Use of the LCSH System: Realities

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Abstract

This study examines the question of whether academic libraries keep up with changes in the Library of Congress subject heading system. An analysis of the handling of 15 subject headings in 50 academic library catalogs available online through the Internet found that libraries are not consistently maintaining subject authority control, or making syndetic references and scope notes in their catalogs. The data are discussed from the perspectives of the libraries' performance, performance on the headings overall, performance on references, performance on the type of change made to the headings, and performance within three widely used online catalog systems. The implications of the findings are discussed in relationship to recent expressions of dissatisfaction with the effectiveness of subject cataloging.

Introduction

A recent announcement on the Cooperative Cataloging Discussion Group (COOPCAT) listserv indicates that subject cataloging practice is under fire-again. The announcement promotes an ALCTS/CCC Subject Analysis Committee program designed to

> address the fact that in the profession at large there is an erosion of confidence in subject cataloging as a cost effective endeavor. This perception is so widespread that those of us who are committed to subject access need to ask ourselves where the failure lies. (ALCTS/CCC Subject Analysis Committee program announcement, 1995)

Obviously, there are many factors contributing to the current concern; criticism for subject cataloging in this country has a long history. What seems different in this announcement is the underlying perception that the subject cataloging effort itself may not be worthwhile, that subject cataloging is not accomplishing what it is designed to do-namely, to help users find individual items on a given topic and to find gathered together all the items on a desired topic.

One potential cause for failure is the process by which libraries provide subject access. As libraries accept without review Library of Congress (LC) cataloging copy for individual items, the question arises whether libraries are performing the authority control and syndetic reference structure that is integral to the system of LC subject headings. The system is greater than the list of headings: it also includes authority control and syndetic structure. Cooperative cataloging efforts provide subject headings for individual items, but updating old headings, providing the structural elements to link terms and show relationships among (LC) established headings are not services that can be obtained in prepackaged form. Building a structure for a catalog is dependent upon the

collection(s) represented by the catalog.

There is little doubt that American libraries use the *Library of Congress Subject Headings* list (LCSH) extensively as a source of subject headings. It is unclear, however, how extensively or consistently they use the LC subject heading *system* and whether they maintain the system. The inconsistencies that would appear from the lack of maintaining the system could partially explain why users (including librarians) are skeptical about the effectiveness of subject cataloging. If the user misses helpful items because they are listed under several synonyms, or if the user is directed to headings not representing material in the collection, then subject cataloging loses effectiveness. Subject cataloging is expensive; subject cataloging done poorly is very expensive. This article examines the question of whether academic libraries keep up with the changes made by the LC in the LC subject heading system.

Background

Libraries have had guidelines for providing a description of library materials for their catalogs for many years. However, not since Cutter's inclusion of rules for subjects in his *Rules for a Dictionary Catalog* (1904), has subject access been a part of an American cataloging code. Other objectives have been suggested (for example, Shera and Egan (1956)), but none have become universally accepted and none have been developed into a practical code. "We have no consensus on the major objectives of a subject catalog, we cannot define subject . . . and we cannot explain the intellectual analysis that determines the subject heading for a cataloged work" (Reynolds 1989, 223). This lack of objectives is fertile ground for the growth of conflicting expectations. Without objectives it is difficult for catalogers to provide predictable subject access. Without objectives it is difficult for users to know what to expect when searching the catalog.

Due to the central role that the LC plays in national and international cooperative efforts, and due to the lack of any other universally developed and accepted standard, the policies of the LC have become the operating standard for most of the libraries in the United States. In fact, the primary source for subject headings in this country is the *Library of Congress Subject Headings* list. Despite its widespread use, however, the LCSH list has been extensively criticized during the eighty-plus years of its existence (Kirkland and Cochrane 1982). Terminology has long been a major concern. Criticism has centered on the inability of the system to keep current, especially in rapidly evolving fields of knowledge. Another criticism has been the structure and grammar of the list itself.

The syndetic reference structure of the LCSH system consists of *see* references from terms not used, to headings that are used, and *see also* references from broader terms to narrower terms, or between any two headings that are related other than hierarchically. LCSH cross references have been shown to be inconsistent, incomplete (Harris 1970), outdated, infrequent (Bates 1977) and not well structured in terms of hierarchical relationships (Sinkankas 1972). Scope notes defining the context in which a heading is used, often in relationship to another heading, could provide another valuable form of linkage. But in a study of librarian users of online catalogs, Connell (1991) found that even though syndetic aids and scope notes proved useful, they were often missing. Librarians in Connell's study actively sought *see* references and several said they wished they could find a scope note in LCSH (233). Bates' (1986) proposal of the "Side-of-the-barn" principle recommends making more references. "In a properly designed system, to get into the system and to get going searching effectively, the searcher need only hit the side of a barn, i.e., any reasonable English language word or phrase should get the searcher started

and linked to explanatory guiding information to assist in the search" (365).

Hoping for more references may be wishful thinking. Since the early 1980s, LC has responded to the criticisms of slowness: "From 5,000 to 7,000 headings, including headings with subdivisions, are added to LCSH each year" (Library of Congress, Subject Cataloging Division, 1994, vii). With this rate of change it is doubtful whether libraries are even keeping up with LC, especially in light of current reductions in cataloging staff. Palmer (1986) examined the issue of whether libraries keep up. In a small scale study of subject cataloging practices in the card catalogs of libraries in Erie County NY, he found that

> ... only the largest libraries were able to provide any kind of subject authority control. Furthermore, not even the largest libraries were able to provide the "See Also" references upon which the Library of Congress assignment of subject headings is based. Changes in LCSH headings resulted in great contusion and a dispersal of resources in the smaller libraries. (71)

Palmer wondered whether this situation is typical. Now, nearly ten years later, the Internet had made the catalogs of many libraries available online, enabling a much wider examination of the question: Do libraries keep up with the changes in the Library of Congress subject headings? Data were gathered on the use of fifteen LC subject headings by fifty libraries whose catalogs are available on the Internet. Specific questions are investigated are:

- *Do libraries use new headings proposed?*
  - Do libraries change the old headings assigned to materials and represented on bibliographic records when headings change, or do they use both old and new?
  - Are they more likely to make certain kinds of changes than others? For example, are libraries more likely to update headings that change from an inversion to direct order, than they are to change headings that are a change in word form?
- *Do libraries make the see from and see also from references proposed?*
  - Are they more likely to make see from references for headings that have changed than they are to make see from references for new headings?
  - Are libraries more likely to make the *see also from* references from broader terms (BT) to narrower terms (NT) than the *see also from* references between related terms (RTs)?
- *If the catalog has a term file, does it match what is in the bibliographic file?*
  - Are all the headings in the term file assigned to records in the bibliographic file? A term file is a file consisting of the form of subject headings which have been used in the catalog, and/or which have been established for use. The bibliographic file consists of the bibliographic records representing materials cataloged by the library.
- *How frequently do libraries make "blind" references?*
  - Is a see from or a see also from reference to a heading that is not assigned to any materials represented in the library's catalog?
- *Do libraries include scope notes explaining the conditions and context in which subject headings are assigned?*
- *Do different automated systems seem to make a difference in how well libraries perform*

authority control?

Methodology

Fifteen headings were chosen from Cataloging Service Bulletins 49-52 (Summer 1990-Spring 1991). Headings were chosen to provide a variety of subject heading changes: change from an inverted heading to a direct heading, change in choice of term, change in word form, change in grammar, change from a heading that is subdivided chronologically by imprint date to the same heading without chronological subdivision. One newly introduced subject heading was also included. An effort was made to choose broad headings, and common topics in order to increase the potential that the headings would be widely used by the libraries in the sample. Data were gathered spring and summer of 1993, giving libraries 2 years to make changes made by LC. See Appendix 1 for a listing of subject headings and accompanying references used in the study.

Each heading was searched in the Library of Congress subject authority file on OCLC to determine scope notes (360 and 680 fields), *see from* references (4xx fields) and *see also from* references (5xx fields) used by LC. For the *see from* references it was also recorded whether the reference was formerly the established heading. For the *see also from* references the relationship to the established heading, whether the reference is a broader term (BT) or a related term (RT), was recorded.

A random sample of 50 institutions was chosen from the 277 college and university libraries in the Hytelnet international listing of libraries available online through the Internet in mid-June, 1993. Each heading was then searched in the fifty library catalogs and information about its use, its listing in a separate term file, the scope notes made, the see from references made, and the *see also from* references made were recorded. If it could be identified, the online system used by each library was also noted.

Values were then assigned to the use of the established heading, the 4xx headings and the 5xx headings. The value range was 1-5 with 1 being the best and 5 being the worst. Specific definitions of the values assigned are:

1. *No errors in terminology or syndetic reference structure*
2. *Old headings used, syndetic structure complete and consistent; or, see references made to related headings in catalog when 1xx heading not used.*
   • A value of 2 was assigned when a library still used the old heading and provided a complete set of references from the new to the old. Value 2 was also assigned when a library indicated that it did not use the established heading and then made a reference to a related term. For example, one library did not use the heading Human geography but referred the user to the two broader headings, Anthropology and Geography which were used by the library.
3. *Term file does not reflect headings used in catalog*
   • A value of 3 represents libraries that have loaded Library of Congress authority files but have not edited the file to reflect their own library's holdings. This results in listing established headings that are not used by the local library.
4. *Reference structure lacking; or, references made to headings not used in catalog*
5. *Old and new headings used; or, old headings used and references from old headings to new headings made*

For examples of values assigned to 1xx, 4xx, and 5xx headings see Appendix 2. The data were then entered into a PC based SAS file and analyzed.

All results (unless otherwise specified) are based on the number of libraries that used each established heading (Table 1). Libraries that did not assign the heading to any materials in their catalog but included references to or from the heading in either the bibliographic file or the term file were considered to have used the heading. For example, the number and percentage of libraries that scored a value of 1 for the heading Human geography is based on the 46 libraries that had materials with that heading assigned. The four libraries that did not use the heading also did not list the heading in their term file. Had any of the four libraries referred to the heading in their term file, that library would have a value calculated for its use of the established heading in relationship to its use of references. By using this method of calculating the values, the number of libraries having a value of 1 is not inflated by libraries that did not use the heading in any context.

Two terms need definition to distinguish their use in this article. An authority file is a file of the established form of subject headings used in the catalog. The record for each established subject heading may include notes about the use of the heading (scope notes), citations to authorities consulted in determination of the heading, and *see from* and *see also from* references made to the heading. In this article authority file refers only to the Library of Congress' subject authority file loaded onto the OCLC.

Table 1. Number of Libraries Assigning Each of the Established Headings to Materials Represented in the Catalog

ESTABLISHED HEADING	LIBRARIES (50 total)	
	Number	Percent
1 Human geography	46	92
2 Historical geography	47	94
3 Medical bacteriology	39	78
4 Jewish scientists	24	48
5 Adjustable rate mortgage	28	56
6 Plant varieties	32	64
7 Finland--Antiquities	31	62
8 Education, Secondary	48	96
9 Islam--Customs and practices	33	66
10 Revolutionaries	47	94
11 Desert plants	41	82
12 Molecular evolution	42	84
13 Stadiums	33	66
14 Sunspots	37	74
15 Adult learning	41	82

A term file is an automated file consisting of the form of the subject headings which have been used in the catalog, or which have been established for use. The term file differs from an authority file in that it may have headings used but not established; or, it may have headings not assigned to materials in the local catalog. Term file will be used for all lists of headings of the individual catalogs even if a true authority file exists.

Results and Discussion
Performance by Libraries

Overview

Libraries performed well in their use of established headings. Most scored high (values 1 or 2) for over 90% of the headings they used. Libraries did not perform as well in their use of cross references. Slightly less than half of the libraries scored high for 90% of their applicable *see also from* references; only four scored high for 90% of their use of *see from* references. In almost every instance, libraries listing subject headings in their term file indicated whether the library had any materials with that heading assigned.

Detail

Table 1 shows the number of libraries that assigned each of the established headings to materials in their collection. No subject heading was assigned by all 50 libraries; however overall, the headings were widely used. Fourteen of the subject headings were assigned to materials by at least half of the libraries. Looking at assignment of the headings by individual libraries, 17 libraries assigned 14-15 (93-100%) of the established headings; twenty-eight of the libraries assigned at least 12 (80-100%).

Libraries performed well in their use of the established headings. Forty-one of the 50 libraries scored high (values of 1 or 2) for over 90% of the established headings that they used (Table 2), and 44 scored high for 80% or more of the headings that they used. In contrast, only 4 libraries scored high for their handling of 90% or more of the *see from* references (4xx fields) prescribed, and only 14 (28%) scored high for 80% or more of the *see from* references prescribed. Stated in other words, over twenty percent of the libraries in this sample are not routinely making *see from* references; or, they are assigning both the established form and the *see from* form(s) as subject headings to materials in their collection.

Table 2. Number of Libraries Scoring High* for 90% of the Established Headings and Corresponding References Used

Type of Heading	Libraries	
	Number (50 total)	Percent
1xx Established heading	41	82
4xx See from	4	8
5xx See also from	23	46
* High is defined as values 1 or 2		

Libraries performed a little better in using *see also from* references (5xx fields) than they did in using *see* from references, but still fewer than half (23) the libraries scored high for 90% or more of the headings they used, and only 31 (62%) scored high for 80% or more of the headings they used.

One result of this study is the low occurrence of established headings listed in term files without corresponding assignment in the bibliographic file. If libraries load LC subject authority tapes, yet fail to edit them to reflect local use, one would find many instances of the term file not reflecting usage in the bibliographic file. It is encouraging that there were only 6 instances of libraries listing an established heading without indicating nonuse in the local catalog. This is less than 1% of the potential (6/750). Overall, non-match between the term file and the bibliographic file for established headings and references occurred only 2% of the time.

Performance on Headings and References

Overview

The use of established headings (93.8%) scored high which means that out of the 609 uses of the established headings by all libraries, 571 (93.8%) of the uses received scores of 1 or 2 for the way that they were handled (Table 3). The uses of *see from* references scored high (56.57%) (Table 4), and 79.2% of the uses of *see also from* references scored high (Table 5). Further examining the data for use of cross references shows that 41.5% of the *see from* references were lacking, or were blind references, or were used as headings simultaneously with the use of the established heading. The uses of *see also from* references were handled poorly 16.9% of the time. Most low scores for both types of references were due to either lack of reference structure entirely, or to the use of old and new headings simultaneously. Blind references were used infrequently.

Table 3. Frequency Distribution of Scores for Established Heading (1xx) Use

Value[1]	Frequency	Percent
1	537	88.2
2	34	5.6
3	6	1.0
5	32	5.3
TOTALS	609	100.1[2]

[1]Highest = 1; lowest = 5
[2]Total slightly above 100% due to rounding

Table 4. Frequency Distribution of Scores for See From References (4xx) Used with Established Headings (1xx)

Value[1]	Frequency	Percent
1	725	52.7
2	53	3.8
3	28	2.0
4	279	20.3
5	292	21.2
TOTALS	1377	100.0

[1]Highest = 1; lowest = 5

Table 5. Frequency Distribution of Scores for *See Also From* References (5xx) Used with Established Headings (1xx)

Value[1]	Frequency	Percent
1	814	74.1
2	56	5.1
3	42	3.8
4	108	9.8
5	78	7.1
TOTALS	1098	99.9[2]

[1]Highest = 1; lowest = 5
[2]Total slightly below 100% due to rounding

Detail

Of the 750 potential uses of the established headings (15 headings x 50 libraries), 609 (81.2%) occurred. Use of established headings is defined to include use in references and/or the term file even if the subject heading was not assigned to materials in the individual library's collection. Examples of such use include using the old heading instead of the new (and making a *see from* reference from the new to the old), and listing the established heading in the term file but not assigning it to any materials in the collection including these kinds of uses results in a higher figure than the 569 instances of subject heading assignment represented in Table 1.

The uses of established headings received scores of 1 or 2 93.8% of the time; only 5.3% received a score of 5 (the lowest possible) (see Table 3). Not unexpectedly, the values scored for the implementation of *see from* references are much lower than for the use of the established headings themselves. There are 1377 prescribed *see from* references for the established headings used. Only 56.2% of the uses scored high, while most of the remainder (41.5%) scored low (Table 4). Better performance occurred in the uses of the *see also from* references prescribed. Seventy-nine point two percent of the uses scored high; 16.9% scored low (Table 5)

Most of the low scores for the use of references come from three situations: from the lack of reference structure, from assigning both old and new headings to materials in the collection, and/or from using both old and new headings in references. The average use of blind references (a reference which guides the user to a subject heading not used in the catalog) for *see from* and *see also from* references combined was only 9% of the potential blind references that could be made. There were 36 blind *see from* references made out of a possible 400, and 19 blind *see also from* references made out of a possible 239. Two subject headings, Human geography and Molecular evolution, seemed to be the most difficult for libraries in terms of avoiding blind references. Approximately a third of the references prescribed for these two headings were made blind (35% and 31% respectively).

The continued use of old headings, and the use of old and new headings simultaneously is alarmingly high. Considering only headings with earlier forms set forth in the authority file, there were 614 potential uses of these headings. Only in 315 (51.3%) instances of use were the new

headings used exclusively. In 240 instances (39.1%) libraries used both the old and the new heading. In 59 instances (9.6%) the old heading was used instead of the new.[1] One library, as a compromise to changing individual records, changed how the search request is processed and provided a note for users indicating that records with the old heading assigned would be grouped under the new heading. Searching either term retrieves the same group of records regardless of the heading assigned to individual items. The following is an example of this type of note: Chemical evolution [earlier heading] retrieves Molecular evolution.

Initially, it was thought that libraries might be more likely to make *see from* references from forms used as earlier headings than from variances not formerly used. Depending on the work flow, librarians may notice changes in terminology in the processing of an item with a new form of subject heading assigned. It is also obvious that users accustomed to the old form of heading may need guidance to the new form. These two conditions might lead libraries to choose making references from earlier forms rather than from other variances, if resources limit the number of references the library can make. However, the data show little difference between how libraries handled earlier forms and forms never established. In fact, for established headings that had 4xx references representing both earlier forms and forms never established, libraries generally made see from references more frequently from the never established forms. For only two headings did libraries make the reference from the earlier form more frequently. *See from* references were made from the earlier form for Adjustable rate mortgage 61% of the time, and from the never established forms 56% of the time. For Molecular evolution, libraries made the references from the earlier forms 80% of the time, and from the never established forms 67% of the time. Overall, *see from* references from earlier headings were made 62% (286/461) of the time, and *see from* references from forms never established 70% (432/620) of the time.

Performance by Type of Change

Overview

Performance was evaluated for the different types of changes in the 15 established headings. Changes represented include changes in word order, grammar, and terminology. There was very little difference in the percentage of uses where libraries used the new heading exclusively. There was greater variation in the percentage of use of the old and the new heading for each type of change. Libraries (52.1%) continued to use both old and new forms when the change was the elimination of publication date as a subdivision. Because this is a minor change, this result is neither surprising nor disturbing. However, the indication that libraries are using both old and new forms of headings for 39.1% of all types of changes is a cause for concern.

Detail

Whether libraries make some kinds of changes more frequently than others was examined in order to see if libraries made changes selectively, spending more time on changes that would most affect retrieval. Changes from an inverted heading to a direct heading, hereafter referred to as inversion; changes in choice of term; changes in word form; changes in grammar; and a change in subdivision practice (dropping the publication date as a subdivision), hereafter called publication date, were the kinds of changes examined. It is possible for one subject heading to represent more

than one kind of change. For example, the heading Jewish scientists has in the past been established as Scientists, Jewish (an inversion), and as Jews as scientists (a change in grammar). One heading, Adult learning, represents no change because it is new.

Of the fifteen established headings five are inversions: Historical geography (from Geography, Historical), Medical bacteriology (from Bacteriology, Medical), Jewish scientists (from Scientists, Jewish), Adjustable rate mortgages (from Mortgage loans, Variable rate), and Plant varieties (from Plants, Cultivated-Varieties). Four are choice of term changes: Human geography (from Anthropogeography); Islam-Customs and practices (from Islamic religious practice, and from Sharia); Desert plants (from Desert flora); and Molecular evolution (from Biochemical evolution). Three are changes in word form: Revolutionaries (from Revolutionists); Stadiums (from Stadia); and Sunspots (from Sun-spots). One heading, Jewish scientists, represents a change in grammar (from Jews as scientists); and, one heading, Education Secondary, is an example of dropping the publication date as a subdivision.

With the exception of changes in grammar, there is little difference in the percentage of use of only the new form of heading for each type of change; new term only use ranged between 47.9 and 59.0% (Table 6). For those libraries that used the heading Jewish scientists, exclusive assignment of the new term was only accomplished 12.5% of the time. In other words, libraries using this heading used both the old (Jews as scientists) and the new (Jewish scientists) 87.5% of the time. The use of old and new headings for this concept is very high. However, since this established heading was the least used by the libraries (24 libraries out of 50) of all the headings, its use may not be indicative of how this type of change is handled by libraries.

The use of old and new headings for other types of changes ranged between 26.0% and 52.1%. Excepting changes in grammar, discussed above, the highest percentage of double use among the types of changes occurred with the change caused by the drop of publication date.

Table 6. Frequency Distribution of Methods tor Handling Different Types of Subject Heading Changes

	Uses of New Form Only		Uses of Old Form Only		Uses of Old & New Form		Totals (for types)
	No.	%	No.	%	No.	%	
Inversion	118	59.0	30	15.0	52	26.0	200
Choice of term	104	48.6	18	8.4	92	43.0	214
Word form	67	52.3	11	8.6	50	39.1	128
Grammar	3	12.5	0	0.0	21	87.5	24
Publication date	23	47.9	0	0.0	25	52.1	48
TOTALS (methods)	315	51.3	59	9.6	240	39.1	614

Using both forms of heading for this change is two times the percentage for using both forms for inversions (52.1% and26% respectively). This is not surprising. For many systems, dropping the publication date as a subdivision may be aesthetically pleasing but may do little to improve retrieval records; however, systems that allow searching on fixed fields will continue to enable the user to limit by publication date. Leaving the publication date subdivision in either type of system does little harm, especially when weighed against the results of not making more substantial types of changes. When eliminating data from changes in grammar and publication date from consideration, the use of old and new headings for the other types of changes averages 35.8% (194/542). This figure is a slight improvement over the 39.1% cited above for all the changes, but not much. It still means that libraries are presenting confusing information more than a third of the time.

Performance on Syndetic References and Scope Notes

Overview

Of the applicable see also references, 53% were made from the broader terms to the established headings. Of the applicable see also references, 67% were made between related terms. Only one library made all the BT-NT references for the headings it used. However, 28 libraries made all the RT-RT references for the headings they used. Only 26% of the potential scope notes were made.

Detail

The data provide frequencies with which libraries make *see also from* references from broader terms (BT) to narrower terms (NT), and between related terms (RT). Hereinafter, these types of references will be distinguished as hierarchical and lateral respectively. Of the two types, hierarchical references are by far the most frequently recommended on authority records. Twelve established headings involved hierarchical references (685 potential uses) while only 3 headings involved lateral references (141 potential uses). Overall, 53% of the potential hierarchical references were made and 67% of the lateral references were made. Only one library made all the hierarchical references recommended for the headings it used; 12 libraries made 80% or more of the recommended hierarchical references; In contrast, 28 libraries made all the lateral references recommended for the headings they used. For each type of *see also from* reference (hierarchical and lateral) there were nine libraries that did not make that type of reference. Six libraries made neither type at all.

Two other types of reference that are useful to users are the complex see also reference (360 field) and the general note (680 field). One of the 15 headings, Historical geography, has a 680 note in the LC authority record; five headings (Medical bacteriology, Plant varieties, Finland-Antiquities, Education, Secondary, Molecular evolution) have 360 notes in the LC authority record. For one additional heading, Human geography, five libraries provide an explanatory note about its use even though no note was listed in the LC authority record. For the remainder of this article, these notes will be collectively referred to as scope notes because all give information about the use of the heading. Only 26% of the potential scope notes were made. This figure excludes the "extra" notes made by five libraries for the heading, Human geography. Considering how helpful scope notes can be, it is unfortunate that so few are used.

Performance by System

Overview

DRA, INNOPAC, and NOTIS, were the systems most used by the libraries in this sample. The largest institutions tended to use NOTIS; the smallest DRA. Overall, INNOPAC institutions scored highest for the established headings and references used. In addition, as a group INNOPAC users scored consistently higher than the mean score for all 50 catalogs in the study. The greatest difference is in the scores for use of see also references. INNOPAC users scored high 73.6% of the time, which is 17.1 percentage points higher than the mean high scores for all libraries (56.5%). The scores for NOTIS and DRA user groups are much closer to the mean, in all instances. For established headings, all three groups scored high greater than 90% of the time. For both types of references, performance scores were much lower. In addition, scope notes were seldom used.

Detail

Seventy percent of libraries used three systems: DRA, INNOPAC, and NOTIS. In fact, these were the only three systems used by more than 2 libraries in the sample: 7 libraries (14%) used DRA, 13 libraries (26%) used INNOPAC, and 14 libraries (28%) used NOTIS. Examining some of the characteristics of the 34 institutions using these systems, DRA tended to be used by the smallest institutions, as determined by numbers of students enrolled (Table 7). Nearly 86% of DRA institutions have student populations below 5000. Another indication of size is the level of degrees offered.

Table 7. Number of Libraries Using Three Systems Grouped by Student Population of Institution

SYSTEM	Under 5,000 (%)	5,000- 9,999 (%)	10,000- 14,999 (%)	15,000- 19,999 (%)	20,000- 24,999 (%)	25,000- 29,999 (%)	Above 30,000 (%)
DRA total = 7	6 (85.7)				1 (14.3)		
INNOPAC total = 13	9 (69.2)	1 (7.7)	2 (15.4)				1 (7.7)
NOTIS total = 14	1 (7.1)	3 (21.4)	3 (21.4)	3 (21.4)	2 (14.3)		2 (14.3)

Three of the 7 DRA institutions offer only undergraduate degrees. Only one institution offers a doctorate.

The majority (69.2%) of INNOPAC institutions also have student populations under 5000, but four INNOPAC institutions (30.8%) have more than 5,000 students including one institution whose student body numbers above 30,000. Four INNOPAC institutions offer only undergraduate degrees and 9 offer post-Bachelor degrees, 6 institutions offer degrees at the doctoral level. NOTIS was used by the greatest number of the largest institutions in the group. Only 1 (7.1%) NOTIS institution has a student body of less than 5000, and half the institutions have a student body of above 15,000. Two have student bodies of more than 35,000. All NOTIS institutions offer degrees at the doctoral level.

As would be expected of smaller institutions, DRA users tended to use fewer of the 15 headings than the NOTIS users. Two DRA users used only 3 (2%) of the headings; the remainder of DRA users used between 6-13 headings (40-87%). No DRA users used all headings. In contrast, the fewest number of headings used by a NOTIS user was 8 (53.3%); all other uses ranged between 12-15 (80-100%) with 5 users using all 15 headings. (There were only 9 libraries in the sample that used all 15 headings.) The bulk of INNOPAC users (7 out of 13) used 9-10 headings (60-69%). One INNOPAC user used all 15 headings.

Another way of comparing the usage differences of established headings among libraries using each system is to look at the number of instances in which headings were used in relationship to potential use. For DRA libraries, there were 64 instances of established heading use out of a possible 104 (61.5%). INNOPAC libraries used established headings 152 times out of a potential of 195 times (77.9%). NOTIS libraries used established headings 197 out of 210 possible times (93.8%).

The performance scores of INNOPAC users are higher than the scores for DRA and NOTIS users. Overall, INNOPAC users scored high for 84.5% of all established headings, *see from* and *see also from* references that they used. NOTIS users scored high for 72% of all headings and references used; and, DRA users scored high for 65.4%. Tables 8, 9, and 10 show the frequencies of scores by system for established headings used, *see from* references used, and *see also from* references used, respectively.

All groups of the three systems users scored high for their use of established headings (Table 8). However, all scored low for their use of *see from* references (Table 9). INNOPAC users had best uses scoring high. If one accepts the premise that *see from* references are important to lead users to controlled vocabulary (that is, in the sense of Bates' "Side-of-the-barn principle) then it is fair to say that none of these groups performed particularly well.

All three groups were more likely to make *see also from* references (Table 10). INNOPAC users performed best, scoring high 90.8% of the time, 17.2% better than for their performance on *see* from references.

Table 8. Frequency of Scores for Established Headings (1xx) Used Grouped by System

System	Values 1 & 2 (%)	Value 3 (%)	Value 5 (%)	Total 1 xx Use!
DRA	58 (90.6)	1 (1.6)	5 (7.8)	64
INNOPAC	147 (96.7)	0 (0.0)	5 (3.3)	152
NOTIS	182 (92.4)	0 (0.0)	15 (7.6)	197

Table 9. Frequency of Scores for See From References (4xx) Used Grouped by System

System	Values 1 & 2 (%)	Value 3 (%)	Values 4 & 5 (%)	Total 4xx Used
DRA	80 (50.0)	3 (1.9)	77 (48.1)	160
INNOPAC	242 (73.6)	5 (1.5)	82 (24.9)	329
NOTIS	254 (57.3)	5 (1.1)	184 (41.5)	443

Table 10. Frequency of Scores for *See Also From* References (5xx) Used Grouped by System

System	Values 1 & 2 (%)	Value 3 (%)	Values 4 & 5 (%)	Total 5xx Used
DRA	104 (71.2)	11 (7.5)	31 (21.2)	146
INNOPAC	256 (90.8)	6 (2.1)	20 (7.1)	282
NOTIS	254 (79.9)	4 (1.3)	60 (18.9)	318

NOTIS users scored high 22.6% more frequently for *see also from* references than for *see from* references; DRA users scored high 21.2% more frequently. Despite DRA users' better overall performance for making applicable *see also from* references than for making *see from references*, DRA users performed less well in terms of avoiding blind *see also from* references. DRA users made more blind references than any other group.

Here again, even though performance (i.e., scoring high) was better for *see also from* references than for *see from* references, the question arises whether performance can be considered good if for the best performance, users are not led to narrower or related terms for nearly 1 out of 10 headings.

As previously noted, only 26% of the potential scope notes were made by all libraries. DRA users provided 18.6% of all scope notes made; NOTIS users 71.2% of all scope notes made. No INNOPAC libraries made any scope notes. This may be a weakness in software design.

CONCLUSIONS

This study examined the question of whether academic libraries keep up with the changes made by LC in the Library of Congress subject heading system. The results are disappointing. Academic libraries on the Internet are not maintaining their catalogs well. However, libraries today are in a dilemma. They do not have the resources to keep up with changes. Subject heading system maintenance is very labor intensive. *See also from* references, for example, involve determining not only that the established heading is used but also whether the headings that are related are used (alone or with subdivision). This kind of information is not available in the normal processing of a single item. For catalogs representing the holdings of libraries located over a large geographical area, the task is even more difficult. Every change is not applicable for all the libraries, so centralized maintenance is difficult. On the other hand, not keeping up with changes results in a confusing tool for users. It means that users may find materials on the same subject under different headings, may be provided blind leads to headings not assigned, may be sent in a circular chase for information when references are provided to both old and new headings, and may not find an explanation on how a heading is used in a particular context.

A well designed catalog is expensive, but so is an ineffective one. The difference is that the cost is shifted to the user. Unfortunately, users' costs are frequently invisible to those making budgetary decisions. Subject heading maintenance does not have the same obvious urgency as a patron waiting for help at the reference desk, or as an expired software license, or even as a rush book order. Monetary value is difficult to assign to non-direct services such as those that a well designed catalog provides.

Why is the confidence in subject cataloging eroding? Although certainly not the whole picture part of the reason may be that users are frequently mislead and confused by poorly maintained catalogs. It is not difficult to conclude that money for cataloging is not very well spent if the result in ineffective.

Note

1. These data for types of uses (i.e., uses of new forms of heading only, uses of old form only, and uses of old and new form) are shown in Table 6 in relationship to types of subject heading changes.

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Appendix 1

Established Headings (1 xx) Used in Study with Accompanying 360,4xx, 5xx and 680 Fields

1. 150   **Human geography**
   450   Anthropo-geography [EARLIER ESTABLISHED FORM]
   450   Anthropogeography
   450   Cultural geography
   450   Geographical distribution of man
   450   Social geography
   550   Anthropology [BROADER TERM]
   550   Geography [BROADER TERM]
   550   Human ecology

2. 150   **Historical geography**
   360   ‡i subdivision ‡i a Historical geography ‡i under names of countries, cities, etc.
   450   Geography, Historical [EARLIER ESTABLISHED FORM]
   550   Geography [BROADER TERM]
   680   ‡i Here are entered works which take a historical approach to geography of countries, regions, etc., at a particular period in the past. Works on the branch of geography that deals with human governments, the boundaries and subdivisions of political units and situation of cities are entered under ‡a Political geography.

3. 150   **Medical bacteriology**
   360   ‡i subdivision ‡a Microbiology ‡i under individual organs and regions of the body and under individual diseases, e.g. ‡a Heart–Microbiology; Foot–Microbiology; Tuberculosis–Microbiology.
   450   Bacteriology, Medical [EARLIER ESTABLISHED FORM]
   550   Bacteriology [BROADER TERM]
   550   Medical microbiology [BROADER TERM]
   550   Bacterial diseases
   550   Pathogenic bacteria

4. 150   **Jewish scientists**
   450   Jews as scientists [EARLIER ESTABLISHED FORM]
   450   Scientists, Jewish [EARLIER ESTABLISHED FORM]
   550   Scientists [BROADER TERM]

5. 150   **Adjustable rate mortgages**
   450   Mortgage loans, Variable rate [EARLIER ESTABLISHED FORM]
   450   Graduated payment mortgage loans
   450   Renegotiable rate mortgage loans
   450   Variable rate mortgage loans
   550   Mortgage loans [broader term]
   550   Variable rate loans [broader term]

Appendix 1 (continued)

6. **150   Plant varieties**
   360   ‡i subdivision ‡a Varieties ‡i under individual plants and groups of plants,
         e.g. ‡a Corn–Varieties
   450   Plants, Cultivated–Varieties [earlier heading]
   450   Crops–Varieties
   450   Cultivars
   450   Plants–Varieties
   450   Varieties, Plant
   550   Plants [BROADER TERM]

7. **151   Finland–Antiquities**
   No 4xx or 5xx fields; however, heading changed from:
         Antiquities–Finland

8. **150   Education, Secondary**
   360   ‡i subdivision ‡a Education (Secondary) ‡i under special classes of people,
         e.g. ‡i Minorities–Education (Secondary); ‡i also subdivision ‡a Study and
         teaching (Secondary) ‡i under special subjects, e.g. ‡a Science–Study and
         teaching (Secondary)
   450   High school education
   450   Secondary education
   450   Secondary schools
   550   High schools
   Heading changed from
   Education, Secondary–[date]

9. **150   Islam–Customs and practices**
   450   Islamic religious practice [EARLIER ESTABLISHED FORM]
   450   Sharia (Islamic religious practice) [EARLIER ESTABLISHED FORM]

10. **150   Revolutionaries**
   450   Revolutionists [EARLIER ESTABLISHED FORM]
   550   Dissenters [BROADER TERM]
   550   Counterrevolutionaries

11. **150   Desert plants**
   450   Desert flora [EARLIER ESTABLISHED FORM]
   550   Arid regions plants [BROADER TERM]

12. **150   Molecular evolution**
   360   ‡i subdivision ‡a Evolution ‡under individual biochemicals and groups of
         biochemicals, e.g. ‡a Insulin–Evolution
   450   Chemical evolution [EARLIER ESTABLISHED FORM]
   450   Biochemical evolution
   550   Evolution [BROADER TERM]
   550   Life–Origin [BROADER TERM]
   550   Molecular biology [BROADER TERM]

Appendix 1 (continued)

13.150 **Stadiums**
   450 Stadia [EARLIER ESTABLISHED FORM]
   550 Sports facilities [BROADER TERM]
14.150 **Sunspots**
   150 Sun-spots [EARLIER ESTABLISHED FORM]
   550 Solar activity [BROADER TERM]
   550 Starspots [BROADER TERM]
15.150 **Adult learning**
   450 Andragogical learning
   450 Self-directed learning
   550 Learning [BROADER TERM]

Appendix 2

Examples of Values Defined for Use of 1xx, 4xx, and 5xx Headings

Examples of Values for Established Headings (1 xx fields)

1xx assigned	1xx in term file	Value
Y	Y	1
N	Y[1]	2
N	Y	3
Y[2]	Y	5[3]

[1]Used older form—provided reference from new form to old form
[2]Used both old and new heading
[3]By definition, established headings are not assigned a value of 4

Examples of Values for *See From* Headings (4xx fields)

1xx assigned	1xx in term file	4xx assigned	4xx ref made	Value
Y	Y	N	Y	1
N	Y[1]	Y	N	2
Y	N	N	Y	3
Y	Y	N	N	4
Y	Y	Y	N	5

[1]Used older form—provided reference from new form to old form

Examples of Values for *See also* Headings (5xx)

1xx assigned	1xx in term file	5xx assigned	5xx ref made	Value
Y	Y	Y	Y	1
N	N	Y	Y[1]	2
Y	N	Y	Y	3
N	Y	Y	Y	4
Y	Y	Y	Y[2]	5

[1]Reference made to form used
[2]Reference also made to older form