Library of Congress Classification Numbers

Issues of Consistency and Their Implications for Union Catalogs

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This study examined Library of Congress Classification (LCC)–based class numbers assigned to a representative sample of 200 titles in 52 American library systems to determine the level of consistency within and across those systems. The results showed that under the condition that a library system has a title, the probability of that title having the same LCC-based class number across library systems is greater than 85 percent. An examination of 121 titles displaying variations in class numbers among library systems showed certain titles (for example, multi-foci titles, titles in series, bibliographies, and fiction) lend themselves to alternate class numbers. Others were assigned variant numbers either due to latitude in the schedules or for reasons that cannot be pinpointed. With increasing dependence on copy cataloging, the size of such variations may continue to decrease. As the preferred class number with its alternates represents a title more fully than just the preferred class number, this paper argues for continued use of alternates by library systems and for finding a method to link alternate class numbers to preferred class numbers for enriched subject access through local and union catalogs.

As long ago as 1968 the possibility of searching for resources in online catalogs through assigned call numbers as access points was raised.[1] A call number is a notation that uniquely identifies an item within a collection and on the shelf. It is a composite number containing a class number that indicates the class that its subject belongs to as per a classification scheme, such as the Library of Congress Classification (LCC) scheme, and a book or an item number that uniquely identifyies an item within that class, derived usually from the author's name and other physical features (e.g., volume number).[2] Today that possibility has been realized; many library catalogs provide call number searches. Some even allow searching by the class number part of the call number. For instance, OCLC's WorldCat, originally a cataloging resource, is becoming increasingly accessible to the public and allows searching and browsing by the class number part of the assigned call number. Moreover, networked resources are often assigned class numbers using the same classification schemes that are being used by the libraries to classify their resources.[3]

A searcher who chooses to search by call or class number can reasonably expect all institutions to have the same class number for a particular title, given that the same classification scheme was used as a source for class numbers, and only one class number was assigned, even for a multi-foci title. In this context, the objective of this study was to ascertain the degree of uniformity of class number assignment that exists within libraries and across different libraries and,

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where deviations exist, to analyze the reasons for deviations and their implications for local and online catalog design in general, and in academic library catalogs in particular.

Background

The many advantages of call numbers in general, and class numbers in particular, as access points over author and title access points have been well-documented.[4] Unlike vocabulary searching, call number searching is precise and unambiguous. Unless a cataloger provides for various vocabulary approaches, such as variant spellings and synonyms, a user may miss relevant items. In contrast, call numbers consist of unambiguous sequences of letters, numerals, or both. There are no two ways to represent the same class number. Thus, call numbers are more precise than vocabulary terms as search tools. Moreover, they are becoming more available as search tools as more and more network resources are being classified using general library classification schemes.

More importantly, call numbers serve as starting points for browsing shelves. Arrangement by call numbers on the shelves results in the collocation first by class numbers and then book numbers. The underlying principle of any general library classification scheme from which class numbers are derived is the principle of collocation, which aims to bring like things together by dividing the universe of knowledge hierarchically into classes and subclasses. Users who know a general class number can browse the shelf in any library without going to a catalog under the assumption that like items will be grouped together by class number. Such shelf browsing, from general to specific and vice versa, also can be simulated in an online catalog. A user can browse a catalog using either the call or class number of a known item wherever he or she is, at home or in a library. Such classificatory access helps overcome the problem of browsing a divided collection by simulating shelf display online, irrespective of the physical location of material. However, browsing will be meaningful in an online catalog only if the class number assignment for a given topic is consistent within and across libraries.

Contributing to inconsistency in the assignment of call or class numbers is that their collocation function is often overlooked in favor of using them as mark-and-park devices for shelf arrangement. Some materials (e.g., videotapes) may not be assigned subject-based class numbers. Libraries may find it difficult to keep up with changes that occur in classification schemes.[5] As Taylor noted in a study on copy cataloging in libraries, many librarians find keeping up with the successive editions of classification schemes difficult, especially when changes between editions was drastic in the form of complete revisions or new editions.[6] In order to keep pace with the changes in classification, libraries must have the resources—time, finances, and personnel—to retrospectively classify collections to reflect the changes as and when they occur. In the absence of such resources, libraries must reconcile themselves to giving items on the same topic two different class numbers. Older collections retain class numbers from an earlier edition of the scheme, while newly acquired materials are assigned class numbers from the latest edition of the scheme. This can result in inconsistency of class numbers across libraries.[7]

One would expect that centralized agencies that provide catalog entries to member libraries for copy cataloging, such as OCLC, and such programs as Cataloging in Publication (CIP) would help to standardize the process of class number assignment across libraries, but this is not always the case. Although OCLC records generally carry both LCC and Dewey Decimal Classification (DDC) numbers, records may be lacking one or both. For example, OCLC records created before 1968 in the field of law may lack Library of Congress call numbers because the Library of Congress schedule for law was not available then. In the absence of call numbers found on OCLC records, libraries have to assign their own call numbers, and these may vary from library to library.

Several studies have investigated the connection between copy cataloging and assigned call numbers. Younger and Nichols found that many libraries make minor adjustments to the call numbers available on cataloging copy for one or more of the following reasons: (1) to match the numbers of earlier collections; (2) to meet the special needs of a given segment of the collection; (3) to add Cutter numbers or prefixes; (4) to avoid shelf-list conflicts; (5) to bring like subjects together; (6) to make the copy fit the latest edition of the classification scheme; (7) to fix errors on the copy; and (8) to use alternative numbers that fit the local collection better. [8] Circumstances such as these result in the separation of books on the same topic on the shelf. As a result, call numbers tend to become mere mark-and-park devices.

O'Neill and McCain, in a joint OCLC–Library of Congress project, conducted a study of library Cuttering practice to learn the extent and types of changes libraries made to call numbers, particularly Cutter numbers.[9] Using a sample of 895 records created from October 1994 to May 1995, O'Neill and McCain compared the DDC call number from the OCLC record and the final call number assigned by the member library that used that record for copy cataloging. They concluded that almost 80 percent of the DDC class numbers assigned by the Library of Congress were accepted by the local library and another 10 percent were accepted with minor revisions.[10]

In another study, Massey and Malinconico examined the University of Alabama's originally assigned call numbers for shelflisting errors, such as wrong class or wrong Cutter number.[11] They examined items cataloged from October 1990 through March 1995 to determine whether the differences

in shelflisting errors between these call numbers and the class numbers copied from OCLC were significant enough to justify investment in original cataloging. They concluded that revising call numbers from a copy for local use was not a cost-effective operation, at least for their university. They did not study the nature of variations and the reasons for such variations.

Methods

The objectives of the present study were to answer the following two research questions:

1. Among academic library systems using the LCC scheme for classifying items, does a given title (where title can be defined as the distinguishing name of a work) have the same class number across different library systems?
2. What are the reasons for any observed variations in assigned class numbers for the same titles?

The study focused on the class number part of the call number, as it is generated from a standard classification scheme to represent the subject matter of the title under consideration. The book number part, which is derived locally by individual libraries and thus subject to a high degree of variation, was not considered. LCC-based class numbers were chosen because the LCC scheme is widely used in academic libraries and, as an enumerative scheme, provides little idiosyncrasy in assigning class numbers. Academic library systems were investigated because a majority of them use the LCC schemes and their catalogs were, for the most part, Internet-accessible.

Before collecting data, the following decisions were made. First, class numbers of a title would be compared with reference to a specific edition. That is, only class numbers of a title with a specific imprint (e.g., New York, MacMillan, 1958) would be compared across various library systems. Second, for each title in the sample of titles, the class number that occurred most frequently among libraries under investigation was defined as the standard class number (SCN). Third, each university library system, whether it has one or more than one branch, was considered to be a single entity. Finally, an imprint-specific class number was considered a match if and only if the title in all branches of a library system exhibited the same one. Even if the class number differed in only one branch, a non-match would be recorded.

The method research included the following steps. A list of 52 large, American university library systems that use LCC as the main scheme for their collections and whose online catalogs were available in the public domain was compiled from the list of the Association of Research Libraries' member libraries (see appendix A). The current list has 113 university libraries in the United States and Canada; when this project was started in 1996, only 107 library systems were members. From that list of 107 library systems, systems in Canada and those not using LCC were eliminated. In the end, only 52 library systems whose catalogs were available on the Internet formed the library sample. The possibility of finding a given title in a large library system is higher than in a smaller library.[12]

The six-volume *Books for College Libraries* was used as a source for monograph titles to be sampled for this study.[13] This publication serves as a retrospective book selection tool for undergraduate libraries. The author assumed that a well-stocked academic library system will have at least one-third of the titles listed in it, and that large university libraries will contain a majority of the items listed.

First, a pretest was conducted using 20 randomly selected monographic titles from *Books for College Libraries* by collecting class numbers for 20 edition-specific titles. Due to the lack of literature on this topic, there was no way to predict the probability that a title will have a consistent class number across library systems without a pretest. Such an estimate was needed to formulate the hypothesis for testing in order to answer the first research question.

The probability estimate for a title to have the same class number across library systems (L_j, j = 1,2. 52) was calculated as 0.88 using the formula:

$$\hat{p} = \frac{\sum_{j=1}^{52} \text{Total number of matches in } L_j}{\sum_{j=1}^{52} \text{Total number of titles available in } L_j}$$

Using a conservative value of $p_0 = 0.85$, the following hypothesis for testing was constructed in order to answer the first research question: The probability of a title having the same class number across library systems is greater 0.85.

From this chosen probability estimate $p_0 = 0.85$, the minimum sample size of titles "n" was determined using the formula, $n = z^2 p_0 (1 - p_0) / e^2$, where z is the standard normal variable and e the allowable margin of error. Setting the level of significance $\alpha = 0.05$, $e = 0.05$, $z_{0.05} = 1.645$, $p_0 = 0.85$, $1 - p_0 = 0.15$, yields "n" to be 138. Because the first five volumes of *Books for College Libraries* were used (excluding the sixth volume—an index), this figure of 138 was rounded to 200 titles so that an equal number of 40 titles could be selected from each volume.

In order to test the hypothesis, the required sample of titles was randomly chosen from *Books for College Libraries.* Each volume has more than one section. For example, volume 1 (Humanities) consists of five sections—General Works, Philosophy, Religion, Music, and Fine Arts—covering 4, 64, 89, 51, and 107 pages respectively. In this volume, 40 titles were selected by randomly choosing

1, 8, 11, 6, and 14 titles, respectively, from the previously mentioned five sections based on the relative sizes of their listings. The sample of target titles was adjusted to increase comparability and achieve representation. For instance, one title in the representative sample, *Burton's Narrative of a Pilgrimage* (1969), was available in only one library system; it was not possible to make a comparison of class numbers. It was replaced by its earlier 1964 publication, which was held by several library systems. The year of publication for the sample titles ranged from 1911 to 1987. The sample titles did not include any titles published in the 1990s because the most recent edition of *Books for College Libraries* was published in 1988. To overcome this lack of representation, the author decided to find out whether any of the sample titles had editions published in the 1990s. Twenty-one such titles were found, and the later editions were used for comparison. The holdings of these 21 titles of 1990s editions were compared with those of their earlier editions. For 14 of those titles, earlier and later editions were found to be more or less the same. For example, 41 library systems held the 1975 edition of Becker's *Human Capital,* the original sample title, as opposed to 43 that owned its 1993 edition, leading to the replacement of the older edition by 1993 edition. In other words, a replacement was made based solely on whether a library system has at least one copy of the item and nothing else; the quality of assigned class number was not even an issue at this stage. The year of publication for the 200 titles thus adjusted ranged from 1911 to 1995, each year being represented by at least one title. The class number for each title across each library system was recorded using Microsoft Excel. Then for each imprint-specific title, the SCN was identified. SCN matches were recorded as 1, non-matches was recorded as 0, and the results were tallied in a title database; this listing is available from the author upon request.

Analysis—Hypothesis Testing

Using the data in the title database, the following hypothesis was tested:

The probability p of a title having the same class number across library systems is greater than 0.85:

H_0: $p = 0.85$
H_1: $p > 0.85$

H_0 can be rejected if the T statistic given by:

$$T = \frac{\hat{p}\text{-}.085}{\sqrt{(0.85)(1\text{-}0.85)/N}} > z_{0.05} \quad (A)$$

where $\hat{p}$ is the probability estimate from a representative sample, z is the standard normal variable, the level of significance $\hat{p}$ is 0.05, and $z_{0.05}$ = 1.645 (from the Normal Distribution Table). Probability estimate $\hat{p}$ was calculated using the values from Title-Database as:

$$\frac{\sum_{j=1}^{200} \text{Total number of libary systems having a match for } T_i}{\sum_{j=1}^{200} \text{Total number of library systems holding } T_i}$$

= 6404 / 7303 = 0.91. Inputting N = 7303 and $\hat{p}$ in Equation A:

$$T = \frac{0.91 - 0.85}{\sqrt{(0.85)(0.15)/7073}} = 14.13.$$

As T = 14.13 is greater than $z_{.05}$ = 1.645, H_0 (p = 0.85) is rejected at the 0.05 significance level. Consequently, the probability that title has the same class number across library systems is greater than 0.85, implying that more than 85 percent of library systems will have the same class number for the same title, which answers the first research question.

Analysis of Non-Matches in the Sample Title-Database

Of the 200 titles in the title sample, only 79 displayed a perfect match to the SCN*s* across different library systems (see title database). The remaining 121 titles exhibited non-matches; the extent of the non-matches across library systems ranged from 2.0 to 71.4 percent, depending on the title. A class number differing from the SCN for a title (i.e., a non-match) can be merely a variant, meaning a number different from the norm or an alternate, or a number that is a legal substitute for the norm.

Variation can occur in any part of an SCN. A class number for a title consists of, at most, three parts. The first part is the alphabetical part, which indicates the main class to which the title belongs; the second part (the numerical part following the alphabetical part) indicates the specific topic of the title under that main class; and the third, a Cutter number, which may or may not be added, is used to bring out an aspect, form, period, place, or subtopic of the subject. An alternate or variant class number, one that does not match a SCN, can display variation in any one of these three parts. For each title, the alternates and their respective SCNs were compared to identify where variation occurred.

Those parts of a title that generally contribute to the design of a class number—such as author; subject headings as generated from the LCSH list; the form of the title, such as biography, bibliography—and the appropriate editions of the Library of Congress schedules were examined in order to find out whether any of these could explain the

presence of alternate or variant class numbers for a title. On the assumption that titles are acquired and processed by libraries soon after their publication using the then-available edition of the schedule, non-matching class numbers were analyzed using valid editions of appropriate schedules. For example, non-matches for Borden's *Robert Laird Borden* (1938) were analyzed using the second edition (1913) of F schedule. The third edition was published only in 1958 and was reprinted in 1965. Such an analysis led to identification of four groups of titles:

- Group I: Titles that received alternate class numbers (37 titles).
- Group II: Titles that were assigned variant class numbers due to latitude in the schedules (34 titles).
- Group III: Titles that were assigned variant class numbers for reasons unknown (42 titles).
- Group IV: Titles that were assigned both alternate and variant class numbers (8 titles).

Group I: Titles with Alternate Class Numbers

The 37 titles with alternate class numbers fall into the 8 categories described below.

- Titles with multiple foci: When a title covers more than one subject, it is given multiple subject headings. From these multiple subject headings, a library can choose as a basis for the class number assignment one not favored by a majority of libraries. Sometimes the subject headings for a title may correspond to the same main class but point to different subtopics under that class. Sometimes they may indicate different classes. For example, in the case of Bowen's *Protestants in a Catholic State: Ireland's Privileged Minority* (1983; 56 percent, 4.19), 22 library systems chose HN400.3.A8 (Social history and conditions, Ireland). An equal number of library systems chose the alternative BX4839 (Religion, Protestantism, Ireland). (Parentheses for each title include date of publication, percentage of library systems with non-matches, and serial number in the title database).
- Titles that belong to monographic series: These titles present a dilemma to the classifier: should the class number reflect the series to which the title belongs, or the contents of that specific title? There seems to be no uniform policy among library systems regarding the assignment of series versus analytical class numbers. Consequently, there is a considerable inconsistency in assigned numbers for titles in series. For instance, the title *Environmental Physiology* (1974; 45.5 percent, 5.28) by Robertshaw is volume 7 of series titled Physiology Series One. Its SCN, QP1 (Physiology, periodicals, societies, serial collections), classed it with the series, while the predominant alternate number QP135 (Physiology, Body temperature) classed it according to its contents as indicated by the subject heading Body temperature-Regulation.
- Literary works of colonial authors: For works of authors from ex-colonies, the PR (English Literature) schedule provides options for two types of class numbers. They can either be classed as "individual authors flourishing after 1960s," or as "authors from colonies, provinces etc." Naipaul's *A House for Mr. Biswas* (1961; 41.7 percent, 2.22) and Birney's *Spreading Time: Remarks on Canadian Writing and Writers* (1980; 16 percent, 2.24) exemplify this problem. In both cases, the SCN classed them with respect to their geographical locations, while the alternates classed them as individual authors flourishing after 1960.
- English fiction titles (cataloged before 1980): Until July 1, 1980, all works of fiction in English were classed in PZ (Fiction in English) at the Library of Congress. The PZ schedule consists of two parts: PZ1-4 (Fiction in English) and PZ5-90 (Juvenile Belles Lettres). Because such an arrangement separated British and American fiction from the rest of the British and American literature as well as English translations of foreign fiction from their originals, the Library of Congress changed its policy to class American fiction with PS, English fiction with PR, and translations into English with the original national literature. Previously, all juvenile nonfiction was also classed in PZ (Juvenile Belles Lettres). Now all juvenile nonfiction is classed with the appropriate subject areas. For example, the SCN of Opie's *Oxford Dictionary of Nursery Rhymes* (1951; 48.6 percent, 2.14) was PZ8.3 O6 (Juvenile Belles Lettres, Verses for children) while the alternate was PN 6110.C4 (Poetry for children).
- Titles belonging to specific literary form, such as poetry: They can be classed with the form schedule or with individual authors. Example: *The Dangerous Edge* (1975; 4.2 percent, 2.23) by Lambert covering history and criticism of detective and mystery stories had PN3448 D4 (Prose, non-historical novels) as its SCN while the alternate was PS3562 A44, a class number for an individual author from the American Literature schedule.
- Memoirs: Memoirs can be classed either with literature or with the subject area of the memoirs. One title illustrated this: Sassoon's *Memoirs of an Infantry Officer* (1930; 42.3 percent, 3.17) with the subject heading World War I—Personal Narratives, English was assigned D640 (First World War, Personal

narratives and other accounts) while alternates PR6037.A65, PR6037.S11, PR6037.A86, PR6037.A84, and PR 6037.A1 were taken from the individual authors section earlier. The alternates also displayed variations in Cutter numbers for reasons discussed under group II titles.

- Bibliographies: Should a bibliography be classed under Z (Bibliography), or under the class number for the bibliography's subject? There seems to be no uniform answer to this question. Thus a bibliography is assigned a Z-based number by some libraries, while others may prefer to classify it under its subject. There were 3 bibliographic titles with 9.8 percent, 14.9 percent, and 13.7 percent non-matches; in all 3 cases the Z-based class number was the SCN. The alternates in each case were the subject-based numbers. Example: Griffin's *Latin America: A Guide to Historical Literature* (1971; 13.7 percent, 5.26) had as its SCN Z1601 (National bibliography, Latin America) and as alternates F1401.5, F1406, F1408, and F1410 (F1401–F1418: History, Latin America) of the English literature schedule. The alternates also displayed variations in Cutter numbers due to reasons discussed under Group II titles.
- Titles that may fall into more than one category with respect to expression: Initially, the subject specialists who designed the LC schedules made use of seven divisions known as Martel's points: (i) General form divisions, (ii) Theory & philosophy, (iii) History, (iv) Treatises, general works, (v) Law, regulation, state relations, (vi) Study and teaching, and (vii) Special subjects and subdivisions of subjects progressing from the more general to the specific.[14] A given title can fall into more than one division, and it is possible for one library to favor one division over the other. Unlike the DDC scheme, LCC does not have a preference order for assigning class numbers in such cases. So, for edited works such as Grzimek's *Animal Life Encyclopedia* (1972; 19.6 percent, 5.30), which exhibited the highest non-match percentage for this category, the majority of libraries preferred QL3 (Zoology, collected works), while others preferred such class numbers as QL7 (Zoology, Encyclopedia) or QL45 (Zoology, general works, 1760–1969).

Group II: Titles That Were Assigned Variant Class Numbers Due to Either Latitude in the Schedule Itself or Lack of Enumerated Numbers

For biographies associated with a specific subject (excluding literature), changes may occur in the Cutter parts of their class numbers due to latitude in the schedule. For biographies, under the appropriate subject, an .A–.Z range is provided by LCC scheme for the classifier to generate a Cutter number unique for the biography. It is the responsibility of the classifier to generate the Cutter number unless the subject of the biography is well-known, in which case the LC schedule will provide an enumerated number. Variation in generating Cutter numbers produces a corresponding variation in class numbers. One example is Mandel's *Samuel Gompers, A Biography* (1963; 14.6 percent, 4.25), which was assigned HD8073 G6 by a majority of libraries, where HD8073 refers to Labor, Biography and G6 is the Cutter number for Gompers from the LC Cutter Table. All the alternates for this title occurred in the Cutter area, namely G63, G5, G634, and G586.

In the literature schedules, a provision is made for classifying works by and about individual literary authors by means of individual author numbers. Again it is the classifiers' responsibility to extend the appropriate literature number by providing a Cutter number to uniquely identify the author in question. To this end, the classifiers have to use the elaborate Author Tables. For example, Wykes's *Triad of Genius* (1953; 28.6 percent, 2.28) is a book consisting of the collected works of Edith Sitwell. Its SCN was PR6037 I83. The PR6037 part of the number stands for English literature, 20th century, individual authors starting with S. The Cutter number I83 was derived from the Author Table. Variants in the Cutter number were as follows: I898, I88, I9, S62 (probably from the Cutter-Sanborn table), I85, I8, and It757.

The Literature schedules also provide ranges of numbers to accommodate the individual works of prolific authors. Differences can occur in the selection of numbers within these ranges, thus generating variations in the numerical part of a class number. Example: *Selected Letters of Samuel Richardson* (1965; 41.4 percent, 2.34) for which the classifier is provided with numbers in the range PR3660–3667 for Richardson as author. Here a majority of libraries chose PR3664, while variants included PR3666, PR3667, PR 3666 A51, and PO 3666 (possibly a clerical error).

Numbers for classical philosophy exist in both the B and PA schedules. Even though PA class numbers are used only for original Greek and Roman texts, some libraries used them also for translations, which should be classed under B religion. For example, the SCN for Aristotle's *Metaphysics* (1976; 6.5 percent, 1.29) was derived from the Philosophy schedule, while the variants classed it under Greek literature. The same discrepancy was exemplified by a nonclassical work. For Fowles's *Aristos* (1970; 7.5 percent, 1.28), the SCN classed it with Philosophy, while the variants classed it with English literature.

Four titles demonstrated that schedules J and K are capable of producing alternate numbers. La Nauze's *The Making of the Australian Constitution* (1972; 71.4 percent, 4.27), which exhibited the highest percentage of

non-matches (72 percent) among all titles in the sample, fell into this category. Its SCN was JQ4011 (Constitutional history, Australia). More than 20 library systems had alternate class numbers, none matching any other in K. This was probably due to there being no LC law schedules at the time the book was classified, so the libraries under investigation had to use locally designed K schedules. The same was true of Goldfarb's *Contempt of Court* (1963; 34.1 percent, 4.26), which received both JK and KF class numbers. In the case of such titles, the SCN*s* and the variants were completely different.

Titles dealing with women's issues also exhibited dual numbers. There were two such occurrences: Gilman's *Women and Economics* (1970; 25 percent, 4.31) and *Women and Development: A Resource Guide* (1984; 19 percent, 4.32*)*. In both cases, the first subject heading was Women-Economic Conditions. For Gilman's work, the SCN was HQ1426 (Woman, Feminism, Reform literature, Later 1860–) while the more specific variant HQ1381 (Women and Economics) was given by 4 libraries. The problem with the second title was unique—it had no CIP record, and the LC-assigned class number on the OCLC record was HQ1240.5 (Feminism, Women and state). The *Books for College Libraries* had HQ1154 (Woman, Feminism, Emancipation of Women, 20th century), which was assigned by seven library systems, but the SCN was HQ1870.9 (Woman, Feminism, Underdeveloped areas).

Sometimes the LC schedules provide Cuttering for subtopics. In such cases, variations may occur in the Cutter part of the class number. The HD (Economic history) schedule has listings of special industries and trade. For some industries Cutter numbers are enumerated, while for others they are to be chosen from a range. In the example of Glasner's *Politics, Prices, and Petroleum* (1985; 3.9 percent, 4.30), the SCN was HD9579 G5, where G5 stands for Gasoline. For the non-matches, the variations occurred in the Cutter part of the class numbers—for example, G61 and G41.

Group III: Titles That Were Assigned Variant Class Numbers for Reasons Unknown

Generalizing about the source of variation in class numbers was impossible with 42 titles. Individual libraries may have their own reasons for providing alternate numbers, but those reasons were not obvious from a mere examination of titles. The variations for these titles occurred in the alphabetical, numerical, or Cutter parts of the class numbers. One example is *Solo Song, 1580–1730* (1973; 25 percent, 1.35), which had as its SCN M1619 M17 even though there was no instruction to Cutter by author in the M schedule. It had, however, 75 percent matches across library systems. Non-matching library systems assigned just M1619 or used a Cutter number variation. The CIP record used the SCN, which may have served as a source for class number.

Cuttering was used by a majority of libraries in three cases to introduce subtopics not enumerated in the schedules. They were Davis's *From the Dark Tower: The Afro-American Writers, 1900–1960* (1974; 4.3 percent, 2.35), with the SCN PS153 N5, where N5 points to Afro-American writers; *Mencius* (1963; 22.9 percent, 1.30) with the SCN BR128 M33, where M33 refers to *Mencius;* and Platnauer's *Latin Elegiac Verse* (1971; 4.8 percent, 2.36), with the SCN PA2335.E5, where E5 refers to elegiac verse. In these 3 cases, the non-matching variants differed only in the Cutter part of the number.

In some cases, the nonconforming libraries seem to have chosen a class number that was broader in scope than the specific enumerated number. For example, there was a specific class number for Leibniz's *Philosophy of Logic and Language* (1972;2.1 percent, 1.38), yet 1 library chose a broader number. In this miscellaneous group, there were also 2 titles illustrating that it is possible for editions of a title not to get the same class number. In the case of Kochan's *Jews in Soviet Russia since 1917* (1970; 9.1 percent, 3.28), its SCN DS135.R9 is an enumerated number. DS135 in the DS schedule (1959) refers to Jews outside Palestine, and the Cutter R9 refers to Russia, general works, 1917–. The variant was DS135.R92, an enumerated number in a later edition of the DS schedule (1987). Exemplifying the same situation was the title *Muslim Creed* by Wensinck (1938; 18.2 percent, 1.31). Its SCN was BP161 (General works on Islam, 1801–1950), the class number also assigned by the Library of Congress to this particular edition. Two library systems assigned BP166.1 (Islam, History of Theology, General works). A check of the BP schedules in use at the time revealed that BP166.1 was not listed in the appropriate edition (1950). However, during the analysis of editions of this title, it was found that another edition, published in 1968, was given BP166.1 by the Library of Congress, which most libraries also used. The use of BP166.1 for the 1938 edition probably can be attributed to reclassification of the older edition to match the class number of the recent edition by the two library systems in question, while others chose to maintain the old number for the earlier edition and the new one for the current edition. In this case the difference between the variant and the SCN was in the numerical part of the class number. There are times when a number has been discarded in the LC schedules, but some libraries continued to use the old number in favor of the new. Two titles represented this case. An example is Davis's *Systematic Embryology of the Angiosperms* (1966; 26.3 percent, 5.37), for which the SCN was QK 643 A5, while the variant was the discarded number QK 693, which also happened to be the Library of Congress–assigned number.

Sometimes libraries chose a specific number even though there was an explicit "see" reference under that number directing the use of another number. In the case of Frank's *Historic Pottery of the Pueblos, 1600–1880* (1974; 2.3 percent, 3.21), a library chose NK4017 (Ceramics) even though there was an instruction "for American Indians use E99" underneath that entry. In this case the SCN and the sole non-matching number were completely different. Sometimes, non-matches appear to be wrong. For Walker's *The Decline of Hell* (1965; 5.1 percent, 1.33), the SCN was BT836.2 (Doctrinal theology, General works, 1951–) but 2 library systems chose BT836 (Doctrinal theology, General works, 1801–1950). So also in the case of Born's *Principles of Optics* (1980; 9.5 percent, 5.40), the SCN and the variant class numbers were respectively QC355.2 (Optics, general works, 1970–) and QC355 (Optics, General works, 1801–1969).

Group IV: Titles That Received Both Alternate and Variant Class Numbers

Eight titles displayed a combination of sources for variation. Their non-matches ranged from 4.3 percent to 54.3 percent. The following are two examples.

- Borde's *Sir John Beverly Robinson: Bone and Sinew of the Compact* (1984; 54.3 percent, 4.23), with 54.3 percent non-matches, had two subject headings: Robinson, John Beverly and Judges—Ontario-Biography. Its SCN was KE 406 R63 (Law of Canada, Biography). Its variant was KE406 R62, a different Cutter. Its alternates were F1058 R6 (History, Ontario, Biographies) and KE8248 R66 and KE8248 R6, where KE8248 (Supreme Court of Canada, Judges, Biography) represents the number for second subject heading,
- *Victorian Science and Victorian Values: Literary Perspectives* (1981; 33.3 percent, 5.33). This is a title in the series *Annals of New Academy of Sciences.* Its SCN was Q11 (Science, Societies, United States), corresponding to series. Its alternates were Q175.52 (Science, Philosophy) and PR468.S34 (History of English Literature, special topics), reflecting its two subject headings.

Conclusion

The finding that a title is likely to have the same class number in more than 85 percent of the library systems holding it was surprising. While one expected that the LCC scheme, being an enumerative classification scheme, would yield considerable consistency among assigned class numbers, such high degree was nevertheless impressive given the study's stringent condition imposed for matching class numbers; namely, for a match to occur all the class numbers for a title in a library system had to be the same. The question that then arises is how best to bring the remaining 15 percent of nonconforming library systems into the fold, at least online, in order to make developing a universal search language that can automatically search all catalogs using one class number for a title feasible.

The sample included titles that must have been cataloged in the precooperative cataloging era. The increasing trend of accepting call numbers as is from the copy cataloging record for local use by libraries will enhance the level of consistency in class number for a title across library systems. Moreover, the Library of Congress is replacing ranges with enumerated class numbers in the online version of the scheme as recommended by Williamson, leading to increasing consistency in the Cutter number part of the class number.[15] Thus copy cataloging and replacement of ranges with enumerated numbers will help to reduce the size of variants discussed under group II, III, and IV titles in new records.

Another equally important finding of this study is that a fair number of titles were correctly assigned alternate class numbers. These include those with multiple foci, titles in series, bibliographies, memoirs, titles by colonial authors, English fiction titles, and works that belong to more than one form of expression in particular, discussed under group I titles. An individual library may like to continue assigning alternate class numbers in order to integrate older materials with new ones on the same topic locally. However, such a library will encounter problems if it has a blanket policy of accepting class numbers found in the copy cataloging record and the copy cataloging record has no alternate numbers. For example, the Library of Congress provides both Q11 and PR468 in its catalog record for the 1981 edition of *Victorian Science and Victorian Values* in the sample, but its record for the 1985 edition has only PR468. Eight library systems that had the 1981 edition under Q11 used PR468 for their 1985 volume. The dispersion of even successive editions of the title by class number violates the fundamental principle of classification, namely collocation, and thus is troubling. Ideally, cataloging copy would provide both standard and alternate class numbers for those materials, and online systems would find a way to link those class numbers.

In the card catalog era, when class numbers served primarily as location devices, libraries were forced to choose only 1 class number. Fortunately, online systems have the potential to handle multiple access points, including multiple class numbers. Internet resource databases provide access to thorough multiple class numbers for the same source, as has been recommended in the *Final Report of the Subcommittee on Metadata and Subject Analysis*

of the Subject Analysis Committee in the Association for Library Collections & Technical Services Cataloging and Classification Section.[16] It would be useful to exploit this potential by providing at least all LCC call numbers in the MARC record for a title for the following reasons:

- First, a preferred call number, together with its alternates, more fully represents a title than just the preferred call number alone. Just as a MARC record for a title carries series information and multiple LCSH describing its contents fully, so also it might carry assigned multiple call numbers in order to increase the availability of subject information through call numbers. Such a record can be easily integrated with digital resource records with multiple class numbers as access points.
- Second, thanks to the activation of many types of search keys—such as publication year—in addition to traditional ones—such as author—a user can browse the collections in a library through many types of virtual displays with the stroke of a key. For instance, a multi-foci title can be assigned multiple call numbers, one of which can be designated as a number for fixing the physical location of that title in a library, but all of which can be searched online. Liberating a library's collection from the constraints of linear displays on shelves and in the card catalog would enhance retrieval by providing the user with multiple subject displays. Assignment of multiple class numbers for digital resources is now a reality. Multiple class numbers at the searching phase for nondigital resources will enable better integration of digital and nondigital resources online.
- Third, an exhaustive listing of class numbers for a title—and, by extension, for related titles—would give data to researchers interested in subject analysis. A cluster of call numbers connected by *see also* entries, similar to clusters of subject headings in authority lists of subject headings, leading from one class number to others connected with it in some way, can be a source of valuable information for researchers interested in subject structures.

In short, where deviations from a common number are warranted, libraries could assign two class numbers—the Library of Congress–assigned class or call number(s) for searching and a local class or call number as a shelf collocation device. It would not be difficult for a library, while downloading a record from OCLC, to keep the Library of Congress–assigned class number associated with that record for searching, even if a decision is made to use another number for the shelf listing. The precedence for such a practice already exists. OCLC member libraries can generate subject headings for local use in generating entries for their online catalogs. Enabling class number searching in sophisticated systems and devising ways to reduce inconsistency will give users enhanced and more precise access to information.

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Appendix: Library Systems Sampled

Arizona State University
Boston University
Brigham Young University
Brown University
Columbia University
Cornell University
Dartmouth College
Emory University
Florida State University
Harvard University
Indiana University
Johns Hopkins University
Kent State University
Michigan State University
New York University
North Carolina State University
Pennsylvania State University
Rice University
Rutgers, the State University of New Jersey
Stanford University
State University of New York, Stony Brook
Texas A & M University
University of California, Berkeley
University of California, Davis
University of California, Irvine
University of California, Los Angeles
University of California, Riverside
University of California, Santa Barbara
University of California, San Diego
University of Delaware
University of Georgia
University of Hawaii
University of Houston
University of Illinois, Chicago
University of Iowa
University of Kentucky
University of Maryland
University of Massachusetts
University of Michigan
University of Nebraska
University of North Carolina
University of Notre Dame
University of Oklahoma
University of Oregon
University of Pennsylvania
University of Pittsburgh
University of Utah
University of Wisconsin–Madison
Vanderbilt University
Washington State University
Washington University, St. Louis
Wayne State University