program testing *see* Computer programs Testing (S)
Computer programming *see* Programming (Electronic computers) (S)
Computer programming — Coding (D)
Computer programming — Electronic — Data processing (CD)
Computer programming — Management (DI)
Computer programming — Office services (DI)
Computer programming — Program flow charting (Block diagramming) (D)
Computer programming — Software (D)
Computer programming — Special subjects (DI)
Computer programming as a profession (LQI)
Computer programming as a profession *see* Programming (Electronic computers) — Vocational guidance (S)
Computer programming management (S)
Computer programs (LQ, S)
Computer programs. Electronic data processing (RLQ)
Computer programs. Electronic data processing including (RLT)
Computer programs — Chemistry (LQI)
Computer programs — Debugging *see* Debugging in computer science (S)
Computer programs — Nuclear and particle physics (LQI)
Computer programs — Reactor physics (LQI)
Computer programs — Testing (S)
Computer programs, Preparation of flow charts to serve as basis of (RDN)
Computer programs (Astronautics) (LTI)
Computer-related equipment — Analog-to-digital and digital-to-analog machines (D)
Computer-related equipment — Character and pattern recognition devices (D)
Computer-related equipment, computer combinations, computer-like machines (RD)
Computer reliability *see* Computer — Reliability (S)
Computer science. Electronic computers (RLQ)
Computer science, Debugging in (RS)
Computer science (Mathematics) (LQI)
Computer security measures *see* Electronic data processing — Security measures (S)
Computer simulation, Digital *see* Digital computer simulation (S)
Computer software *see* Computer programs (S)
Computer software *see* Programming (Electronic computers), Programming languages (Electronic computers), and similar headings (S)
Computer software (Mathematics) (LQI)
Computer sorting *see* Sorting (Electronic computers) (S)
Computer sound processing (S)
Computer specialists (Mathematics) (LQI)
Computer storage devices (S)
Computer typesetting *see* Computerized typesetting(S)
[Computers] Analog computers (CLQ)
[Computers] Analog — Specific types of computers — Electronic — Data processing (CD)
[Computers] Biography (CLQ)
[Computers] By name, A-Z (RLT)
[Computers] Computerization of files
[Computers] Computerized typesetting (S)
[Computers] Data processing, Electronic — Input and storage — Punch cards, paper tape; magnetic tape, disks, drums, data cells, optical scanning, audio input (D)
[Computers] Data processing, Electronic — Input, storage, output — Time-sharing, real-time, on-line systems (D)
[Computers] Data processing, Electronic — Outputs — Printouts, graphics, other visual displays, audio (D)
[Computers] Dictionaries and encyclopedias (CLQ)
[Computers] Digital computers (CLQ)
[Computers] Digital — Specific types of computers — Electronic — Data processing (CD)
[Computers] General works, treatises and textbooks (CLQ)
[Computers] Problems, exercises, examinations (CLQ)
[Computers] Special. By name, A-Z (CLQ)
[Computers] Specific types of computers — Electronic — Data processing (CD)
[Computers] Use of computers and other equipment — Mechanized storage, search, retrieval of information (CD)
[Computers] Vocational guidance (CLQ)
Computers — Abbreviations (S)
Computers — Amateurs' manuals (S)
Computers — Anecdotes, facetiae, satire, etc. (S)

Computers — Caricatures and cartoons (S)
Computers — Circuits (S)
Computers — Circuits — quality control (S)
Computers — Design and construction *see* Computer engineering (S)
Computers — Documentation use (DI)
Computers — Electronic data processing *see* Electronic data processing (DI)
Computers — Electronic engineering — Production economics (DI)
Computers — Fires and fire prevention (S)
Computers — Input-output equipment *see* Computer input-output equipment (S)
Computers — Juvenile literature (S)
Computers — Marketing *see* Marketing (DI)
Computers — Memory systems *see* Computer storage devices (S)
Computers — Moral and religious aspects (S)
Computers — Notation (S)
Computers — Optical equipment (S)
Computers — Patents (S)
Computers — Popular works (S)
Computers — Printout equipment *see* Printers (Data processing systems) (S)
Computers — Programming *see* Programming (Electronic computers) (S)
Computers — Reliability (S)
Computers — Special developments — Electronic engineering (CD)
Computers — Storage devices *see* Computer storage devices (S)
Computers — Technical and manufacturing (DCI)
Computers — Vocational guidance (S)
Computers, Analog (RD, RLQ)
Computers, Automatic *see* Computers (PS)
Computers, Data terminals *see* Computer input-output equipment (PS)
Computers, Density altitude — Special — Meteorological — Miscellaneous aspects — Aeronautics (CLT)
Computers, Density altitude (Aeronautical meteorology) (LTI)
Computers, Digital (RD, RLQ)
Computers, Electronic *see* Eletronic computers (LQI)
Computers, Electronic *see* Computers (S)
Computers, Electronic — Programming management (CS)
Computers, Electronic analog (PS)
Computers, Electronic digital (PS)
Computers, Electronic digital — Memory systems *see* Computer storage devices (PS)
Computers, Electronic digital — Sound processing *see* Computer sound processing (PS)
Computers, Hybrid (PS)
Computers, Hybrid [included in] Computer combinations (RDN)
Computers, Hybrid (Aeronautics) (LTI)
Computers, Special. By name, A-Z (RTL)
Computers and civilization (S)
Computers and computer installations — Fire prevention and extinction in special classes of buildings and facilities — Protection from fire — Building construction (CLT)
Computers and computer installations (Fire prevention and extinction) (LTI)
Computers and other equipment, Use of (RDN)
Computers in general (D)
Computers in general, Components of (RD)
Computers in general, Components of — Circuitry (CD)
Computers in general, Components of — Input-output equipment (CD)
Computers in general, Components of — Printout equipment (CD)
Computers in general, Components of — Storage and memory equipment (CD)
Computers in general, Fundamentals of (RD)
Computers in general, Operation, maintenance, repair of (RD)
Computers (Computing machines) *see* Computers (PS)
Computers (Electronic) Programming *see* Programming (PS)
Computers (Input equipment) *see* Computer input-output equipment (PS)
Computers (Output equipment) *see* Computer input-output equipment (PS)

Fig. 5. Composite list of class descriptions, index terms and subject headings. Material from LC classes other than Q and T has been omitted, as have all cross-references leading to the terms and all *see also* references leading away from the terms.

NOTES

1. Cf Amankwe. Nwozo, "Africa in the standard classification scheme," *Library Resources & Technical Services,* 16(2): 178-194, (Spring 1972); Veryha, Wasyl, "Library of Congress Classification and subject headings relating to Slavic and Eastern Europe," ibid., 16(4):470-487, (Fall 1972); Jones, Gerda A. and Elizabeth H. Weeks, "An expansion of Library of Congress classes PT 2600-2688," ibid., 17(l):32-34, (Winter 1973); Wang, Sze-Tseng, "The structure of Library of Congress headings for belles-lettres in Chinese literature," *ibid.,* 17(2): 231-237, (Spring 1973); Mowery, Robert L., "The classification of African literature by the Library of Congress," ibid., 17(3): 340-352, (Summer 1973).

2. For approximately twenty years, Dewey has been "going international." That is, modifications of the pro-American, pro-English language and pro-Protestant religion are encouraged in other countries.

3. For means and methods, see British Standards Institution. *Guide to the Universal Decimal* Classification *(UDC). B.S. l000C: 1963.* London, British Standards Institution, 1963 (F.I.D. no. 345) p. 10-32, 52-57. Brazilian readers should note that a full edition of UDC is not available in English. Translation from other languages as a means of getting such an edition soon apparently is not occurring. It is expected that TJDC numbers will eventually become available via MARC.

4. Freeman, Robert R. *Research Project for the Evaluation of the UDC* as *the Indexing Language for a Mechanized Reference Retrieval System: Progress Report for the Period July 1,* 1965 — *January 31, 1966.* New York, American Institute of Physics, 1966. (AIP/DRP UDC-2); Freeman, Robert R. and Pauline Atherton. *File Organization and Search Strategy using the Universal Decimal Classification in Mechanized Reference Retrieval Systems.* New York, American Institute of Physics, 1967. (AID/UDC 5); Freeman, Robert R. and Pauline Atherton. Final *Report of the Research Project for the Evaluation of the UDC as the Indexing Language for a Mechanized Reference Retrieval System.* New York, American Institute of Physics, 1968. (AID/UDC-9). This project developed a *medium* edition of UDC by translating non-English schedules as needed. The results were demonstrated several times in study sessions held in Denmark, after 1968.

5. The Library of Congress Classification describes the holdings of the Library of Congress. It is not the national library in the sense in which one thinks of the Bibliothèque Nationale.

6. Aselson, Robert F. "Microforms: where do they fit?" *Library Resources & Technical Services.* 15(l):57-62, (Winter 1971).

7. For an example, Brazilian readers should look at the three locations for the work of Dietrich von Bern in the PT schedule.

8. Since the original version of this paper was given in 1969, this approach has been adopted in a dissertation and the whole LC system studied quantitatively and to some extent qualitatively. Cf. Immroth, John Phillip. *Analysis of Vocabulary Control in the Library of Congress Classification and Subject Headings.* Littleton, Colorado, Libraries Unlimited, 1971. (Research Studies in Library Science, no. 3).

9. *Ibid.,* p. 109-140, 156-172.

10. Richmond, Phyllis A. "General advantages and disadvantages of using the Library of Congress Classification," *The Use of the Library of Congress Classification. Proceedings of the Institute on the Use of the Library of Congress Classification .... New* York *City, July 7-9, 1966.* Edited by Richard H. Schimmelpfeng and C. Donald Cook. Chicago, American Library Association, 1968. p. 216, 218-219.

11. The following depth classification schemes have been published in *Library Science, with a Slant to Documentation:*

Air vehicle wing production ..	v. 7,	no. 1	1970
Banking	v. 8,	no. 1	1971
Bearing production engineering	v. 1,	no. 3	1964
Book science	v. 1,	no. 1	1964
Drug	v. 1,	no. 3	1964
Economics of human resource	v. 9,	no. 2	1972
Food Technology	v. 7,	no. 3	1970
Fountain pen production	v. 9,	no. 3	1972
Gear production engineering ..	v. 3,	no. 1	1966
Glass production technology ..	v. 4,	no. 3	1967
Human disease	v. 8,	no. 4	1971
Human nervous system	v. 10,	no. 1	1973
International trade	v. 8,	no. 2	1971
Investment	v. 8,	no. 1	1971
Lathe production	v. 8,	no. 3	1971
Medical radiology	v. 2,	no. 2	1905
Motor vehicle production	v. 4,	no. 2	1967
Nut production engineering .. .	v. 1,	no. 2	1964
Production engineering of locomotive	v. 3,	no. 3	1966
Production engineering of reciprocating internal combustion engine	v. 2,	no. 1	1965
Screw production engineering	v. 1,	no. 1	1964
Steam generator production engineering	v. 8,	no. 2	1971
Taxation	v. 8,	no. 2	1971
Transport economics	v. 7,	no. 4	1970

12. *INTREX: Report of a Planning Conference on Information Transfer Experiments, September 3, 1*865. Edited by Carl F. J. Overhage and R. Joyce Harman. Cambridge, Mass., M. I. T. Press, 1965. p. 68.

13. Avram, Henriette and Kay D. Guiles, "Content descriptors for machine-readable records: a working paper," *Journal of Library* Automation, 5(4):211-212, (Dec. 1972).

14. Immroth's system works beautifully with the literature schedules, but so far neither the author nor her students have been able to duplicate his results in other areas.

15. Rotated indexing (Keyword-in-Context KWIC is an example) means indexing a title by each major word in turn. Permuted indexing means permuting each contiguous word set by each term in turn. Example:

    popular health movement
    popular movement, health
    health movement, popular
    health, popular movement
    movement, popular health
    movement, health, popular

    In either case, all words for all titles in the whole document set are then alphabetized. In the version of this paper given at the American Library Association Pre-Conference on Subject Analysis, June 1969, there were only 72 items arrived at by these methods, whereas the present list includes 185 terms, indicating the growth of the subject literature about computers during the interim.

16. For examples, see Maron, M. E., "Automatic indexing" an experimental inquiry." *Journal of the Association* for *Computing Machinery.* 8 (3): 404-417, (April 1961); Williams, J. H. *Results of Classifying Documents with Multiple Discriminant Functions.* Rockville, Maryland, Federal Systems Division, International Business Machines Corp., 1965. This type should not be confused with the experimental varieties of Karen Sparck Jones *(Automatic Keyword Classification.* Hamden, Conn,, Shoe String Press, 1971) and others. The latter kinds attempt the work of the classificationist rather than the classifier, and so far have been used only with very small data bases in homogeneous subject fields.

RESUMO

Classificação enumcrativa considerada cm termos dos dois sistemas mais disponiveis: Decimal de Dewey e Biblioteca do Congresso. Estes são, primeiramente, abordados considerando-se as necessidades das bibliotecas não automatizadas. As possibilidades de utilização de cópias de catalogação legível por máquina são consideradas. £ levantada a hipótese do computador possibilitar a revisão contínua das tabelas de ambos os sistemas de classificação, com mudanças radicais, quando necessário, mais rapidamente e com menos problemas do que no período pré-automático. Os aspectos da catalogação detalhada, indexação exaustiva e alguns tipos de indexação automática não devem ser encarados sob o ponto de vista da adoção de urn ou outro sistema, mas sim da utiliza§ao de ambos, ao mesmo tempo, através de classes descritivas, indices de classes combinados com cabeçalhos de assunto. Indices em cadeia, rotados e permutados deveriam ser, ainda, acrescentados para facilitar ao usuário um número máximo de pontos de acesso a informação. Ênfase à total e potencial exploração (recuperação) do conteiido do livro e de outros materiais catalogados.