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## **REFERENCE LIBRARY SERVICE IN THE DIGITAL ENVIRONMENT**

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### **Abstract**

The reference library plays a valuable role in a print environment for at least two purposes: direct ready reference, the seeking or verification of basic facts; and finding contextual aspects of a person, place, event, period, or other topic. For the first task, one needs an appropriate single source; for the second, a well-selected range of different reference resources, such as dictionaries, encyclopedias, atlases, bibliographies, and biographical dictionaries. Reference library service has not yet made an effective transition into the digital library environment. Research has focused on empowering reference librarians. A complementary emphasis on empowering library users, renewed attention to bibliographic access, and a more holistic view are needed.

## **INTRODUCTION**

*Library & Information Science Research (LISR)* is successfully completing thirty years of publication and the record of achievement is impressive. How could the next thirty years be even better? An early editorial by Ellen Altman admonished us to focus on problems in library service that have not been adequately addressed in this journal or elsewhere and in which a fresh investment of research and development could have a significant practical impact (Altman, 1979, p. 293). A candidate for consideration is the service provided by the reference library, which has played an important role in the paper library environment and it still does. But, somehow, the reference library and the service it provides have not yet made an effective transition into the digital library environment. Why not? How might it? How should we re-design reference library service?

## **DIGITAL REFERENCE LIBRARY SERVICE TODAY**

### **The 9 to 5 problem**

During a conference in 2006 on the difference between print and digital libraries, the directors of two very large university libraries expressed dissatisfaction with the prevailing provision of library service to undergraduates and, especially, reference service (Lee, 2007). One concern was that professional librarians would staff the reference desk from 9 a.m. to 5 p.m., but students often preferred to do their assignments in their dorm rooms using their laptops from 9

*p.m.* to 5 *a.m.* Not many reference collections are open from 9 *p.m.* to 5 *a.m.* and not many students would want to go to visit one at that time even if it were. The professional literature of reference service explores the feasibility of making reference librarians available with 24/7 call center technology, which doubtless has a useful role but which would still require librarians to work from 9 *p.m.* to 5 *a.m.*, constitutes only one component of reference library service, and does not seem likely to scale. What is wrong with this picture? What could be done about it? The problem is, of course, much larger. For students being taught by distance education and, indeed, for most users of most libraries most of the time a visit to a reference library is more or less inconvenient.

### **A visit to a virtual reference library**

Individual reference works often exist in digital editions and reference services are not absent from the digital library environment, but, somehow, the functionality of the reference library and the role that it plays in the print environment does not seem to have migrated effectively to the digital environment. The Internet Public Library <[www.ipl.org](http://www.ipl.org)> provides a fine example of a reference library transposed to a digital environment. It is an attractive and useful site with a familiar feel. What is striking is the extent to which it is a careful reconstruction of the characteristics and technology of the codex: having found the reference department within the library one selects a section based on a combination of topic and genre, selects a promising resource, and drills down into it in the hope that one might find mention of the name or topic of interest, then backing out (up a layer or two) and then drilling down again until one finds one or more acceptable records or abandons the effort. The approach is essentially top down: initial selection at the highest levels, then drilling down, backing out, and moving laterally at higher levels in order to drill down again. It is a faithful reproduction of the affordances and characteristics of the codex. Is this digital mimicking of a non-digital technology the best answer? One is reminded of Robert Faithorne's quip that direct mechanization of traditional library classifications is like building locomotives to run with legs (Fairthorne, 1961, 144).

### **The research literature on reference library service**

Leafing through the pages of *Library & Information Science Research* since the first issue one finds rather little discussion of reference library service *per se*. This comment should not be taken as a criticism specific to *LISR*. The same conclusion emerges even more starkly if one scans the last forty years of *RQ*, now *Reference and User Services Quarterly*, or recent volumes of *Library and Information Science Abstracts*. Instead, the substantial research contributions have been dominated by two specialized topics:

(i) *Accuracy*: The answers provided by reference librarians was frequently studied and, often, about 50-60% the answers were found to be accurate for a variety of different reasons (e.g., Crowley, 1985). One cause is that printed reference works are sometimes inaccurate and always obsolescent; another is that reference collections are selective and necessarily incomplete; a third is that the librarian may have failed to understand the patron's query. A nice example is the

query “Can birds fly?” which was really about whether a commercial airline would allow a passenger take a pet bird on board. This query was wrongly interpreted, inappropriately answered, and should have been (re)directed to the airline (Dewdney & Ross, 1994).

(ii) *Call centers*: The application of digital technology can extend the use of the telephone in enabling reference librarians to answer questions remotely in the manner of a commercial call center. The emphasis on this topic has become so great that the “reference question” is no longer defined as a type of question but by the manner in which it is answered and the phrase “digital reference service” is not the service provided by the reference *library*, but is limited to the subset of answers provided by the reference *librarian*, e.g. “For the purpose of the research agenda, digital reference is defined . . . as *the use of human intermediaries to answer questions in a digital environment*” (Lankes, 2005, p. 321, emphasis in original). This definition excludes consideration any library service arrangement by which a user finds an answer to a reference question unaided.

There is, of course, continuing research on teaching library use, which includes the use of reference libraries, but it is not presented in the literature as closely tied to the design and evaluation of reference library services. Other aspects of reference library service are present but given considerably less attention: The preference of most library users for finding their own answers (e.g., Swope & Katzer, 1972); the weeding and development of reference collections (e.g., Biggs & Biggs, 1987); expert systems to recommend which reference source to use (e.g., Shao-Feng & Lancaster, 1995); and larger libraries quietly making self-help easier by providing Web pages that facilitate patron access to ready-reference resources available online (e.g. Mudrock, 2002; Stacy-Bates, 2000).

Two related characteristics stand out in research literature on the reference library service: There is little about the reference library as a whole, about the coherent combination of space, reference works, amenities (e.g., space, tables, and copy services), and library staff; and the research is primarily about the empowerment of *librarians*, not about the empowerment of *library users*.

A more holistic, user-centered view of reference library reference service can be found if we look far enough. Back in 1930 James Wyer’s *Reference work: A textbook for students of library work and librarians*, published by the American Library Association, had this to say: “With all this must go the utmost efforts at training in *self-help*. No theory of reference work is complete which fails to recognize the library’s obligation to train its public in the use of its collections. This is at bottom only altruistic selfishness, because a trained public that helps itself will make for easier and more satisfying library service, and will enable more people to be served.” (Wyer 1930, p. 9).

Introducing the proceedings of the University of Chicago Graduate Library School institute on the reference function of the library in 1942, Pierce Butler wrote: “From these considerations it should now be possible for us to define reference work in terms of its functions: it is that process by which civilized man is able to obtain specific information at will by the use of books which have been organized into a library” (Butler, 1943, p. 11). More recently Jo Bell

Whitlatch (1990) wrote in her *The role of the academic reference librarian* “Users who request reference service represent users who are generally less experienced with the library and have a relatively incomplete understanding of how to use the library. The more users know about the library, the more likely they are to help themselves” (p. 14; see also Pierce, 1984).

## THE SEMANTICS OF REFERENCE SERVICE

Developing the functionality of the reference library in a digital environment would be helped by greater clarity in discussion.

### “Facilitate” and “intermediate”

In an important sense all reference library use, including use by the majority of users who avoid asking for assistance, is mediated by librarians because the reference library and all reference library service – the space, the collection, arrangement, the hours of service, and the staffing pattern – are the result of the deliberate actions of library staff. It would be helpful to have clearer terminology to distinguish between the narrower case in which service is provided through the individual librarian acting as an *intermediary* (as in the call center mode) and the more general case in which the cumulative actions of the library staff *facilitate* by creating a service situation in which the patron can often find some or most answers without asking for help.

Direct assistance to library users is, of course, very valuable, but that should not lead us to forget that the core professional task of librarians since the phrase “library science” was coined two hundred years ago by Martin Schrettinger (1808) has not been direct service to patrons but the design and deployment of systems and services that enable patrons to serve themselves. Libraries could reduce operating costs by avoiding the key innovations of Schrettinger and his successors: by discontinuing the public catalog, by shelving books in accession order, by ending open access, and by not lending. But it is the investment in these amenities that empowers users to serve themselves, enables the library to accommodate much more library use, and makes the library more attractive to the community served. Consider any actual reference library and compare the number of different people who can use a reference library *collection* simultaneously with the number of patrons that could be served simultaneously by the reference *staff*.

### “Reference service”

As already noted, there has been a marked trend to restrict the meaning of “reference service.” The most basic level of service in a reference library is the provision of a judicious selection of reference resources in which users can look, with the librarian providing some direction as and when needed. (This is Wyer’s “conservative level” and Samuel Rothstein’s “minimal level” (Rettig, 1978)). Given the huge growth in the numbers of users, the perennial need for economy, and users’ preference for self-service one might have expected this minimal level to have received a great deal of research attention and an emphasize on service designs tending towards efficient and effective self-service, but it has not. In the U.S. literature, instead,

attention has turned to a narrower focus on the direct personal interventions by professional librarians, so much so that the *ALA glossary of library and information science* (Young et al., 1983) excludes everything else from its definition of “Reference service.” Often, texts are ambiguous and “reference service” can be read as referring either to the reference library’s service or to a reference librarians’ question-answering, but, if anything, this narrow definition has taken a stronger hold over time. Similarly, if a user transacts a successful search in a reference work in a reference library, it is not considered to be a “reference transaction” unless a librarian found the answer for the user (Richardson, 2002). This narrow definition is U.S. usage. British writings, in contrast, adopts a more holistic view. “Reference service” is the service provided by the reference library: collection, amenities, and library staff, both professionals and support. (Han & Goulding (2003) note this difference in emphasis.)

The narrowness of the definition of “reference service” ought not, in itself, to make a difference, but it may help to explain the heavy research focus on the empowerment of librarians, rather than of users, and it is hard to avoid a suspicion that the narrowing of the meaning is associated with a narrowing of vision. Library planning and management was deeply influenced by systems thinking in the 1960s and 1970s and in hindsight it is rather surprising that we have not seen more interest in reference library service as a socio-technical system involving the collection, the amenities, the library staff, and, of course, the library’s users.

### **IDEAL FOR THE USER**

What would have been the ideal reference library service situation in a pre-digital, paper environment? For any given user, it would certainly have included a generous array of the best available resources for that one user, optimized in choice and arrangement for that one user’s immediate personal needs, with a specialist librarian available when needed. It is not, of course, practical to provide a separate array of reference resources for each user and, if it were, it would have to change continuously as that one user’s interests shifted. Some new and different technology is needed.

Microfilm has different capabilities. After extreme resolution microphotography at a resolution of fifty complete Bibles per square inch was announced in 1925, a German library user, Michael Gesell, glimpsed the potential and wrote a lyrical essay on the prospect of escaping the inconvenience of large conventional libraries by having a perfect personal collection of microfilmed resources lining his study walls like wall-paper and all readable through a desktop “microtelescope”:

[Dr Goldberg] has invented the library of the future.

His invention allows one to carry a library of a thousand books, each of a thousand pages, in one vest pocket. The entire *Brockhaus* encyclopedia takes up not even five square centimeters of space . . .

If I were a rich man, I would have Dr Goldberg build me a workroom. It should be eight-sided, have a comfortable revolving chair in the middle, at which the microtelescope would be installed, and the walls should be made of

glass plates.

This workroom needs only a modest space of eight by five meters and five meters high. [On the walls,] as anyone can verify, one could accommodate about twenty million books, each of a thousand pages. I would sit in my revolving chair and start to read. No state library would be able to irritate me anymore, as I would have the most important of world literature at hand . . .

Seriously: What is radio or aviation compared with this invention?  
(Gesell 1926; Translation from Buckland, 2006b, 112-114).

But microtext technology has not developed in that way. So how, now, might we design the ideal reference library service to empower users in an increasingly digital environment? Let us return to the students in the dorms trying to complete their assignments from 9 p.m. to 5 a.m. and consider how reference library service in a digital environment might be designed for them, without limiting ourselves (or them) to call center solutions. Marcia Bates provided a good starting point in an excellent article for reference librarians (Bates, 1976). She adopts a holistic approach, argues for a rigorous reconsideration of bibliography, and points out that bibliographies, too, are intermediaries. This approach requires a broad understanding of “bibliography” as including not merely the listing of documents but enabling the purposeful selection not only of whole documents but also fragments within them. She drew on the insights of Patrick Wilson and his classic *Two kinds of power: An essay on bibliographical control* (Wilson, 1968). The big change since Bates wrote in 1976 is in the increased scope for bibliographers to create new forms and varieties of bibliographical access in an environment that has become far more digital and much more networked.

## REFERENCE AND BIBLIOGRAPHY

### Objective

Here, as with Mann (1999, p. 56) reference service is understood as dealing with questions for which a “right” answer is plausible, such as “Where is Leipsic?” However, there is more at stake: the difference between understanding and mere memorizing lies not in the isolated factoid, but in acquiring some knowledge of the context and relationships of things and, at a factual level, reference libraries are a very good resource for initial investigations. The objective for our design should be to empower the user. (Empowering the librarian is necessarily subordinate to that higher goal.) Telecommunications technologies lead naturally to call centers. A digital environment characterized by local computing power everywhere and the ability to engage with remote resources anywhere, leads naturally to user self-help and a desire for self-sufficiency. The economic and psychological grounds for promoting self-help are compelling and, if our service is to be used, we need to minimize the time, the effort, and the difficulty of use.

### Search

One would like to know, in advance, where to look, especially when one is looking for something rather obscure. It is so tedious, time-wasting, and discouraging to look in one reference work after another, failing to find the name or topic being sought. It would be nice to know reliably ahead of time where to look and where not to bother. What if the library reference service could indicate immediately which of the reference resources had records responsive to the user's query? It is here that the judgments of experienced reference librarians can be helpful, but there is also a technical solution: the construction of a union index, a unified index to multiple sources, just as a union catalog is an index to multiple libraries' collections.

Union indexes, being tedious to compile, are not common in the paper environment. One example in our own field is *The Library and Information Science CumIndex*, edited by Frederick Kilgour (1975), a union index to 96 leading books derived by consolidating their back-of-book indexes. It was one of several "CumIndexes" designed on the basis of research by James L. Dolby and Howard L. Resnikoff. A useful union index found in large reference libraries is the *World Biographical Index*, an index with some 10 million entries for over 3 million persons in over 8,600 reference works, initially published on microfilm and now available online in the *World Biographical Information System Online* (K. G. Saur Verlag, 2007). Most libraries will have had only a small subset of those 8,600 published reference works on paper, but, first with microfilming and now with mass digitization, these and many more are becoming available. The *Science Citation Index* can be considered a kind of union index of journal literature. It indexes citations, rather than topics, but it is a very large union index nevertheless. Periodicals containing articles line library shelves and citations are the periphery, at the ends and edges of the articles. A citation index inverts this relationship: the science citation index takes the citations and creates arrangements of them. When the searcher finds a citation of interest, the paper is accessible peripherally from it.

In a print environment one must find the resource before looking in it for an entry. With a union index the searcher can first find mentions of the term of interest, and then consider the age and probable trustworthiness of the source in which it was found. An additional merit of a union index is that facilitates the comparison of multiple different sources. It is reassuring when several sources agree, and worth knowing when they disagree.

The creation of a union index entries inverts the relationship between the whole and the parts. Inversion is a matter of reversing the relationship between a part and the whole and is far more feasible with digital documents (Buckland, 2007a).

The resources in the Internet Public Library's Reference library are all digital, so a union index should be feasible if the individual publishers were willing to cooperate in its creation without insisting on limited silos of offerings of single publishers.

Although printed union indexes are uncommon, the idea and the effect should be thoroughly familiar and acceptable to the students in the dorms since Google is, in effect, a huge unedited union index. Google points directly and immediately to mentions of a name or topic. Only then need one consider the identity and likely reliability of the source in which it has been found.

## **Trust**

Which sources should be trusted? Reference works do contain and perpetuate errors, but some are considered more reliable and/or more up-to-date than others. Reliability is independent

of technological medium, although digital resources are much easier to correct or to update. Selection for inclusion in a reference library is a significant endorsement. There are a variety of additional options in a digital environment. As one example, the technology that identifies “sponsored links” could presumably identify resources recommended (“sponsored”) by librarians.

### **Systems’ vocabularies and users’ dialects**

There are always problems of vocabulary. Well-edited resources usually have some kind of categorizing: a classification, index, thesaurus, etc. The effect of a network is to make available an increasing array of resources with unfamiliar vocabularies.

Language is dynamic and evolves in communities of discourse, so individuals in different specialties use words more or less differently. So not only do users have to cope with differing vocabularies in different resources, but, also, the users of any given resource will themselves have more or less differing dialects, so, ideally, multiple indexes for different communities to the same resource are indicated.

Addressing vocabulary differences is part of the reference interview process. Creating mappings to and between different vocabularies “by hand” is very expensive and the results are inevitably obsolescent (Buckland, 2007b). Vocabulary mapping and search term recommender systems (also known as relative indexes or entry vocabulary indexes) have been developed for digital environments and their widespread incorporation into digital library services is overdue (e.g. Buckland, Chen, Gey, & Larson, 2006). The need for multiple indexes to the same resource is not the same as providing access to multiple system vocabularies for the same user, but the same approach can be used in a digital environment (Petras, 2006).

### **Facets and genres**

There are specialized genres of reference resource of each of What, Where, When and Who: For What, library subject headings and encyclopedias; for Where place name gazetteers; and so on, and each has special display needs, including cross-references for subject headings, map displays for gazetteers, time lines for events, and family trees for biographies. Who, now, would want a library catalog without a map interface to support geographical aspects of search and selection? (Buckland, Chen, Gey, Larson, Mostern, & Petras, 2007).

The opportunities extend well beyond the provision of specialized solutions for the basic facets of What, Where, When and Who because in practice good resources for each facet may also contain category codes for the other facets. *LCSH*, for example, commonly has chronological and geographical subdivisions, e.g. **Architecture** -- *Japan -- Edo period, 1600-1868*. “Architecture” is positioned within a web of related terms. The secondary levels of categorization (“*Japan*” and “*Edo period, 1600-1868*”) allow the possibility of creating an additional web of connections to other aspects of Japan and/or other developments anywhere during the Edo period, both through *LCSH* and through other vocabularies in with other reference resources. Gazetteers are lists of place names, but they categorize kinds of places (“feature types”). The National Geo-intelligence Agency’s Geographical Description Code “School” corresponds directly to *LCSH*’s “School buildings” but also to “Schools” (as

institutions). Making a connection through this kind of mapping allows a subject search for schools to extend to finding actual schools, or, in the other direction, a school building located on a map can lead through the gazetteer to catalogs and bibliographies to literature (if any) about that particular school and about schools and school buildings in that region or generally.

### **Structure and infrastructure**

A bibliography can be considered an intermediary and indexes and metadata should be considered to be infrastructure. The first and original role of metadata is describing documents. A second role of metadata is to form organizing structures by means of which documents can be arranged. These structures can be used both to search for individual documents and also to identify patterns within a population of documents. The second role of metadata typically involves an inversion of the relationship between document and metadata, as indexes ordinarily are. These structures can be considered infrastructure just as much electrical power, telecommunications, and other supportive amenities (Buckland, 2006a).

As structures and infrastructures develop in a digital environment the boundaries in the print world between individual reference resources, between the reference library and the rest of the library, and between the reference library service and the laptops in the dorms can be expected to become more fluid and permeable.

## **CONCLUSION**

One can learn a great deal on almost any topic in a short while in a reference library. The theme underlying this paper is the need to develop structures appropriate to digital technology, to the users' needs, and to the users' work environment. For thirty years library reference research focused on empowering the professional librarian. Evolving technology in the digital environment invites an increased emphasis on empowering the library user and on optimizing reference library service as a whole, a rich and promising research agenda for the next thirty years.

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