

The Automation of Cataloging-1976

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IN 1976 THE automation of cataloging, already at a refined stage, alighted on the cusp of a major event. Having already witnessed the Ohio College Library Center (OCLC with its on-line catalog become the most pervasive automated network in the nation, cataloging librarians still awaited the advent of genuine on-line cataloging. The University of Chicago (UC) and the New York Public Library (NYPL), both library automation innovators, were working toward the creation of data structure and data base management, and on-line bibliographic control systems, respectively. Instead, it appears that the Washington Library Network (WLN), with the software services of Boeing Computer Services Inc., is planning as of this writing¹ to create an on-line cataloging and on-line automated authority control system, and to provide the kind of sophisticated Boolean search capability built into Stanford University's BALLOTS system. If it occurs, this will be an exciting event, although the continued growth of OCLC and the spread of COM (computer-output microfilm) catalogs and reports² are awesome in their ubiquity albeit no longer spectacular.

Effort will be made here to review the automation of cataloging. Rather than providing merely a review and description of different catalog systems and products (aspects dealt with at length elsewhere³), this paper will emphasize recent developments in the automation of the cataloging process.

AUTOMATION OF CATALOGING –V- AUTOMATED CATALOG PRODUCTS

A distinction must be made between the automation of cataloging and automated catalog products. In order to make this distinction clear, definitions of the terms merit review.

Cataloging will be defined here as the intellectual process whereby a given work (e.g., the actual copy of a book) is described, categorized by subject, and assigned a physical location in a library. What makes this process the work of a professional cataloger is that it is done in accordance with a code of rules and thesauri governing the form and content of the catalog record. The *Anglo-American Cataloging Rules* (AACR) serves as the code for describing a bibliographic entity.⁴ Unfortunately, there are no similar rules governing subject analysis. Haykin,⁵ the introduction to the eighth edition of the *Library of Congress Subject Headings* (LCSH),⁶ and the front matter in the tenth edition of the *Sears List of Subject Headings*⁷ currently provide guidance. In choosing specific terms in accordance with these guides, two sources of au- variations of the authority obtain for most academic and public libraries in the United States: (1) past practice in a given library in which the work is being cataloged, and (2) the practice of the Library of Congress (LC) as exemplified by its catalog records (for choice and form of main and added entries) and by LCSH and its supplements or Sears (for choice and form of subjects). Furthermore, the location function must also be served. A physical shelf location for an item is usually assigned on the basis of the subject of the book (in accordance with one of the

two major classification systems in the United States⁸); the location may be refined by including some aspect of the author's name, and in some cases the author, title and copy number of the volume when a unique location is desired.⁹ An alternative to location by subject is location by date of accession or some other nonbibliographic, yet related quality, such as size or color.

The catalog thus comprehends all of the individual catalog records created in the aforementioned manner. (It is important to stress that the records must always be created with reference to the catalog into which they will be included, and most advisedly with respect to the name and topical subject authorities provided by LC or Sears.) For the purpose of this discussion, then, the definition of cataloging is the process by which a cataloger creates a catalog record in accordance with prevailing codes and authorities, and with reference to the catalog of which it will become a component. This definition indicates that the goal of automating cataloging—the effective replacement of the cataloger by a machine—will probably never happen. Many of the tasks involved in the cataloging process, including better user access, however, have been greatly assisted by data processing technology.

Despite the claim that consistency in the establishment of names, uniform titles and subjects is the “hobgoblin of little minds,” cataloging is the only mechanism that allows one to find all of the works of a given author, all items on a given topic, and other similar benefits which follow from this concept of a catalog. Completion of the cataloging process should make three functions possible: (1) the ability to determine if a library has a given item; (2) knowledge of all of a given author's works located in the library; and (3) knowledge of all works in a library dealing with a given subject.¹⁰

Automated catalog products follow precisely from, and are consequences of, the catalog records created in the cataloging process. If the names of a given author vary and the cataloger has neither entered the author's name in a consistent manner nor linked the variations of the author's name by references, then the data base created and the catalog products generated from it—which include these inconsistent or unlinked data—will militate against retrieval of a specific work of the author and direction to all of the author's other cataloged works. This situation contradicts the tenet that the catalog must bring together all of the works of a given author.¹¹ There can be no separation of the catalog products from cataloging. In effect, the information on a 75mm x 125mm card constitutes a catalog card only if the data on it resulted from the previously described cataloging process. The card's utility, or for that matter the value of a given on-line display, is limited if the catalog process is restricted to ensuring an exact correspondence between the information on the card and on the title page. Transcribing the author's name and the title from the title page of a book does not necessarily relate that book or its author to other works by that author or to other versions of the same book, which are required results of the process. The distinction between cataloging and the products through which it is expressed thus provides the framework within which further analysis of the automation of cataloging can be made.

THE OHIO COLLEGE LIBRARY CENTER

The Ohio College Library Center (OCLC) automated cataloging system represents a major break from tradition. Although no longer unique in its on-line sophistication, OCLC's awesome technology has, in effect, proposed a technical structure and process which places little emphasis on the cataloging values previously enunciated. Before elaborating, a brief review of the OCLC system is in order.

OCLC, a nonprofit corporation originally composed of a network of academic libraries in Ohio, now has approximately 600 user libraries across the country, including probably every size of academic and public library, as well as government libraries, a national library (National Agricultural Library), and even the special library of a for-profit corporation.¹² OCLC currently has a data base of more than 2 million monographic cataloging records created essentially from two sources: (1) LC MARC (Machine-readable Cataloging) records, and (2) catalog entries contributed by the various libraries using the OCLC shared cataloging facility. The latter source provides the majority of records in the data base. "Shared cataloging" here means the use of a given OCLC record (LC MARC or user-input MARC) by an OCLC network member-in other words, the data of one institution is partially or completely shared by another institution.

There are several methods of gaining access to the OCLC data base. It can be searched by LC card number, OCLC number, ISBN (International Standard Book Number), ISSN (International Standard Serial Number) and CODEN (a unique standardized alphabetic code applied to serial titles).¹³ These are the relatively simple searches because they usually have a one-to-one correlation with given records-if a given LC card number is entered as the search code, there is normally only one record or bibliographic work in the OCLC data base which will match that number. Author, author-title, and title only searches are possible through the use of OCLC predefined search keys or algorithms. For an author search, one enters the first three letters of the author's last name, the first three letters of the author's first name, and the first letter of the author's middle name, all of which are separated by commas. Thus "Kilgour, Frederick Gridley" would be searched by the algorithm "Kil,Fre,G." Searches by author-title and title only are conducted in a similar manner. In theory, the OCLC "minicat"¹⁴, is the product of these searches. In response to an author-title search request, the minicat contains an average of thirty-two entries having only a fortuitous relation to each other-a "catalog" far easier to negotiate than any classical catalog, according to its chief proponent, Kilgour.¹⁵ The OCLC search methods are inadequate for the following types of search request:

1. Corporate author requests and others in which the search is for a "needle in a haystack," i.e., the number of entries generated is too great to negotiate.
2. Author requests or author-title requests present difficulties where the author's name is entered in the data base in a form slightly different from the one from which the key was created, or where the key used is based on a version of the author's name substantively varying from the version entered in the data base.
3. The category with the most subtle problem is the one in which an existing LC MARC record is sought by use of an LC card number or other search key, has been received and processed by OCLC, but is not available to the user. If an OCLC-contributing library entered a record into the data base which is subsequently (and seemingly) duplicated by an LC MARC record and both records have the same LC card number, the LC MARC record is deferred and unavailable to the OCLC user until the duplication is resolved by OCLC staff. Only the OCLC input record is available, and it takes precedence over the LC MARC record.¹⁶

Operational problems such as response time and communications equipment will be simply viewed as technical considerations and not treated in any detail here.

The most common products generated from the OCLC data base are computer line-printed catalog cards. In addition, some users are locally producing spine and book labels,¹⁷ periodically

receiving accessions lists from OCLC, and having their history tapes (the OCLC produced tapes containing the catalog records of the individual library) processed for the purpose of producing COM catalogs.¹⁸ Other libraries are experimenting with use of the OCLC data base as a public service tool.¹⁹

How are new records added to OCLC? In principle, new records are added when an LC MARC record does not duplicate a record already in the data base, or when a user library (after having used the various access methods) does not find a record in the OCLC data base for the item searched. In the latter case, the record for that item is subsequently entered in the data base by the user.

The quality of cataloging anywhere-not just among OCLC users-varies from library to library, and from one cataloger to another. All LC MARC records entering the OCLC data base have gone through the complex process of cataloging prior to being converted to LC MARC records. Records entering OCLC from its hundreds of users, however, have been cataloged by processes which vary significantly with respect to the effort made to establish name and subject entries, and the creation of the overall bibliographic record. As Markuson has stated: "Many OCLC users have a list of acceptable and unacceptable libraries in terms of use of OCLC records. The quality of the data base is thus of concern to all users."²⁰

In the previous description of the cataloging process, authority checking and establishment of names and subjects was carried out: (1) with reference to previously established names and topics, extant rules and principles as appropriate (AACR, LCSH, etc.); (2) to link explicitly variant or different names of a given author; and (3) to link valid, invalid and related topics through appropriate references. The cataloging process also included a description of the item in accordance with the rules for description embodied in AACR, as well as assignment of a physical location.

Which of these cataloging processes are actually built into the OCLC "cataloging" system? The only automatic checking done by the OCLC system is the match on search keys; rather than requiring the user to search files manually, the machine searches through the various indices (ISBN, CODEN, etc.). To the extent that any of the other processes ingredient in cataloging take place, they are manually performed. Nothing is built into the OCLC system which automatically executes the various cataloging procedures described above: there is no automated catalog control in the OCLC system. Nothing is built into the system which will automatically notify the cataloger that JT Marris is a pseudonym of John Creasey, nor which will automatically change all occurrences of "Pincherle, Alberto, 19072" to "Moravia, Alberto" (the need for this arose when LC changed the form of the name). There is nothing built into the system to notify a terminal operator entering LC copy from the *Library of Congress Catalog of Printed Cards* which has the subject tracing "Aeroplanes" that it is no longer valid and has been replaced by "Airplanes"; nor is anything built into the cataloging system which will automatically alert the cataloger to a typographic error such as "Bulter" if "Butler" is the author's name.

Rather than being called a "cataloging system," OCLC more appropriately could be called an "automated catalog support system." It performs none of the necessary control functions of the cataloging process-authority checking, referrals and links between valid and invalid terms and names-nor does it permit meaningful searching for all authority terms (cf. its inability to search certain corporate authors). OCLC is, however, an automated catalog support system in that the less professional steps in the cataloging process are supported by OCLC. It provides for automated searching of the LC MARC and contributed MARC data base by the various techniques previously described. In most cases these techniques are very successful.²¹ Because

the OCLC data base is not the user library's catalog, it must reconcile the OCLC record it finds with its own catalog. This automated search is much easier and cheaper than the previous manual searches in the file(s) of LC proof slips and the multipart *National Union Catalog* (NUC)-not to mention the cost of maintaining the proof slip file(s).

The great cost benefit OCLC has provided has been in the production of catalog cards.²² By printing card sets on demand and distributing them alphabetized (or in other optional sequences), OCLC has truly assisted the participating libraries. Aside from searching for copy, local card production has been the single element of a library's operation most affected by the system. The physical catalog cards themselves fall into the previously discussed category of automated catalog products. Cataloging assistance from OCLC includes this vital card production function. The result of this process must be expressed through some display medium, and the OCLC system is excellent in its card production and delivery system, for it provides a maximum number of formatting options and allows the library user to make any desired changes.²³

AUTOMATED BIBLIOGRAPHICAL CONTROL SYSTEMS

The Washington Library Network (WLN) has taken an approach completely different from that of OCLC.²⁴ Aside from having the on-line technology of OCLC, WLN includes the best aspects of two systems being developed and another which is in operation. WLN will establish a data base management system which incorporates both the quadraplanar data structure originated by the University of Chicago²⁵ (UC) and the New York Public Library's long-term plan for on-line authority control (NYPL's current authority control system is batch-oriented). The WLN system will be in operation by the time this paper is published. In addition, the sophisticated search techniques built into Stanford University's BALLOTS system²⁶ will, for the most part, be replicated by WLN. A review of these three elements-with emphasis on the first two-will clarify the distinctions between the notion of an automated cataloging system and a shared cataloging support system such as OCLC.

A data base management system is a system which relates and controls data effectively by eliminating redundant storage. A goal of the system at UC is that any "input or update need be done only one time to keep the entire data base current."²⁷ The value of this is that there are no separate systems, each with its own data files. For example, the bibliographic data from which an order is generated is merely updated by the catalog department rather than being wholly inputted a second time. The data for a given record is used and reused in a variety of ways. It is entered only once and stored, but is subsequently accessible in a variety of modes: the single citation can be used as the basis for a circulation, acquisitions, or cataloging record. This is a departure from previously designed library systems in that separate and redundant files were kept for each functional system-e.g., citations for the same work in an order file, in a cataloging file and in a circulation file were maintained in a variety of forms.

The concept of the *quadraplanar* data structure developed by UC further introduces a level of subtlety not found in the OCLC system. (The term quadraplanar simply means four levels or planes of data-the reader must not be intimidated by a word describing such a vital concept.) The design of the UC system provides:

for a bibliographic data structure . . . that permits multiple libraries to share the same data base-the design minimizes redundant storage of bibliographic data, while maintaining the

independence of each library's information. The bibliographic data base could be configured either as a collective catalog or as separate catalogs. In either configuration the same quality control found in manual card catalogs can be provided.²⁸

The data structure conceived by UC and planned for use by both UC and WLN has four levels. A purpose that this structure most usefully serves is the bibliographic control of a multiplicity of libraries either in a network, in some other arrangement, or in no relation to each other other than the sharing of the same computerized system and universal plane records. The conception is as follows (for both UC and WLN):

- (1) The *Universal Plane* is the bibliographical identification level. Based on the International Standard Bibliographical Description (ISBD), this level includes a title page description of the data and is described by WLN as the title statement. It is considered the root description of a given work, the portion which in principle would be the description used by any library.
- (2) The *Multi-Institution Plane* or "collection" level further identifies the bibliographic entity and includes entry information. A collection record is the record held (and used) by a network, consortium or cooperative of libraries predicated on sharing a single record for a specific work, and for which there is agreement on all entry forms. It does not include such library specific data as a local library's call number, i.e. it has no information which makes it specific to a given member library. There may be "n" number of collections, and in effect "n" number of networks.
- (3) The *Single-Institution Plane* or library level contains library specific information. Such information as the library's call number and additional entries not included at the collection level are contained at the library level. Obviously there will be many libraries at this level and similarly this is the point at which greater variation will be evidenced. Most public libraries are Dewey classed, while the dominant academic classification is LC. Although library specific, this level does not include such item specific information as the branch, agency or collection within a library that holds a copy of the work or any other information relating to specific copies.
- (4) Lastly is the *Copy Plane* or item level. The specific item is described or controlled here. Found at this level are the data relating to the specific books held by a given library, e.g. the copy number or anything else which describes a single copy of a book or uniquely distinguishes one item from another (such as an accession number).²⁹

The quadraplanar structure keeps track of different categories of data at each level; it will:

- (1) accommodate with minimum redundancy the bibliographic information of more than one institution;
- (2) allow the information of each institution to be separately identified and processed; and
- (3) permit the bibliographic information of each institution to function separately as a catalog.³⁰

Built into the data base management system and interacting with the quadruplanar structure is an entire module concerned with authority control (or "vocabulary" control as it is frequently termed by WLN).³¹ This is the key to the bibliographic control built into the planned UC and WLN systems, as well as the system to result from the planned conversion from batch-oriented to on-line authority control of NYPL.

ON-LINE AUTHORITY CONTROL

Because none of the systems discussed are fully operational yet, any evaluation of them must be in terms of what they plan to do. The University of Chicago, through its concept of "catalog control" (authority control in a data base management environment), attempts to serve the following functions:

- (1) to provide machine authority control over headings,
- (2) to provide machine entry control over headings used as entries in bibliographic data,
- (3) to ensure data integrity, and
- (4) to reduce storage by controlling all uses of a heading as an entry in bibliographic information through a single occurrence in authority information.³²

This concept of catalog control is exciting in that it addresses the major problem not attacked by OCLC: the problem of computerized control over entries and headings in a network environment.

By reviewing some examples of that which OCLC's system does not allow, a clear perception of the difference between the UC and NYPL models and OCLC will be possible. One automatic function to be performed by the UC system is the separate listing of new terms; in other words, any term which is not identical to one already established is automatically listed as a new term. This will "kick out" for review all typographic errors such as "Yeats, William Bulter, 1865-1939" and "Horse" ("Horses" is the correct LC subject term). It will also highlight errors such as the occurrence of "Trollope, Anthony" without dates included-any veteran cataloger would automatically recognize that such an entry established without dates is minimally suspect, probably wrong, and in any case worth further investigation. The NYPL system automatically changes the title page name "Mouly, Enric" to the LC entry "Mouly, Henri, 1896-".³³ This is an example of the cross-reference function being served, and of another control feature not built into the OCLC system. The NYPL system changes specified invalid uses of a name or term to the valid use,³⁴ and it is presumed that UC and WLN have designed a functionally equivalent feature into their respective systems. This cross-reference function will apply similarly to subject headings, e.g., "Ethology" is changed to "Human Behavior," and "Physical Endurance" is automatically changed to "Physical Fitness."

Automated control is therefore established over authority terms by having invalid terms changed to valid ones, and erroneous and new valid terms automatically listed for review by an appropriate professional. These critical features are absent from the OCLC system, but are viable for networking through the "multi-institution plane." Each group of libraries in a given multi-institution or collection shares the same bibliographic information "including entries

(main, added and subject) of common choice and form."³⁵ Consequently, any member of the multi-institution group (network, consortium, etc.) agreeing to and sharing the same authority terms will automatically have new terms (some of which will be judged invalid) separately listed for review, so that their correctness can be ascertained by the network's cataloging arbiter. Invalid names and subject terms will presumably be converted automatically to valid names and subject terms. A further capability will be the mass transfer or "global fix." This technique allows a given name or topic to be changed-every single occurrence of it-to another name or topic. This is a most useful tool, especially with the many subject changes presently being made. It means that one need not find every occurrence of "Aeroplanes" and then each of these change to "Airplanes." The net result of this automated catalog control is to maximize the probability that the authority terms for a given network will be correct, consistent with respect to each other, and not redundant. This automated control of a multi-institution shared cataloging data base will be a major breakthrough in the automation of cataloging.

Despite this progress, a serious problem still remaining is the continued maintenance of existing institutionally based manual catalogs.³⁶ For example, many OCLC participants are confronted with the problem of resolving differences between new authority terms and their antecedents in their local catalogs. The typical OCLC user has many older cards under the term "Aeroplanes." The replacement term "Airplanes" now appears on current LC MARC records, and consequently participant libraries will receive catalog cards conflicting with their older LC-based cards. If the library does not close its catalog and start a new one, it must resolve discrepancies which might arise between retrospective records and those in the shared data base. Through automated catalog control, however, the computer will minimize and generally spare the library the problem of resolving conflicts within a shared data base.

CLOSING THE CATALOG

The only real solution to eliminating local catalog conflicts with the shared UC or WLN type of data base is to close the local catalog and exercise one of two options. The first alternative is to input the local catalog totally into the data base, while also resolving conflicts; and then have all subsequent iterations of the catalog produced utilizing the full quadruplanar structure of the data base (title statement from the first level, entries from the multi-institution level, and institution and copy information from the other two levels). Depending on the software developed, such a catalog can be totally on-line, or in a book or microfilm format. It is inconceivable in card format, however, for the obvious reason that rational librarians would not choose to generate, on any cyclical basis, entire card catalogs to supersede previous card catalogs.

The other solution to the problem of conflicts between the automated data base and the retrospective card catalog is a resolution in some locally cost-effective manner which in most cases (certainly the "Airplanes" v. "Aeroplanes" example) would require the establishment of a network of "see also" references. Closing the card catalog and replacing it with another card catalog, even if it is produced from an automated controlled data base, is questionable. First, the same problems will arise for terms in the new card catalog as LC continues to improve its subject terminology-entries such as "European War, 1914-1918" cannot be tolerated forever, even by LC. Thus, revisions will be required, or a "see also" structure will have to be established to refer the user to both versions of the term. The user will furthermore have to find the entry either in

the old closed catalog, under one of the two versions in the new catalog, or conceivably in a third version. The related reason not to close a card catalog and replace it with another card catalog is that the library user is forced into an extra lookup and/or several searches when the item is not found under the first heading queried. The headlong rush to close the catalog-stamped in part and unintentionally by LC's decision to close its own catalog because of internal problems³⁷-must be tempered by a concern for the library users who will be ravaged by the multiple lookups forced on them by cost- but not service-oriented administrators. This criticism assumes that the library will replace its closed catalog with another card catalog. (LC plans to supersede its closed card catalogs with a variety of automated catalog products which together will fulfill the traditional catalog functions.)

AUTOMATED CATALOG PRODUCTS

A brief discussion of automated catalog products and services follows logically after a discussion of closing the catalog. A library with an automated cataloging data base is best advised to employ some kind of catalog that is "self-refreshing,"³⁸ i.e., a catalog which reconstitutes itself. In the use of an on-line catalog, the catalog is reorganized or refreshed every time the update button is pressed. This phenomenon is more profoundly evidenced whenever an authority term is altered in such a machine-controlled catalog, which causes the entire catalog to be restructured. For off-line products (that is, products which are a representation of the catalog at a given time), the refreshment of the catalog is the superseding of the previous iteration by a succeeding version. In effect, it is a snapshot of the automated catalog at the time of production. From the user's viewpoint, however, the on-line terminal display at the most recent point in time, the most recent COM catalog, or the most recent combination of cumulations and supplements of book catalogs are examples of refreshed catalogs. As indicated earlier refreshment of the card catalog only occurs by disposal of all of the' cards and subsequent replacement of them with a newly generated catalog of cards-a process which would elevate from clown to genius the person who advocated bringing coals to Newcastle. The only other alternative is to add and remove cards on a continuing basis from the catalog, as appropriate. The catalog will be refreshed, but in an impractical and totally manual mode.

Computer-printed catalog cards do have a place in the card catalog and are finding that place in a large number of American libraries, vis á vis OCLC's users, the customers of Baker & Taylor, Blackwell/North America and Josten's, and the many other libraries producing cards locally, including the University of Chicago.³⁹ The computer of LC's Catalog Distribution Services Division (formerly the Card Division) produces high quality cards, indistinguishable to the untutored eye from the previous typeset cards. LC cards are now electronically photocomposed, allowing for a wide range of type sizes, fonts and styles.⁴⁰ The LC card sets, however, are neither headed nor prealphabetized. Independent and network library consumers find these features to be compelling reasons to buy computer-printed cards, despite their single font and size, from the kind of card producers described above (OCLC, Baker & Taylor, et al.). Many libraries receive computer-produced processing kits from the data bases of OCLC, the commercial jobbers, or their own facilities.⁴¹ These are very useful products in this era of escalating costs for labor-intensive operations and of shrinking personnel budgets.

COM catalogs are becoming increasingly prevalent, replacing less timely and more costly book catalogs.⁴² The COM catalog can also be used as a more timely substitute for the printed book catalog, which is produced comparatively slowly. The COM catalog is most effectively

used in a research library, such as the Georgia Institute of Technology,⁴³ as well as in many public libraries. Some COM catalogs are produced by commercial firms, such as Science Press and Autographics, by jobbers such as Blackwell/North America and Bro-Dart, and by libraries such as the Dance Collection of NYPL, the Los Angeles County Public Library, and contractually by NYPL for the New York State Library. (In the latter case, NYPL takes the library's OCLC history tapes, passes them through its automated catalog production system, and produces a cumulated COM catalog.)

Book catalogs are still to be found, but they are becoming obsolete because of the inherent delays experienced in production and the costs involved in updating them.⁴⁴ Evidence of this trend should be clear: two major book catalog producers, Science Press and Autographics, both offer COM catalogs as alternatives to their book catalogs. In some cases, they have also dropped hard copy supplements in favor of complete cumulations-another example of "selfrefreshing." The most sophisticated book catalog product and state of the art for the book catalog genre, is NYPL's "Dictionary Catalog of the Research Libraries," which currently contains alphabetized vernacular computer-typeset Hebrew entries.⁴⁵ The Hebrew vernacular presented three problems in particular. The first was the dual-faceted problem of inputting and creating photocomposed Hebrew characters. The next problem was modifying the pagination conventions of the printing program so that the Hebrew words would print right to left at the same time Roman alphabet text printed left to right in the same entry, and in some cases even the same line. The third problem was to get the Hebrew entries to file in accordance with NYPL's filing rules. To overcome this difficulty, sort keys for the Hebrew entries had to be established, and sorting had to be done in Hebrew alphabet sequence rather than as if romanized (as done in the NUC). All of these problems were solved with publication of the December 1975 major cumulation of the first NYPL catalog which contained the vernacular Hebrew data.

"I hope that the success of OCLC . . . will not cut off the development of alternative network systems. Such other systems should include at least of rigorous bibliographical control built into its initial stage."⁴⁶ The author uttered those words three years ago, and, it is especially gratifying to report that this hope will be realized in systems now being developed.

The Ohio College Library Center, taken as a bibliographic search and card production center⁴⁷ and "not a bibliographical control center,"⁴⁸ is not to be criticized for its several outstanding achievements: (1) OCLC demonstrated, on the most widespread scale, that on-line technology is viable for library networking; (2) OCLC card products either freed valuable library staff from the repetitive work of card production or reduced the cost of card production and catalog maintenance (the latter through the mailing of pre-arranged cards); and (3) OCLC, through its on-line data base and despite its duplication of records and other problems, facilitates interlibrary loan, shared resource development, and sharing of cataloging information on an unprecedented basis. Admittedly, its almost unlimited growth is causing headaches. Lacking the processing capability to service present OCLC data base users adequately, OCLC has had to impose a moratorium on the addition of users.⁴⁹ Despite its shortcomings, however, OCLC continues to provide a valuable and relatively unique service.

Stanford University's BALLOTS is currently expanding to the network level, and the University of California (Berkeley) is testing BALLOTS' network capability.⁵⁰ BALLOTS offers a far more sophisticated searching capability than OCLC (almost any word or combination of words can be used for access keys in BALLOTS, including dates as search modifiers).⁵¹ As a network system, BALLOTS requires its users to do their own authority work and does not currently get into the intricate processes of automated bibliographic control.

The single most recurring theme of this paper is that the automation of cataloging will become more of a reality with the full-scale implementation of the automated catalog control modules and the multiple-level (quadraplanar) cataloging data structures within the data base management systems of the University of Chicago and the Washington Library Network. This point will not be labored further; portents of the future, however, do merit consideration.

"From the present perspective . . . the MARC II format has been the single most important event in the automation of cataloging. With a national standard for the communication of bibliographical information, the feasibility of sharing machine-readable cataloging data was permanently established";⁵² nothing in the intervening years since this statement was made has occurred to prompt the author to revise it. With the advent of alternatives to OCLC (especially alternatives which promise to include catalog control features not built into the OCLC system), however, the MARC data structure assumes a towering stature. Insofar as OCLC maintains history tapes of its users' catalog records in the MARC format, the users can theoretically take that history tape to another network, have its authority terms subjected to the rigors of catalog control, and take appropriate remedial steps. Labor will certainly be required to make a successful cleanup of authority terms, but much less work than would be involved in trying to edit authorities through the OCLC system. Should UC or WLN be willing to have them, it is likely that some OCLC users will test and even use these alternatives to OCLC because of the unique benefits they offer in relation to those offered by OCLC. MARC is the key, because virtually all automated cataloging systems dependent on LC cataloging have a built-in capability for accepting cataloging data in the MARC format.

In effect, the MARC format is "a passport to freedom" for libraries. This is true not only for OCLC users, but for the users of commercial services as well. Any library entering into a contract for cataloging services should require, at minimum, a history tape in the MARC 11 format of all of its data on a periodic basis. Dissatisfaction with a given supplier and better prices or service elsewhere are good reasons to switch, and the MARC history files make it possible. This flexibility would have been most useful prior to MARC, when commercial book catalog producers maintained the cataloging data in unique formats that made the data virtually unusable by any other producer. The reasons for this practice were not necessarily negative; the unique format was tailored to the programs the supplier used for creating book catalogs. MARC thus provides certain freedoms which will increase the choices available to libraries looking for automated cataloging services, create competition where it previously barely existed, and continue to function as the structure for delivering Library of Congress output to the nation's consumers, whether they are networks, jobbers, or individual institutions.

The hope for an alternative (or at least for a more library consumer-oriented cataloging)⁵³ can be realized through the kind of system conceived by the University of Chicago and implemented by the Washington Library Network. Assuming that adjustments could be made so that the unique ISBD punctuation could be eliminated in public service products and an ideal alternative output format(s) could be defined, the other levels of the data structure would provide rigorous control over authority terms which are oriented to serving a domestic public not usually found at the receiving end of international cataloging. The beauty of the quadraplanar structure embedded in the UC data management system is that it eliminates "variability that is not logically inevitable and . . . accommodates variability that is necessary."⁵⁴ The design for a pluralistic, yet bibliographically controlled, system has been developed. The prospect of automated bibliographic control alternatives in on-line cataloging systems is welcomed and applauded.

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