Evaluation of Online Databases and Their Uses in Collection Evaluation

BARBARA A. RICE

SOME READERS MAY BE SURPRISED to find this article in an issue on collection evaluation. Are online databases indeed a part of the collection, or are they a type of reference service? In actuality, they are both. Databases have become an important part of libraries' reference collections and may in some cases serve as a substitute for the addition of print materials to these collections. Online databases, both bibliographic and numeric, have been reported to be part of library collections. The literature will be analyzed from this point of view.

An online database is a machine-readable file of organized information with which the user interacts by means of a terminal connected to the computer housing the file. The terminal may be wired directly to the computer or it may communicate with it via a telecommunications network. The important feature of the online mode is that the user interacts with the information in the computer, sending and receiving messages in an almost instantaneous time frame.

This paper deals only with those databases which can be accessed directly by a user from his/her own library and does not deal with many available in information analysis centers to which the user cannot be directly linked online. Many information analysis centers receive, analyze and prepare online files. These are, for the most part, accessed only by center personnel or others in the information center's host institution or agency. For the most part dial-up access to the information analysis center is not available for libraries. Instead, the library usually submits a

Barbara Rice is Principal Librarian, Reference Services, New York State Library, Albany, New York.

search to the center, which then performs the search and sends back an answer. The emphasis of this paper is on online access by a library to a database the library staff did not prepare, but which has been made available outside the preparing agency for direct access.

It is only recently that databases have begun to be considered a part of a library's collections. No wonder. They only became available in libraries in the 1970s. The first articles on machine-readable bibliographic databases began appearing in the *Annual Review of Information Science and Technology* early in the decade. The first chapter on "Use of Machine-Readable Databases"[1] appeared in the 1974 volume. As online database availability was increasing, library funds for acquisitions were decreasing. This decrease forced libraries to move from the concept of comprehensive collections of all that their users could possibly want to collections of most heavily used items with a dependence on access to others' collections for lesser used items. Online bibliographic databases provided quick and improved access to others' collections and to information about publications which a library might or might not have in its own collection. The means of access itself, rather than the materials became a component of any individual library's collections.

The collection development literature is slowly beginning to acknowledge this change. Although some standard collection development texts such as Gardner[2] now have a section on computer-based materials, Bonk and Magrill[3] does not. Even though databases or tapes may be mentioned as items to consider in the sections on selection, they are nowhere to be found in the sections on collection evaluation. George Bonn's[4] classic *Library Trends* article on "Evaluation of the Collection" which appeared in 1974 makes no mention of database evaluation. It was too early. This paper will focus on developments since 1974. The ALA *Guidelines for Collection Development*[5] lists datatapes as one form of material collected but the section on collection evaluation gives no specific guidance on their evaluation or the evaluation of any other of the special forms such as newspapers, manuscripts or audiovisual materials. Online files are not mentioned. So, although some sources view databases as part of the collection, few standard sources evaluate them as such.

The new ANSI standard on library statistics[6] does list databases as a part of collection resources and groups them with currently received periodicals in a category titled "currently renewed resources." The number of databases to which the library provides access for its users is to be reported. In addition, the standard specifies that database transactions should be reported as a subset of reference transactions. Databases

are viewed in the literature and in the standard as a part of the collections and as a reference service.

The nature of databases and their role(s) in libraries are still evolving. A quick scan of the bibliography for this article will indicate that we have not even decided how to spell database yet. Is it one word or two? Earlier usage was primarily *data base*, but the current trend seems to be one word. This author will use *database*, as does the journal of that name which began publication in 1978.[7] The fact is that in a very short ten-year period databases have found their way into library services and collections.

Bibliographic Databases

It is primarily in the area of reference that bibliographic databases have gained a secure footing as part of the collection. Bibliographic databases contain those elements of bibliographic description used to describe books, journals, documents, and other publications or portions thereof. In the 1980 Supplement to Sheehy[8] a section on "Data Bases" appeared for the first time which acknowledged that "the use of computer-readable data bases...is now considered to be a normal part of library reference work."[9] Their presence in Sheehy, however, was short-lived, not because the use of databases became abnormal, but because, as the Second Supplement published in 1982 states, "rapid changes and developments in the field of data base computer searching..." had made it "impractical either to update or augment that earlier list."[10] So Section F of the 1980 Supplement became in 1982 a listing of recent directories of database services. Walford's *Guide to Reference Material*[11] lists magnetic or machine-readable files with the print version.

There are numerous directories of the burgeoning number of databases. Schmittroth's *Encyclopedia of Information Systems and Services*,[12] Cuadra Associates' *Directory of Online Databases*,[13] Williams's *Computer-Readable Databases*,[14] and Aslib's *Online Bibliographic Databases*[15] are amongst the most prominent and up-to-date. The fifth edition of the *Encyclopedia of Information Systems and Services* had 25 percent more entries than the fourth edition, which had been published one year earlier. Cuadra Associates publishes a quarterly supplement to its directory. In the Summer 1980 issue of *RQ*[16] Danuta Nitecki's "Online Services" column was introduced. The column deals with automation as it affects public services. A year later, in Summer 1981, *RQ* began reviews of databases for generalists. Here, editor Helen Josephine referred to the databases as "online *reference* tools,"[17] definitely a

part of the collection and used to answer questions as the print tools have been. The reviews are for generalists—i.e., reference librarians rather than searchers—and they keep generalists aware of the content and scope of each database. Comparisons between access for the print and online versions of a file are made.

The databases discussed thus far are primarily online bibliographic files which are the online equivalent of print abstract and indexing services, and this probably explains their ready acceptance into reference services. There are, however, in actuality several categories of online databases, all of which will be treated in this article, and all of which have found slightly different placement and use within the library's collections.

The main types of databases discussed in this article are bibliographic and numeric. The bibliographic databases are three major types: online union catalogs of library holdings, such as OCLC and RLIN, henceforth referred to as bibliographic utilities; online equivalents of print abstracting/indexing services such as COMPENDEX, CA Search or INFORM. These seem to have developed no distinctive designation, but are by far the greatest in number and are usually referred to as simply databases or bibliographic databases; and full-text databases of newspapers, journals, directories or court cases such as New York Times Information Bank or *Harvard Business Review* online, LEXIS, or WESTLAW which contain the full text of the publication online. The numeric databases are files of primarily statistical information—either numeric or brief textual—from which a patron extracts specific pieces of data. Patrons may extract data for further manipulation or, in some cases, may revise data in the numeric file.

Because these databases are constructed in different ways and are used differently in libraries the evaluative criteria applied vary. This paper will not discuss evaluation of their extended subject searching capabilities, but it will discuss evaluation from the point of view of selection for the reference collection or evaluation once added to that collection. Also not considered will be discussions of a library's own online catalog or circulation system, although these are certainly bibliographic databases. The scope of this paper is bibliographic, numeric and full-text databases which are not the library's own and which the library decides to access as a means of developing its collections and/or services. This review will probably raise as many questions as it provides insights, for the concept of online files as a part of collections is still forming.

It is a credit to libraries that they have managed to embrace online databases, have incorporated them into the day-to-day operations of normally slow-moving institutions, and still have had time to report their progress in doing so. Much, however, remains unreported, and many readers will doubtless know of online uses or evaluations of them which exist, but because they are unreported do not appear in this article. This paper is a survey of trends as reported in the literature and no attempt was made to survey existing practice to supplement that reported.

Ready Reference

All three types of databases are extensively used in ready reference. James Sweetland's 1979 article, "Using Online Systems in Reference Work,"[18] was the first of a rash of similar articles which appeared in the period 1981 through 1983.

The reasons advanced for their uses in reference varied. Sweetland needed to establish high-level information service in a new library with limited staff and physical size. He specifically selected OCLC, Lockheed and the New York Times Information Bank for searching. In other cases, the introduction of online searching into reference activities was more of a spin-off from the fact that the library was already providing search service as reported by Miko,[19] Cochrane,[20] Droessler,[21] and Friend.[22] Librarians who already knew how to perform subject searches on files such as DIALOG, BRS (Bibliographic Retrieval Services), or SDC (Systems Development Corporation) found themselves itching to use their terminals when faced with verification problems at the reference area. And so some terminals moved from back rooms into the reference desk. Evaluations reported here are primarily compilations of information on the type of searching performed and the cost. Searches performed at the reference desk are primarily for verification of incomplete citations, but other uses—such as providing addresses of authors or publishers, preparing lists of recent works by an author, determining subject headings to use in a catalog search, and determining which library(ies) own a specific title—were reported by these authors and by Durkin and Dolan,[23] who surveyed BRS users in 1979. Online searching is faster than manual searching and is therefore very helpful to staff who, even if their numbers remain constant, face increasing service demands. Online searching provides a wide range of search tools in one place, and may provide access that is not available in print tools. For example, there are usually more access points than the print file and

access points may be searched simultaneously. Online indexes are not at the bindery or temporarily not located for other reasons. With online indexes, the computer system may be down, or a file may be temporarily unavailable while it is being updated, but the online version usually is more current than the print version. Access to the database of a major vendor may provide a tool that would not normally have been purchased for the print collection. Costs that have been reported are not comparable or especially meaningful, since no one includes the same elements for computing cost (e.g., equipment, training, online costs, print cost, librarian's time) for either online or manual searching.

Comparison of uses or costs between libraries would suffer from the usual problems of reference service measurement. What actually constituted a "search" had not yet been defined when the Association of Reserch Libraries (ARL) compiled a SPEC Kit on "Online Bibliographic Search Services" in 1981.[24] Should a ready-reference online search constitute a hash mark—as part of other reference statistics—or should reference librarians keep separate track of the number of queries which were answered with online assistance? How can we evaluate the quality and not simply the number of searches? What elements must be included when calculating costs? Thus far, no reports of evaluations of ready-reference searching have appeared as part of collection or services evaluations.

Print v. Online Migration

The added advantages of online reference tools as compared to their print counterparts which were just described has led to what has been termed the print *v*. online migration. Marydee Ojala makes an interesting point when she states that a significant difference between print and online reference tools is that: "With the printed tool, the money has already been spent, and the time involved in becoming acquainted with the peculiarities of the book is not measured in dollars. With online indexes the opposite is true."[25]

One public librarian went so far as to state that, "instead of buying books, we do online searches on demand. It's much more cost effective to provide materials that people actually need, on demand, rather than buying materials that may or may not meet an actual information need."[26] This is, doubtless, an extreme statement, but as libraries discovered the advantages of accessing online reference materials, it became inevitable that at least some of these libraries would question whether it was necessary to subscribe to both the print and online services. The fact that this consideration exists supports the point that online services are

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indeed part of the collections. And it is at this point that collection development staff (if they are not reference librarians) may become involved in the evaluation process. Those articles in the literature indicate that although libraries may be considering cancellation of print titles, few are taking action. A notable exception to this general trend is an article by Pfaffenberger and Echt[27] on the "Substitution of SciSearch and Social SciSearch for Their Print Versions in an Academic Library." The authors selected *Science Citation Index* (SCI) and *Social Sciences Citation Index* (SSCI) for study because of their high print subscription costs. SCI and SSCI were removed from the reference area and replaced by a sign which told patrons that they could have a free search instead of doing the search themselves. It was found that it was less expensive to provide the online services for SCI, but that it was not economical to substitute online for SSCI. The primary difference was that there was heavier use of the SSCI and use was primarily by subject, rather than by citation as with SCI.

Most other papers, while they report a perceived migration do not indeed show significant numbers. Childs and Carmel,[28] in a survey of the use of print *v.* online *Index Medicus* in twenty British Regional Health Authority Libraries, found *increased* or changed use of the print tool when online became available. Lancaster and Goldhor[29] in a 1979-80 survey of 200 academic and special libraries in the United States found that subscriptions to abstract/indexing services were declining, but felt that this was only partly due to availability of online equivalents. Much more important, they stated, was the fact that "subscription costs are increasing while the relative purchasing power of many library budgets is declining."[30] This analysis was confirmed in a more recent paper by Miller and Kobelski[31] who surveyed 193 New York State special libraries. They report that 40 percent of the responding libraries had cancelled some index/abstract journal subscriptions since beginning online searching, but that 50 percent of the responding libraries had also *added* subscriptions. Only twenty-two (or 24 percent) of the ninety-one libraries who returned the survey stated that online availability was an important factor in the cancellation decisions.

Other major factors considered were cost, volume of usage and whether or not the tool was of primary importance to the library's mission. Online availability is only one factor amongst those weighed in a collection development decision to cancel a subscription. Lancaster and Goldhor[32] found some evidence to suggest that availability of a tool online might be influencing libraries which never had a subscription before to opt for the online service. An obvious difficulty with selecting

an online service is that you cannot be assured that it, or all portions of it, will always be online. If it is a tool of interest primarily for current information this is not a major consideration, but if it is of interest also for current and retrospective information this *is* a consideration.

Bibliographic Utilities in Reference Work

As stated earlier the means of access to other collections when used in lieu of a completely comprehensive collection of one's own can be considered to be part of a library's collection. The major bibliographic utilities, Online Computer Library Center (OCLC), Research Libraries Information Network (RLIN), University of Toronto Libraries Automation System (UTLAS) and Washington Library Network (WLN), do not have print equivalents and are used in this way. For the most part, these tools found application in reference because they were already in the library, and staff found them useful for more than shared cataloging or interlibrary loan. However, Sweetland, and Droessler and Rholes made conscious decisions to use OCLC and RLIN respectively at the reference desk even though they were not in previous use at the library.[33]

The primary use made of the online abstracting/indexing services was for bibliographic verification, and this is also true of the reference use of bibliographic utilities. Baker and Kluegel[34] report extensive use of OCLC in reference amongst ARL members. Farmer[35] evaluated RLIN as a reference tool and has trained librarians in California and Nevada in its use as such. Miller[36] summarizes the uses of both OCLC and RLIN, and, in addition, he evaluates the specific reference capabilities of each. RLIN is preferred for reference use because the search capabilities exceed those of OCLC. RLIN has truncation, subject search and combined index searching, whereas OCLC's primary advantage is retrieval by predetermined truncated search keys and by year(s) of publication. Jacobs et al.[37] came to much the same conclusion, and also they evaluated WLN. WLN, like RLIN, has subject and keyword access and combined index searching is possible. This probably arises from the fact that it was the first among these bibliographic utilities and it was designed primarily as a cataloging database, with later additions of interlibrary loan, acquisitions, and serials union list subsystems. RLIN, which came later, was designed to support not only cataloging, but also shared access to collections and cooperative collection development, and WLN was also designed from the start to support multiple functions. Online bibliographic databases—especially abstracting/indexing services and the bibliographic utilities—have been incorporated rapidly into reference work and their acquisition may be viewed as part

of the building of the library's collections. Their use as part of the collections has not been extensively evaluated, but widespread reference use attests to their ease of use, cost-effectiveness over print resources in some cases, and the improved access which they provide over manual tools.

Selection/Evaluation Of Online Databases

Whether or not to add online services to the library's collection or services usually is considered or evaluated extensively. Evaluation of online databases may occur at the time of initial selection of a database(s) or service provider, when two or more databases are being compared for subject coverage or search efficiency and, less frequently, as part of a collection or service evaluation. Selection decisions are made by considering many of the same elements which enter into subsequent evaluations. The evaluation of whether or not to add an online service to the library centers around its use for subject searching but libraries also consider the database(s) as additions to the collections. The substitution of online for a print portion of the collection has already been discussed.

Vendor Selection

Many directories, abstract/index services, and business or financial files are made available through three major vendors, BRS, DIALOG and SDC. A library may select one or more of these services, and, in so doing, it must acquire hundreds of supporting reference tools. In fact, in selecting a vendor package, many files are often added to the collections which would not have been if considered on a file-for-file basis. In addition, specific files are available from government agencies or professional organizations. The primary consideration in most selection or evaluation decisions is subject. For a monograph or serial the selector asks whether the title is in a subject collected by the library, and the type of treatment of that subject—i.e., basic or research. The selector of a database vendor has a more complex problem, because, as Nichol[38] points out, each vendor has some unique and some duplicate databases. However, an overriding concern is still how well the blend of databases offered match the library's collection development policy. Williams,[39] Nichol,[40] Lancaster,[41] and Stern[42] summarize the other evaluative criteria used. Cost and means of searching are the primary considerations. This results in the following questions being applied to the potential vendor's products:

1. How simple or complex is the system to use?
   a. How much training is needed?
   b. Is training readily available?
   c. Can users search themselves or must librarians perform the searches?
2. What are the comparative costs for:
   a. online time?
   b. communications?
   c. printing?
   d. royalties?
3. What restrictions on access exist?
   a. Must the library subscribe to some print equivalents?
   b. Can it charge for the products?
   c. Is use restricted to searches from one portion of the searchers' organization only?
4. How does treatment of important individual databases compare?

These same criteria apply no matter whether one is considering choice of vendors, if broad coverage is to be obtained, or whether or not to obtain a given database direct from a producer when only one or two subjects are being considered. No one consideration dominates and different libraries make different choices based on their clients' subject needs, library staff skills and interest, budget and organizational structure. The criteria for comparing treatment of a subject area or the same database by different vendors follows.

Selection/Evaluation of Individual Databases

There is ample literature which can help make the choice between individual databases. Most of this has been written from the point of view of the searcher, who is evaluating how well similar databases meet specific user needs. These reports can also be valuable in vendor selection when specific subject areas are more important than others, or when a decision of whether to obtain coverage from a vendor or direct from the producer is being made (in those instances where such choices are available).

First, there are the directories which were listed earlier in the section on "Bibliographic Databases." These titles typically give subject coverage, date coverage, frequency of updating, availability of tapes, producer, and vendor. Next, there are review articles in the trade literature such as *RQ, Database, Online,* and *Online Review*.[43] And, finally, many journal articles have appeared comparing specific databases or subject

coverage by two or more databases, or vendor coverage of the same database. The following list is by no means comprehensive, but is indicative of the scope of published evaluations. Notes are added where the scope is not clear from the title.

Comparisons of two databases:[44]

"The IRL Life Sciences Collection and BIOSIS"
"The Use of Online Databases for Historical Research" (compares HISTORICAL ABSTRACTS and AMERICAN HISTORY AND LIFE)
"The ERIC and LISA Databases: How the Sources of Library Science Literature Compare"
"Georef/Geoarchive"
"WESTLAW vs. LEXIS: Computer-Assisted Legal Research Comes of Age"

Comparisons of several databases covering a subject area:[45]

"A Sampler of Data Bases for Searches in History"
"Decision Analysis for Selecting Online Databases to Answer Business Questions"
"An Analysis of Effective Management Searching: A Comparison of Three Major Bibliographic Databases"
"Company Information Searching in an Industrial Setting"
"DOE's Energy Database (EDB) Versus other Energy Related Databases: A Comparative Analysis"
"Database Overlap vs. Complementary Coverage in Forestry and Forest Products; Factors in Database Acquisition"

Comparison of same database offered by different vendors:[46]

"A Comparison of BIOSIS Previews as Offered by Different Vendors"
"Online Systems for Legal Research"
"Multiple System Searching"

Methods of evaluation in these articles varied. The "Georef/Geoarchive" article[47] evaluated recall and precision for twelve subject searches and also compared timeliness and document type coverage. The "ERIC and LISA"[48] article compared precision and recall also. The authors, who were comparing results with known items from manual searches, were surprised at the low (51 and 57 percent) recall percentages for the online searches. The "IRL/BIOSIS" article[49] compared journal-coverage overlap, indexing practices and currency, but not recall and precision.

Those articles which covered one or more databases in a subject area used the following evaluative criteria: subject coverage, file size, document type, date coverage, quality, and depth of indexing, proportion of unique results obtained, proportion overlap, currency, and cost for different vendors. Donati[50] used a different approach in the decision-analysis article, selecting business databases in relation to crucial ques-

tions. The first decision point is whether or not information on a principle, practice or problem is involved, or whether information about a specific product or industry is needed. Further, key questions within each category are then analyzed in relation to ABI, F & S Index, PROMPT, and other business databases.

It is apparent from reading these articles that there is no standard set of evaluative criteria which have been developed for evaluation of bibliographic databases. They, like the spelling of the words *database* and *online*, vary. What weight is given to each factor? How does a library reach a decision as to which vendor to select or which databases to search when the problem is so complex? Evaluation of specific systems overlaps with comparison of individual databases within each system. The decision process itself is not reported in the literature. Finding out what happens in practice would involve analysis of how libraries who have recently decided to provide online search services made the following decisions:

1. Should we provide online services?
2. Which databases should be provided (i.e., which titles should be added to our collections/services)?
3. From whom should we obtain the database(s)? The criteria for vendor selection would then apply.

In actuality these decisions may not proceed in the order listed above and each one may be made by a different group(s) within the library's administrative structure. Some libraries select a vendor with primary consideration being given to subject coverage or comparison treatment of individual databases, whereas in other libraries considerations of cost and staffing impact may prevail. Is there a preponderance of any one consideration over another? What factors cause different libraries to weight criteria differently? Factors which are certainly important are what group(s) is making the decision, where the money will be coming from, what library unit will be administratively responsible for service, prior experience of staff with databases, and the uses which will be made of the system. Articles in the premier issue of the journal *Science & Technology Libraries*[51] featured articles on planning to initiate online search services and described the issues which the authors' institutions addressed in the planning process. The articles did not, however, describe how the different factors were weighed in the decision process.

At this point, it should be emphasized again that for the most part these decisions are not made as collection development decisions

but primarily as service decisions. Further, declines in library budgets may force libraries to evaluate whether such service should be continued, just as we now evaluate whether to cut monographs or serials, and, if serials—which ones. Databases have been treated as separate entities and are usually budgeted separately, but with their introduction to the collections, some libraries may come to evaluate them in relation to the acquisitions budget and the resource sharing budget (if there is one). At present, though, few libraries would probably extend the concept as far as did *Online Libraries and Microcomputers*[52] when it suggested that: "With the proliferation of full-text databases and information sources which are only available online, it makes a great deal of common sense to fund equipment from the acquisitions budget." In this case the equipment being referred to are the computer terminals, modems and printers required to use online tools. It would not be very different from the situation where a microform dealer offers a reader or reader-printer with large microform purchases. The money in this situation doubtless comes from the acquisitions rather than the equipment budget. At present, database acquisition and maintenance are not usually part of an acquisitions budget, although purchase of print reference tools is. Fees for bibliographic utility use primarily come from the cataloging budget, although the utility may be used for resource sharing. In reality, many libraries have budgets with rigid categories of salary, acquisitions and supplies/equipment. Practically, it is difficult to shift the budget line from which something is taken once precedent has been established.

Full-Text Databases

Bibliographic databases were initially described as falling into three major types: bibliographic utilities, online equivalents of print abstract/index services and full-text databases. Now, full-text databases will be discussed in more detail. Full-text databases have been on the scene since 1977, and in the last two years access to them has begun to change dramatically.

The major and obvious difference between full-text and other bibliographic databases is that the full document is available for search and for retrieval. Let's first consider the effect on search strategy. In the other bibliographic databases, documents are described by information extracted from the document (e.g., author, title, date) and information added by a cataloger or indexer such as subject headings, index terms or an abstract. The searcher retrieves a reference to the document by search-

ing any combination of the extracted information. In full-text search-
ing, a user can search any term in the document in natural language.
There is no need to translate his query into controlled vocabulary terms,
which usually forces a more general search. On the other hand, the user
must know all possible synonyms or ways of expressing the subject for
which he searches and must deal with more false drops resulting from
the fact that most terms have more than one meaning or context in
which they may occur. Perez summarizes the advantages and disadvan-
tages of controlled vocabulary and free text (or full document) searching
in newspapers and other general publications.[53]

Newspapers are examples of a type of publication which are availa-
ble in two different ways online—either as files which are the equivalent
of abstract/index files or in full text. *The New York Times* is an
example of this. New York Times Information Bank (NYTIB) became
available online in 1973. It consisted of bibliographic citations and
abstracts for *The New York Times* and other major newspapers. Search-
ing was by descriptor terms, and, in this form it found quick acceptance
in libraries within traditional reference—much more quickly than the
other bibliographic databases. In 1975, just two years after the first
commercially available NYTIB installation began operating,
Bachelder[54] reported that 50 percent of NYTIB terminals in public,
college or university libraries were at the reference desk. Why libraries
were so quick to place this database in the reference collection is not
clear to this writer, although Bachelder maintains that the reason is
"obvious: the Information Bank is an excellent reference tool."[55] The
problems associated with making effective use of the NYTIB in refer-
ence were ably described by Riechel.[56]

In 1980, search capability was enhanced by providing free-text
access to the abstracts, and in July 1981 the *New York Times Online* was
introduced, offering full-text access to the paper from 1 June 1980. In
April 1983 *The New York Times* stopped offering the NYTIB, but made
it available through Mead Data Corporation. Mead incorporated the
Information Bank and the *New York Times Online* into its NEXIS
service which, since 1979, had offered the *Washington Post*, AP, UPI,
and PR wire services online in full text.

Other full-text systems for online newspaper searching are INFO-
GLOBE and VU/TEXT. In addition, many newspapers are available in
the index form or index plus free-text searching of summaries. All of
these are thoroughly described by Nina Ross.[57] Stephen Smith reviewed
the changes which had occurred in online news retrieval in 1983.[58] Many
of the newspaper files exist in combination with other files which

contain information that users need on a very timely basis, primarily business, financial or legal information.

Mead Data Corporation, which produces NEXIS, is also the producer of LEXIS, one of the major full-text legal databases which are commercially available. The other, WESTLAW, is a product of West Publishing Company. The two have been competing for users of Computer Assisted Legal Research Systems (CALR) since their introduction in the early 1970s. Larson and Williams[59] review the literature on the evaluation of LEXIS, WESTLAW, and the other CALR systems, JURIS, AUTO-CITE and FLITE. They identify the following interrelated evaluation criteria: time saved, cost effectiveness, efficiency, quality of results, manual *v.* computer effectiveness, user friendliness and operation by end-users compared to trained specialists. The new evaluative criterion appearing here—not found in those listed when evaluating vendors of bibliographic databases or comparing databases—is end-user searching compared to trained specialist operation. The legal systems were developed by or in close cooperation with lawyers and bar associations to search the text of cases or to trace the history of cases and certain compilations of law, such as the *United States Code*. Their first widespread use was in law schools, during the time period 1977-80 as reported by Neth,[60] Mersky and Christensen,[61] and Munro et al.[62]

Neth[63] reports that the terminal at Case Western was installed in the law school and used by students and faculty members. Librarians are not mentioned. Mersky and Christensen,[64] describing experience in Texas law schools, imply that the terminals are in libraries when they show that acquisition of LEXIS or WESTLAW depends on the size of the library budget; and they confirm this by reporting that, in most instances, training is coordinated through the law school library or in others by a full-time member of the teaching faculty. In any event, the persons being trained are students, and one would predict that CALR should soon be in great use in law firms. Myers[65] in 1978 surveyed the impact of LEXIS on large law libraries. Of the respondents, 86 percent had a terminal, and for most subscribers the terminal was in the library or an adjacent office. Many of the librarians had had LEXIS training. However, most of them were not doing many searches, the majority reporting zero to four per week. Unfortunately, the number of searches done by lawyers was not reported. More recent studies could not be found, but, on the basis of that report, it is safe to say that legal databases do not yet seem to have become as much a part of law library collections (with the exception of law school libraries) as have bibliographic databases. Will this continue in the future?

In 1980, Greguras et al.[66] described the changing information needs of the legal profession. Probably in response to expanded needs for information beyond the purely legal, Mead and West are now brokering access to DIALOG, BRS, SDC, Legi-Tech and a wide variety of specialized databases to LEXIS and WESTLAW subscribers. Will lawyers learn the idiosyncracies of DIALOG, BRS or SDC databases, or, needing assistance with these, will the lawyers see that librarians are competent searchers and leave the searching of bibliographic as well as full-text legal databases to librarians? (More will be said on this subject in the section on end-user searching.) Although there is little evidence that full-text legal databases have found their way into library collections, other databases have. The New York Times Information Bank has already been mentioned. Just as the bibliographic and full-text legal databases came of age in the 1970s, the "News and Trends" section of *Online Libraries and Microcomputers*[67] predicted that the 1980s may be the age of the online full-text books, periodicals, directories, texts and encyclopedias. Perusal of the BRS and DIALOG database catalogs shows a variety of full-text files. Notes are added to the following titles if the database is not the online equivalent of the same print title:

—American Chemical Society Primary Journal Database (BRS). Full text of 18 primary ACS journals.
—Kirk-Othmer Encyclopedia of Chemical Technology (BRS).
—American Men and Women of Science (BRS, DIALOG).
—Mental Measurements Yearbook (BRS).
—CHEMLAW (DIALOG). Full text of U.S. Federal regulations, as published in the *U.S. Code* and updated in the *Federal Register*, for manufacture, use, storage, transportation, and disposal of chemical sustances.
—CHRONOLOG NEWSLETTER (DIALOG).
—Critical Care Medicine Library (BRS). Full text of twenty-five prominent medical textbooks in emergency and critical care medicine.

At present, use is expensive, but future development of optical disk technology may change this. The age of the electronic journal, predicted for some years is still not with us, although it is certainly closer. More and more full-text databases are available. An advertisement in the April 1984 *American Libraries*[68] announced that full text of many of the articles in *Magazine Index* and *Trade and Industry Index* would soon be available online.

As more directories and journals become available online, libraries will be questioning whether or not to subscribe to one or both and the print *v.* online migration may become more extensive than earlier reported. But in this case the choice is not print or online for a secondary service such as an abstract/index tool, but print or online for the full entity, i.e., *American Men and Women of Science*, or *The New York Times*, or a court opinion. Access is usually faster and greater, but costs are higher.

Numeric Databases

A numeric database is a computer-readable collection of data which are predominantly numeric in nature: Numeric databases were developed before bibliographic databases and have been described by Luedke, et al.[69] Initially access to these data was through the information analysis centers, professional organizations, or government bodies that produced them. More recently, the development of software packages for access and further analysis have made feasible the use of numeric databases by other than the producers.

Fried et al.[70] describe an online numeric database as a system—a combination of numeric database and search system which retrieves data and presents it online to the user. The article by Fried et al. was the first in what was to be a series of online columns on numeric databases. Only two such columns appeared.

Economic and financial data are the most accessible commercially. This is probably because there is a fairly large audience for this type of information and thus commercial vendors have a market for it.[71] Major vendors are Data Resources Inc., Wharton Econometric Forecasting Associates, Chase Econometric Associates, and A.P. Sharp, Inc. Information is available either online through a time-sharing system or via direct access to the producer's computers. Although some special libraries doubtless access these systems, there is little use reported. A 1977 survey by Wisdom and Houghton[72] in Great Britain showed that the files were being used primarily by financial analysts, economists or managers. Only a handful of librarians were using data files other than Predicasts. In 1976, Predicasts and Lockheed began the first combined online bibliographic and numeric data retrieval and analysis system, Predicasts Terminal System (PTS). In addition to the Predicasts literature, the system gave access to economic, social and industrial numeric data. It was this venture that doubtless introduced many libraries to

numeric databases for the first time. A 1983 DIALOG catalog listed twelve numeric databases, all in the area of business and economics. The first listing of online nonbibliographic databases in *Online Review* in 1977 contained 127 entries, and in six months that number had increased to 246.[73]

Online nonbibliographic databases do not seem to have found their way into libraries to any large extent, with the exception of those available through DIALOG. The major reporting of library use or involvement is in the area of social science data, involving tapes, rather than online use. The Winter 1982 issue of *Library Trends* was titled "Data Libraries for the Social Sciences."[74] Rowe[75] described the need for incorporation of knowledge about machine-readable data files (MRDF) into the reference process but stated that MRDF are normally housed at data libraries in academic departments, research institutes or computer centers. She went on to say that a few libraries have incorporated MRDF into their collections and a few others have acquired codebooks or documentation, but not the tapes. Most libraries, she continued, have done nothing. Those libraries which have are described elsewhere in the *Library Trends* issue and by Ferguson[76] in a *Drexel Library Quarterly* issue devoted to "Machine-Readable Social Science Data."[77] Jones[78] described complete integration into collection and services and Ruus[79] described a data library operated jointly by the library and computing center. The difficulties attendant in housing the tapes and documentation separately from the computer may be overcome if these files become available online.

The Summer-Fall 1982 issue of the *Drexel Library Quarterly* was devoted to numeric databases. Bartkus[80] described the use of scientific numeric databases in reference and information services at duPont. There, scientific numeric databases have been selected and used by either the engineering or information services department, whereas access to commercial and business databases has been coordinated through the information services department. Bartkus predicted that numeric databases will tend to be searched by the individual, rather than an intermediary, because other databases will be available to the individual to manipulate the data extracted, and because the individual uses it directly in his work (design, technical computation or economic study). Access to the databases has been centered in the organization of the searcher-user, rather than the library. Bartkus went on to outline several possible roles for the library in the acquisition and use of numeric databases; a clearinghouse coordination or specialist services

function. Wherever they are selected and evaluated, the criteria described by Ewbank[81] may be applied.

The evaluation process for numeric databases has multiple steps, as does selection of a bibliographic database, since both the database and the system used to access it must be evaluated. The evaluation revolves primarily around the content of the database, the system used to access it, and factors relating to management of the database. Factors to consider relating to content evaluation are scope (dependent and independent variables, precision of the data, level of data evaluation) completeness, source coverage, the process by which data are selected and evaluated, redundancy, references, consistency amongst units measured, and recency. Factors to consider in relation to database management relate to production and maintenance of the file. Is there adequate technical and institutional support? periodic update and revision? adequate documentation?

A key element of evaluation which must be performed in the case of numeric data is that of the access system. As Wisdom and Houghton[82] point out the searcher of a bibliographic database is looking to see whether or not information on a subject exists, whereas the searcher of the numeric database knows what is available and searches to find it. He/she needs a good access system and ways to extract and further manipulate the data. Ewbank[83] recommends evaluation of system documentation, indexing system, availability (hours, downtime), report formats, and protection from user changes. Although his criteria were developed primarily for scientific data, Autrey[84] applies identical criteria for social science numeric databases and then goes on to raise several issues specific to social science files, namely, user training, privacy and confidentiality of computer records of organizations' internal data and those from personal questionnaires and interviews.

Scientists are usually conversant with computers and have used them in their work for a generation now, whereas social scientists have only come to use them more recently. More training or more user-friendly systems are presently necessary in order for social scientists to use numeric databases online. In a 1983 review of "Online Searching in the Reference Room" Bonta[85] specified three different areas of expertise involved in searching online databases: knowledge of the database being searched, knowledge of the search system, and knowledge of the subject itself. Greater knowledge of the subject matter has been suggested to be more crucial for searching numeric databases, and perhaps for that reason they have not found their way into libraries. However,

even in those institutions where persons with advanced degrees are employed as searchers, the user's need to incorporate the information obtained directly into a work product or to manipulate the data further make intermediary searching a hindrance rather than a help. Rumble[86] has summarized the basic reasons why only a fraction of the existing numeric databases in science are actually available online. These are the high cost of data entry, difficulties in database building, lack of obvious economic benefits, a small number of well-articulated demands, and lack of encouragement from major online vendors.

End-User Searching

Just as end users search numeric and full-text databases, especially legal and newspaper files, the time for end users to search bibliographic databases may have arrived. BRS introduced its AFTER DARK service in January 1983 and DIALOG its KNOWLEDGE INDEX service in November 1982.[87] Special evening rates and simplified search strategies are offered to encourage individual users, many of whom have all that is necessary (personal computer, modem and phone) to access these files. A search software package using one language to search the different major vendors—SCI-MATE—has also recently been developed in combination with a data management package by Institute for Scientific Information.[88] In February of 1984, Menlo Corporation announced a software package for use with DIALOG databases which is menu-driven and guides users through searches and database selection.[89] The software is available with several microcomputers.[90] Other end-user software packages are available. Will patrons prefer to do the searches themselves or will they still turn to librarians as intermediaries?

The conditions seem similar to those which have caused users of numeric databases to do the searches themselves, i.e., knowledge of subject content, an easy access system and a tool for further manipulation of the information. Some libraries have already subscribed to BRS AFTER DARK for patron use.[91] KNOWLEDGE INDEX offers document delivery in connection with the service, an attractive feature for the user who would like to avoid the frustrations of dealing with a library and would prefer to have the document delivered to his home or office. On the full-text systems, of course, the document can be printed online, in some cases in advance of when the information is available in print.

Some independent dealers are beginning to offer selective database coverage, either through one of the major vendors or independently. For example, EXEC INFO service offers a combination of full text—

Harvard Business Review and *Academic American Encyclopedia*—and bibliographic abstract/index—Management Contents and ABI/Inform—through BRS for a flat monthly rate. VU/TEXT offers a wide package including full-text newspapers, the Pennsylvania Legislative Database, PTS Prompt, ABI/Inform, and current stock market quotes. These developments are summarized by Smith.[92]

Although Stabler[93] argued at the 1984 National Online Meeting that librarians will continue as intermediaries for the bibliographic databases, her arguments are based on 1983 technology where only a limited number of files are available through the simplified search routines of BRS/AFTER DARK or KNOWLEDGE INDEX systems and the fact that, since the access system has been simplified to encourage end users, search results are not as comprehensive or specific as those performed by librarians. This could change, depending on the success of these new services, users' direct access to more full-text files, and development of simplified search software.

Use of Bibliographic Databases in Collection Evaluation

There are two areas where online bibliographic databases have played a role in collection evaluation. These are in comparison of collections in coordinated collection development and in evaluation of periodical collections.

Bibliographic Utilities in Coordinated Collection Development

The ALA "Guide to Coordinated and Cooperative Collection Development"[94] states that these functions presume easy bibliographic access not only to cataloged items, but also to automated order and in-process files when available. Online access is easy, especially when compared to no access, use of many microfiche or book catalogs, or making guesses based on known collection development policies. It is well known that online catalogs have revolutionized resource sharing. They are used by selectors considering retrospective purchases to determine whether a title of suspected little future use is held by an institution with which one has a cooperative arrangement or from which one can borrow readily. But moving from sharing of existing collections to a coordination of future collecting is a quantum leap. Pat Battin[95] ably expressed the situation when she stated: "When one's resources are not equal to the demand, dependencies replace resources in the sharing equation." Before resources can be coordinated, existing strengths and collecting policies must be analyzed. An essential component of this

process, as Reed-Scott[96] states, is agreement on the methodology or
methodologies for evaluating their collections. A major product of
Research Libraries Group's Cooperative Collection Management
Development program is its RLG Collection Development Manual,[97]
which describes how member libraries should report existing collection
strength and current collecting intensity. Member libraries have com-
pleted the conspectus in many subject areas and have accepted collec-
tion responsibility for the group in defined subject areas based on
analysis of the results. The conspectus results are now online on RLIN.
Why online? The information is easier to search this way and there is
access by subject words and phrases, institutions, Library of Congress
classification number, primary collecting responsibility, and collection
level.[98] The multiple access characteristic and currency of information
facilitate its use for comparing and analyzing collections. Gwinn and
Mosher describe the development of the conspectus and its use in
regional and specialized national planning.[99] The conspectus is a pow-
erful collection evaluation tool and Association of Research Libraries
has evaluated the adoption of the RLG Conspectus On-Line for use by a
larger, less cohesive group of research libraries. The Association of
Research Libraries has recommended that it be adopted with modifica-
tions to enable national cooperation in collection development to
become an ongoing reality.[100] If this happens, collection evaluation
results will be online on a grand scale.

   Although collection strengths cannot be compared online, OCLC
participants can conduct analyses of their tapes between any two or
more institutions.[101] Interpretation of the results of overlap studies is
not clearcut and they do not seem to have been widely applied in
coordinated collection development.

Serials Evaluation
   In 1978 Barbara Rice[102] surveyed the use of bibliographic databases
in collection development activities and found that they were being used
in the selection process for verification, but little was being made of
them in collection evaluation. While that paper was being written,
BRS[103] and DIALOG[104] both announced the availability of a collection
development service which lists the total number of times journals are
cited in the subscriber's searches for a six-month or one-year period.
Lancaster,[105] however, echoes Line's[106] criticism of the use of citation
counts to evaluate periodical holdings, and states that, "no measure of
journal use other than one derived from a local-use study is of any
significant, practical value to libraries."[107] On the other hand, use

studies are viewed with considerable suspicion by many and the con-
troversy has by no means been resolved. Recently, ALA published its
"Guide to Collection Evaluation through Use and User Studies," and
citation studies are listed as one possible type of user study.[108] The
guidelines conclude with a warning that no technique alone is suffi-
cient for evaluation and that any one type (e.g., in-house use, citation
studies, circulation counts, or document delivery data) has distinct
advantages and disadvantages. All use studies are cumbersome; and
online citation methods, especially the collection development services,
offer a quick way to compile a list of titles which patrons may well have
requested from the library. Since Bourne and Robinson's[109] early article
describing the use of references from online selective-dissemination
services to test document delivery, there have been a number of articles
descibing the use of citation counts from online bibliographic databases
to identify titles for addition to the collection and for collection evalua-
tion. Hafner,[110] Rice,[111] Seba and Forest,[112] Danilowicz and Szarski,[113]
and Trubkin[114] all used lists which they generated from retrospective
search or selective dissemination services. Garfield[115] maintains the
validity of this technique and has used it to produce his *Journal Cit-
ation Reports* for both *Science Citation Index*[116] and *Social Sciences
Citation Index.*[117] Sprules[118] pointed out that the technique may be valid
for a special, discipline-oriented library, but that it did not work for a
large multidisciplinary collection. Part of the problem with all use
studies is that each type measures a different use, and opponents and
proponents are at odds because we really have not defined what "use" is.
When Rice[119] compared lists of chemistry titles generated by BRS's
collection development service with those generated by *Journal Cit-
ation Reports*, an in-house use study, faculty choice, and the "List of
1000 Journals Most Frequently Cited in Chemical Abstracts," she con-
cluded that no list can match the unique purposes of any one collection.
The BRS collection development service seemed most useful for identi-
fying titles which should be added to the collection. However, the BRS
and DIALOG services were not popular and are no longer available.
Collection development staff and serials librarians obviously did not
regard them as valid selection tools.

Conclusion

Bibliographic databases are being widely used in libraries as refer-
ence tools and have been evaluated primarily from the selection point of
view rather than from the vantage of how well they are meeting library

collection or service goals. Numeric databases have not yet become a part of library collections, as have the bibliographic utilities and index/abstract or full-text bibliographic tools. In addition to becoming a part of the collections, the bibliographic databases have also been used to evaluate holdings in coordinated collection development programs and to evaluate the serial holdings of a given library. The field changes rapidly and the picture then, especially with respect to full text and numeric databases and end-user searching may well be different. The on-demand library described by Aveney[120] may well come to pass, but its time, like that of the paperless society's, remains in the future.

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