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OCTOBER 1957, VOL. 48, NO. 8

Library Machines and Systems

United States Documentation Trends

The Librarian and the Organization

A Profit Viewpoint Toward Library Operations

Management Tool for Evaluating Library Services

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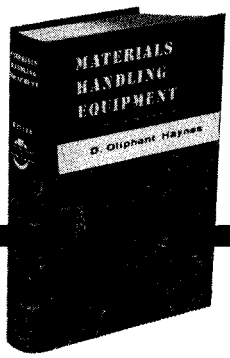

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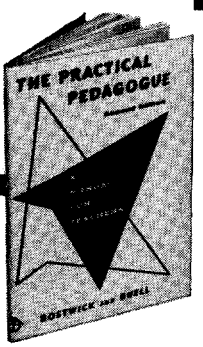

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Machines and Systems For The Modern Library

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THERE IS ACTIVE FERMENT today in library science. For years the literature was almost totally concerned with operating techniques, educational procedures, building design, public relations, recruiting and all the other paraphernalia of every profession. Today the fundamentals of librarianship are being reappraised. We no longer accept as gospel the established systems but rather we try to rethink the fundamentals that helped create these systems.

Many of us make the same discoveries that our library ancestors did, but because of ignorance and because our vocabularies may be different, we think we have made new discoveries. Sometimes it is not ignorance but an attempt to dress up rather thin ideas with the fashionable vocabularies of mathematics, logic, philosophy and the sciences.

The resulting cacophony tends to confuse more than clarify. However, beneath it all there is a real agitation. There is a genuine search for methods and means to improve librarianship. It is true that there is much more sound and noise than any basic achievement, but it is also true that there are real searches going on with new tools.

Factors Changing Librarianship

There are, in the main, three reasons for this present day search:
1. The availability of machines and other new tools
2. The fact that librarians concern themselves with new kinds of materials
3. The fact that the library clientele is making new demands on library services.

Today there are machines in everyday use that can perform various library functions. There are machines that can record and store information either as holes in cards, or as holes in tape, or as magnetized images, photographic images, beams of electrons and so on. Then there are rapid scanning and reading devices that can search out stored information, extract it, record it and deliver a copy. There are also computer-like switching machines that can show mathematical relationships between ideas and compute these very rapidly. And there are transmitting machines that can deliver copy over long distances at very high rates of speed.

The mechanization of many mechanical and even intellectual library activities is, therefore, not only possible but practical. Furthermore many librarians work in close proximity to these macines and have access to them, so they have opportunities to experiment.

Pictures, films and records have raised problems for librarians. However, much more fundamental in its effect has been the pressure on the library to organize and produce information that is in a more primitive state than books and journals. Originally a library was essentially a collection of books, and the catalog, with its rather broad indexing, served as an adequate key to these relatively large packages of information. Later, scientific societies began to

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publish the papers presented by the society members. These transactions in time became journals.

Although the science indexes and abstracts for this journal literature began quite early, especially in Germany, it was some time after the development of modern library systems for books that librarians began to recognize the importance of the indexed abstract journals as bibliographic tools. In fact, with a few exceptions, librarians have played only a minor role in the development of these abstract journals.

In recent years the scientific community began using the literature it was producing at a stage more primitive than the formal journal article, namely the research report. As a matter of fact, scientists have always used information in all its stages of development from the most simple oral communication and letter through the more formal symposium, lecture, report and published paper. But today the time sequence between the actual scientific discovery and its utilization by other researchers is becoming shorter and shorter.

The consumption of fundamental science by the technologies is increasing at a very great rate. Where formerly the time lag between the development of a fundamental idea and its utilization by technology was measured in tens of years, it is now measured in months and weeks. Within weeks after the development of the decay scheme of thorium, for instance, plans were developed to build reactors to utilize this discovery.

This rapid consumption of knowledge is due in part to the increasing importance of science and technology to society, which in turn is causing the nations of the world to devote more and more manpower to scientific research and development. The demands of this ever increasing mass of scientists and engineers is exerting tremendous pressures on all forms of recorded and even unrecorded information. The librarian, therefore, is finding it necessary to produce for his clients information that exists in forms that are much more primitive than the book and journal.

How far back to the original source does the librarian go to produce this information? Back to the so-called topical reports? Back further to the memorandum and interim report? Or still further back to the periodic report and on back to the laboratory notebook? At what point does the record become library material? Obviously today it can go back to even before a written record is made—to the direct communication between researcher and researcher. Thus it is not unusual for a librarian in an effort to answer a reference request to find that there are no recorded data available. All he can provide the requester is information about who is doing the work.

Thus the format in which information exists is tied closely to the demands made on the librarian, not only to produce the requested information very quickly but also to provide the information in much finer detail. The specialization of scientists and their demands for information while it is still in the process of generation make for very small packages of information. Furthermore the information sought is often so specific that the indexing must be detailed in the extreme.

As a result, bibliographic searching tools — the catalogs and indexes — are very large in relation to the collection. The amount of work necessary to produce and maintain these tools is therefore very great and expensive. Often there is added to this the costs of security controls with their receipts, inventories and strict circulation controls.

Also acquisition of reports is often a hazardous, nerve wracking business. Many reports are not available through the normal commercial channels like books and journals. The various government agencies under whose contracts most of these reports are prepared have many different policies and procedures for making these reports available. And too often the bibliographic control is so

haphazard and sketchy that it is extremely difficult to identify a document and its source. In fact all too frequently the very existence of a report remains unknown because no bibliographic record exists. All in all, the small reports library is an expensive operation requiring much professional administration.

To dismiss this report literature as just an example of the old near-print materials which libraries have adequately taken care of in vertical files is really to misunderstand what the real problems are. That is why it so often happens that the older, "classical" librarians fail to understand the reports librarian — the documentalist if you will—or appreciate his problems. The reports librarian is under pressure from his management to make his operation more economical. He watches in horror as his catalogs and indexes grow at a rate that threaten to take over the whole library, while at the same time he is desperately trying to process the ever-rising flood of new literature.

In trying to solve his problems, the modern librarian is rethinking many of the fundamentals of librarianship. He tries devices and approaches that industry and business use for calculations and stock and inventory control and he listens to the many advocates of systems and machines who are eager to make a sale.

What to choose? The librarian's task isn't made easier by the huckster-like fancy language that many proponents and salesmen of the various systems and machines employ to dress up their wares. Erudite terms are borrowed from all the sciences, engineering, symbolic logic and metaphysics and when these do not suffice, words are coined from mythology or the telegraphic code book.

Actually, of course, the basic ideas, just like the basic problems, can be expressed in essentially simple terms. In the remainder of this paper, therefore, I intend to examine the fundamentals involved in the various existing machines and systems as applied to modern libraries and to describe them and their areas of applicability briefly, so that the individual librarian may be able to determine for himself their applicability to his own operation.

Document and Index Storage Possibilities

From a librarian's viewpoint there are two forms of information storage. You can store the index and you can store the document or an abstract of the document. The most efficient way to store the document is to reproduce it photographically in miniature. With modern reading machines and modern methods of reproduction no other method can approach the efficiency of microfilm, microcard, minicard and so on.

The only fly in this ointment is the resistance of readers to the use of the less convenient miniaturization. Maybe the new generation of television viewers will find reading from a screen less objectionable. However, because it would make this paper much too long, I am omitting any discussion of storage and transmittal of documents and confining my remarks to the indexing problem.

As for the storage of the index, machines immediately present a problem. Machines cannot store ordinary language efficiently. Language must be converted into codes. This immediately introduces a complication and an expense. The index must be coded, the questions put to the index must be coded and the answer must be decoded. All this takes time, effort and money. The machine, therefore, must produce certain efficiencies to compensate for this.

There are in existence today some library subject and author indexes on IBM punch cards. To put an author index into an IBM card one can either use a code or dedicate almost a whole card field to the name. If the whole card is used for the name, then the only advantages over a typed card are a mechanical means for alphabetizing the whole file and a mechanical means for reproducing the file.

The actual searching for a specific name can be done so much more efficiently by manual means that the author index punch card file is practically always searched manually. If a code is used to record the name in the card, then machine searching is mandatory. This is bad enough considering the effort required and the cost of the machine. What is worse, the standard name codes, like Cutter numbers, do not produce the exact name but rather a group of names from which the individual name must be extracted manually. In other words, there is nothing as efficient, as easy to set up and maintain and as easy to operate as a simple typed or printed author index.

It is only when it is necessary to have a mechanical means for reproducing an index that a machine author index can be justified. As a searching device it is utterly ridiculous. Wherever a library author catalog that is searched by a machine is found, one can be reasonably sure that the developers of the system are more than slightly "machine happy" and have not done the necessary elementary thinking about the problem.

Cataloging With Machines

Now what can the machines do better than the conventional catalog? Here the answers depend on the systems employed with the machines, but for simplicity of presentation these topics will be treated separately. I shall discuss machines as if any or all systems are used even though this, of course, is not practical.

One advantage that can be gained by using machines is that the information need be recorded only once. In a conventional catalog the information must be recorded under each subject heading. However, since the machine is fast and patient, it is willing to search through a whole file to produce a desired item or items. This is true of hand-sorted punch cards, machine-sorted punch cards, punch tapes, magnetic tapes and others. Unfortunately a person wanting the information is often not as patient as the machine. Also the cost of making a long machine search can be very expensive. Therefore librarians have found that there are limits to the number of items that can be searched conveniently.

The machine user must first estimate the number of items his file will contain and then calculate the length of time a search will require. In the case of hand-sorted punch cards, files of up to 5000 cards work well and files over 10,000 cards as a rule do not work well. Mechanical shake-out devices and specially designed codes can increase these quantities somewhat but not appreciably. In the case of machine-sorted cards, a rule of thumb is to figure about 200 to 300 cards a minute for those machines that read the whole code at a single pass. This allows for normal make-ready. Where the ordinary sorter is used and each column is read separately, then this figure must be divided by the number of columns which have to be read. As a rule then, for ordinary library reference work it isn't convenient to search much over 50,000 cards.

There have been instances where large library indexes have been put on machine-sorted punch cards or magnetic tapes with little or no thought given to the relationship between the size of the collection and the time needed to make the search. The results of course were disastrous. What formerly could be found in a matter of minutes in the conventional catalog now took several hours with the machine. Worse still, the machine was sometimes in use just when an urgent search had to be made. Searches, therefore, had to be scheduled, generally one day in advance, in order to make the most efficient use of the machines.

Some people, upon discovering that a complete search of a file took too long, converted their single entry file

into a unit card system with a card for each item behind each heading, exactly like a conventional catalog. When this was done, all the inherent advantages of the single entry system were lost and the resulting catalog was simply a conventional file which was read by a machine. This, of course, as in the case of the author index, is completely silly unless the information is kept in machine form so that it can be mechanically reproduced, that is, the machine is used as a printing device. With the more conventional punched card, punched tape or magnetic tape machines, therefore, great care must be exercised that the collection is not so large that the time needed to search it is excessive.

There are, at present, several new developments which may remove this size limitation. One is a very large machine which can very quickly search out information stored in random fashion on magnetic discs. The other is a cut film process which carries code and document on a tiny piece of film. Both are very new and as yet untested for library applications. Both at present are fantastically expensive and far beyond the financial reach of any ordinary library. Their potentialities, however, are great, and as these devices are developed they should be watched carefully for possible library applications.

Human Frailties Inherent In Searching Systems

Before discussing systems as such, one thing must be made clear. The mechanized searching systems as they exist today are not creative. That is to say, no information can be extracted that the original indexer has not recorded. The information extracted may be used for new purposes or the searcher may "browse" through the index by looking at related subject matter or he may go into the cross references to see if the associations may bring him fresh viewpoints, but always he extracts only information the indexer has recorded.

Not until the indexing device can read directly in the document or until the recorded information can go beyond the index heading, will new concepts be created which the indexer did not put there in the first place. If an index can, by manipulation, present new information, then this information is very apt to be false. In fact, one of the major problems of the manipulative type indexing systems is to devise techniques that will prevent this creation of new, false concepts.

From all this one thing is quite clear. The quality of the index produced is directly proportional to the intellectual effort applied to the production of the index. Anyone who proclaims that his indexing system is appreciably cheaper or requires a lower intellectual level than conventional means to produce a high quality index is offering a false bill of goods. There may be some savings in certain clerical and mechanical functions but the big expensive job of extracting the subject content from a document and putting it into an index remains essentially the same for all systems.

One of the wryly amusing things about many of the self-laudatory presentations of special systems is their striking contrasts between the superiority of their information retrieval as compared with a previously used conventional system. In nearly every instance the old conventional index or catalog was the part-time product of a harried librarian generally without much subject training whereas the new index was the full time product of a staff of subject experts. The real improvement obviously was due to the better subject extraction and was not due to any system or technique.

The fundamental difficulty with the conventional catalog is its extreme bulk where detailed indexing is required. Since each entry must occupy a fixed position in the catalog it becomes very expensive to try to index each subject

in all its possible combinations and levels. As a result, the cataloger chooses the level of indexing to fit the document in hand, without regard to the possible utilization of the information.

For example, a document giving an elaborate account of the physical properties of a metal is cataloged as *Metal —Physical Properties.* Another report which has a brief account on the melting point of this metal is cataloged as *Metal — Melting Point.* Actually the first document has much better information on the melting point of this metal, and so it takes an astute and experienced catalog searcher to know he must look under various subject headings to find the specific information he is seeking, in spite of the fact that there may be an exact subject heading which fits his needs.

It is obvious from everything that has been said so far that to use machines merely to read conventional library catalogs or indexes is not only uneconomic but, worse still, provides no additional service than that obtainable from a conventional catalog or printed index. The successful applications of machines depend on making full use of their special abilities. The major special ability of machines is their capability of comparing things mathematically, thus adding, subtracting and even multiplying and dividing. The essential thing therefore is to have a system which can successfully manipulate index headings.

Systems Which Can Manipulate Entries

The essential of the new schemes is that they break the headings into their component parts, leaving it up to the searcher to recombine them as required. This permits entry searching at any level, with the cataloger having to make only one entry for each subject. This can be worked out by any one of several methods.

Historically, the first to use it were the hand-sorted punch cards. When the number of holes around a card proved to be insufficient for all the subject headings, it became logical to dedicate, for example, one field to materials and another to properties and to combine these as needed. Thus, in the example given above, one hole would be slotted for the metal and in the properties field all the individual properties referred to in the document would also be slotted. Thus in one card one could search for any single property of the metal or collectively for all the physical properties. This system was extended to the Batten or Peek-a-Boo cards where instead of having one card for each document and a fixed position on the card for each entry, the situation was reversed. Each card was dedicated to one entry and a position on each card was dedicated to a document number. As the headings are combined, the cards are stacked one on top of another and the coincidence of the holes shows which documents contain the desired information.

Instead of visually matching holes, the Coordinate Indexing system matches document numbers by arranging them in convenient columns of ten. However, Coordinate Indexing may also be recorded as holes in a card as in the Batten system. There are machines available to do this and cards which are able to hold up to 40,000 entries.

Another technique involves the use of a telegraphic-like code whose terms can be combined to give any level or combination sought. This so-called semantic factoring also combines into it some aspects of subject classification, permitting class and sub-class searches, but essentially it does the same thing as described in the other systems.

A more refined technique involving the complex manipulation possible with a large computing machine is currently being tested at the National Bureau of Standards for the U. S. Patent Office in the field of steroid chemistry. By the use of ingenious codes, each steroid is indexed for its elemental constituents,

its structure and its properties. Then when information is sought, the machine "reads" all the information recorded and selects those portions desired in any combination of parts, structure, properties or uses. The depth of indexing possible with this system is almost infinite. Here is an extremely complex chemical and yet the searcher can pick out any single element in any position, or any group of elements within the compound and match them against any set of properties. This is possible only because each item is indexed and coded separately and the computing machine can read the code very fast and match and select the items sought better than any human could do it.

All these systems have a few inherent difficulties. If a document is complex and deals with several subjects, it is possible to make false combinations of the indexing terms. This can be avoided by treating each section of the document as an independent unit and indexing it separately. All these systems require that the documents be numbered in order to identify them and thus often introduce an extra step in getting at the desired item.

Most of them need codes with the attendant expense of coding and decoding. The elaborate machine techniques require programming of the machines. All of them separate the searcher from the usual descriptive matter found on a catalog card and prevent the effective use of the human imagination. There are, in fact, attempts at present to overcome this difficulty by systematizing searches through related or associated fields. Except for the simplest punch cards, most of the new systems are much more expensive than conventional catalogs except in instances where advantage is taken of the mechanical ability of machines to reproduce additional indexes or catalogs.

What does this all mean to the individual librarian? Obviously no single answer can be given. For simple identification such as sought in author indexes or shelf lists, the standard card file is the most efficient. If only broad subjects are sought, then conventional cataloging or standard journal indexing is more than adequate.

If extremely detailed subject analysis is necessary, one of the new systems should be investigated. If the collection is small, one of the simpler hand-sorted punch card systems should be investigated; however the code to be used must be carefully designed and tested.

If the collection is larger than 10,000 items and the conventional catalog does not seem to meet the needs for detailed indexing, then a Peek-a-Boo or Co-ordinate Index, either hand-sorted or machine-sorted, should be considered. But again great care must be exercised. Tests should be made in those subject areas which are giving difficulty. Careful cost analyses should be made. If the public is to manipulate the file, user acceptance tests must be run. Frequency of use must be calculated.

If machines are used and they are idle most of the time, it may be too expensive. On the other hand, if many answers must be provided quickly and the searches must be done separately or machine time must be scheduled in advance, then the system will fail.

In spite of all this, one should not forget the peculiar fascination of gadgetry and new approaches. Productivity and efficiency are associated in peoples' minds with machines, and the terms "new" and "progressive" are often considered synonymous.

Sometimes it is very difficult to convince management that what you need is a cataloger and a few more trays in your card file, and yet it may be very easy to convince management that if you had a subject analyst, a key punch operator, a coding clerk and a large monthly rental for some imposing machinery, your information retrieval system would produce fabulous results. These are practical matters that cannot be ignored. The answers lies with you.

Trends in United States Documentation Research

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I BELIEVE it can be said that the first general interest in documentation was exhibited immediately following World War II. This interest stemmed from the vast amount of money and effort poured into research and development during the war with the consequent dilemma that was faced in trying to make some sense out of the record of technical activity when things quieted down a bit. In short, we were faced with a tremendous mass of technical information generated on a hectic wartime basis, and this information, although produced, received very little attention relative to establishing controls and records for retrospective searching.

Post-War Attitudes

Although the rate of research and development activity dropped off considerably immediately following World War II, there was still, in comparison to the period before the war, a much larger amount of information to be handled. So, in effect, we had a dual problem of bringing together the results of the wartime production of information and at the same time coping with newly produced information in amounts far greater than we had handled before.

From the strictly military point of view, I believe it can be stated that there was little concern with the problem, and it was only when our military leaders became influenced by scientific opinion that any real interest was shown.

When I speak of scientific opinion, I refer primarily to some of our best scientific talent which had been charged with military responsibilities and, in general, continued to be associated with military research and development after the war. This body of opinion made itself known in many ways and it was supported for different reasons by the military services.

Congress was also influenced by some of the top scientists who had done so much to help a successful war effort and its interest was reflected in generous appropriations for research and development and the utilization of the resulting technical information. Perhaps the best known example of Congressional interest was the establishment of the Office of Technical Services in the Department of Commerce. Its primary mission was to make available to American industry the benefits of military research and development progress made during wartime, as well as the results of German technical progress.

I believe, on the whole, the attitude of librarians was conditioned more by the fact that funds became available for application to information control techniques than by a serious concern for the problems faced by an expanding technology; at least I recall no significant library influence on these problems until money was made available for such activities as the Science and Technology Project, the Office of Technical Services and others. Perhaps the rather placid attitude of librarians resulted from a long standing dearth of

Paper presented before the Aslib Research Committee, London on April 4, 1957.

funds for library work generally and the rather automatic conclusion that additional money would not be forthcoming. Be this as it may, it wasn't long before the interest of librarians was stirred, and I am sure you are familiar with what has happened since.

Activities Of The Past Decade

When it became recognized that in reality an enormous problem had to be faced, the American mind exhibited its usual enthusiastic approach to solving the problem. In general, the attitude at that time was—"Well, we have large masses of information to control, therefore the obvious way to go about it is to apply well-known American business techniques to speed up the control." That is perhaps why in the days immediately following the war there was great enthusiasm for the application of accounting equipment and office appliances to the problems of information handling.

There was very little criticism of the standard techniques of classifying or indexing information, the interest being primarily in mechanizing it. Gradually, however, new devices not used in business were developed which, it was hoped, would offer improvement in the information handling dilemma. The Rapid Selector, Ultrafax, flat-bed facsimile equipment and others appeared. In the main, however, applications of existing business equipment were utilized.

Along with this rash of mechanized attempts, and during the same period, there were several other methods employed to alleviate the problem. One of these was the result of a general governmental tendency toward centralization as exhibited in the establishment of ASTIA. Another was through decentralized but cooperative schemes in which several large information organizations adopted standardized techniques, as exhibited by the side-margin catalog cards prepared by what was known as the G.S.I.S., or Group for the Standardization of Information Services. This group incidentally has had a significant influence on information control procedures in the United States, since there are now 75 catalog card-producing organizations using the side-margin card.

Documentation research interest was evident in still another way during the period between 1946 and 1956. There were individuals who formed their own documentation research organizations. Although there may be some question as to the amount of actual research performed by some of these groups, they were indicative of the interest and support given to documentation research. You are familiar with some of them including Documentation, Inc., Documation, Inc., Herner, Meyer and Company, Zator, and others.

Not quite so bold, but essentially for the same reasons, others associated themselves with organizations for the primary purpose of conducting research. These include the Center for Documentation and Communication Research at Western Reserve University, the Research Group at Chemical Abstracts and some others.

It also became apparent that increased interest in documentation research was being displayed by a number of industrial organizations and various government agencies including the National Science Foundation, the Air Force Office of Scientific Research, the National Bureau of Standards, the Air Research and Development Command, the Office of Naval Research, the Office of Ordnance Research, the Patent Office and the intelligence agencies. More recently the Ford Foundation sponsored the establishment of the Council on Library Resources which includes among its objectives the support of promising documentation research projects.

The net effect of this increasing activity between 1946 and 1956 was a veritable deluge of "new" systems, machine techniques, announcements of studies being undertaken, newly coined terms, extravagant claims, vitriolic accusations and vitriolic denials. Fortu-

nately, the fact that there was a serious problem of information handling requiring expert attention was brought to the attention of some capable people.

It all made for a rather stimulating period of growing pains and provided for professional groups an arena for inspection and resolution of some of the serious problems to be faced. Perhaps the most important result of these ten years is that although no great gains have been made in resolving the problem, we have succeeded in stirring up in the minds of research administrators and scientists a more active interest.

Present Day Attitudes And Activities

We have come to the point where, I believe, we can devote more of our time and effort to the basic difficulties concerned with the efficient handling of information. It is evident now that we need to evaluate properly those systems of information handling which are available to us and scientifically conduct tests on a large enough scale to provide general criteria that can be applied to any information system.

We are now becoming concerned with certain fundamental problems which may have some bearing on the problems of storage and retrieval. It is only recently in the United States that some of our linguistic specialists have felt that perhaps investigation of linguistic transformations may assist in making information more readily retrievable and that by simplifying language structure it may be possible to design machine systems useful in information retrieval.

We have about come to the conclusion that machines just can't do everything and recognize they have limitations for storage and retrieval of information. We now have competent logicians questioning some of the approaches that have been made to the mechanization of informative handling. We are well aware of the many difficulties to be faced in the development of reasonable codes for machine storage and retrieval.

There is currently some question concerning the difference between the development of a classification for storage and a classification for retrieval of information. There has been quite a lot of discussion concerning the expenditure of vast sums of money to develop high priced equipment for supplying answers to questions, when perhaps we are not sufficiently familiar with the way people ask for information. I believe that in all of these areas, we recognize a requirement for time and that the answers will not be forthcoming tomorrow.

The foregoing perhaps does not indicate trends in United States documentation research as much as it does recognition of the need for considered judgment in future research projects. This does not mean that we shall see the end of crackpot ideas or that we shall be able to or want to subdue the enthusiasm of individuals who take up the documentation cudgel. As in all areas of science, this seems to be a necessary, albeit frequently expensive, part of the procedure. I do, however, believe we will discharge the brash enthusiasts to their proper court of opinion before accepting their wares.

The interest in documentation research in the United States will undoubtedly continue to grow, and it is significant that in symposia, conferences, demonstrations and meetings concerned with the topic, more and more scientists and administrators are found in attendance. Continued interest is also assured by certain signs of the times such as position openings listed in the professional journals and newspapers and that never-failing indicator of demand, the higher salaries offered.

I believe groups such as the Aslib Research Committee have much to offer in this general area and may well provide that stabilizing influence so much needed today. By this I do not mean stability born of conservatism but rather that resulting from serious study and sound judgment.

The Librarian And the Organization Man

ELIZABETH FERGUSON, Librarian
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I HAVE BEEN ASKED to prepare "something about special library administration." Now administration covers quite a large waterfront. It involves, as I see it, practically everything about running a library in a company or in any organization, and this includes reckoning with the foibles of many human beings. Special librarians are so close to the everyday aspects of administration that it is hard to spell out a working attitude or philosophy about it.

One point of view that has not been stressed too often is the concept implied in the phrase "administration and the special library." This was the title of a course given experimentally in New York recently.[1] It was intended to indicate that the special librarian as an administrator had responsibilities: (1) as a member of the staff of his organization and (2) in his specialized function as librarian. The course further stressed that the key to a special library's success was providing its services in the manner most acceptable and useful to the organization. It is my personal opinion that this dual role makes the problems of special librarians different from those of other librarians.

This concept gives a decidedly different twist to the glib way we usually refer to "management" and I thought it might be worthwhile to give a little thought to "what makes management tick." This, of course, happens to be one of the most intriguing questions of the day. Not only executives but doctors, psychiatrists, social scientists, teachers and vocational people are studying and writing about it. Librarians have every reason to be interested.

One of the most thought-provoking of all the studies on the subject is *The Organization Man* by William H. Whyte, Jr., assistant managing editor of *Fortune* magazine.[2] This book stayed high on the best-seller list for many weeks and has been widely reviewed and discussed. I found so much in it that seemed to shed light on *our* business world that I asked Mr. Whyte to express some of his ideas personally in a taped interview. I am most grateful to him for taking the time to make the following transcription:

MISS FERGUSON: There is one phrase in your book which seemed to me to express the way we librarians often feel about our work. That phrase was "anonymity of achievement." Just what do you mean by that?

MR. WHYTE: It is a condition that far more people than librarians feel today. Now the desire of man to control his achievements, to feel that they are his fruit, is a very old one and it has never been satisfied in any society as well as we would like. Over these last few decades this frustration that man feels for the lack of control over his achievements has become more and more of a problem. I think it has become more and more of a problem for many reasons, but one of the most important is the fact that more and more people are becoming enrolled in huge institutions.

MISS FERGUSON: By institutions I suppose you mean organizations as in the

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title of your book. Would you tell us what you mean by "the organization" and by "the organization man?"

MR. WHYTE: By the organization man I mean essentially that little class, mostly college educated, of people in our society who, for better or worse, have tied their destinies to a large organization. Now I talked in my book primarily about the corporation man because he happens to be the most conspicuous example, but he is far more prevalent than simply as a corporation man. He is a member of big academia, he is part of the huge foundation project, he is a government man, he is the man who works for the Atomic Energy Commission, he is the doctor in the group clinic, he is the young lawyer in the law office. He is not often the very top leader, only a few of them become that, but he is the dominant person in our society today.

MISS FERGUSON: This of course makes him very pertinent to us because special librarians work for him in all these situations you have mentioned. Would you tell us then what is the nature of this conflict—is it man versus organization or is it man with himself?

MR. WHYTE: I think it's both. Let me address myself to man versus organization, because the problem of man versus organization eventually becomes one of self doubt. Let me illustrate. In large organizations we have all sorts of pressures on the individual, and the more benevolent, the more enlightened these organizations, the more subtle the pressures and in a sense the more insidious. Because first-rate people of any kind—whether they wish to be leaders or scientists or are primarily involved in research—do have a desire to shape their own destinies. And yet there is a collision between shaping your own destiny, doing what you want to do, what you think is right, and what the organization thinks is right.

This is a very real problem and I think I can illustrate it best by a talk I had with an executive of a very large corporation, a very successful executive. He had just been promoted and he was very agitated when I talked to him. He was afraid that perhaps this move was out of his pattern. He kept saying, "I'm afraid it's out of my pattern." He said something that I thought was very illuminating, "You know, one thing you've got to learn in this kind of life we lead is that most of the decisions affecting your destiny are made for you by other people. But once in a while, maybe only three or four times in your life, you get a chance to wrench that destiny into your own hands. The trick," he went on to say, "is to recognize that time when it comes." He was afraid in his case that he hadn't.

I cite this man because I think that he saw in a rather intellectually clear way the essential conflict. Now remember that this was not a mean company —they weren't firing him, quite the opposite, they were promoting him—but he still felt that loss of individual autonomy. I'm not saying that he was unsuccessful in resolving this particular problem nor am I inferring that the organization was wrong, but this is the kind of problem that all of us face.

My own feeling is that this is not a new problem but that it is being made more difficult for this reason. In this country today, and in a measure I think in Western Europe as well, we are seeing the growth of what I happen to call the social ethic, or it could be called the organization ethic. It is essentially an ethic which tells the individual that his end and the ends of the organization should be one and the same, or that they can be one and the same. I think it is intellectually very disarming because it muffles the kind of conflict I just spoke of. This kind of conflict is inevitable, and once we say we shouldn't have it, that we should have a guilty conscience about it, then we have totally disarmed ourselves for the struggle.

MISS FERGUSON: Talking about a struggle for individual control sounds to me

William H. Whyte, Jr. who recently received the ALA Liberty and Justice Book Award, contemporary problems and affairs category, for his study *The Organization Man.*

like the struggle of any professional person. Would you say that this problem is that of a professional person working for business?

MR. WHYTE: Very much so. I think the problem affects two kinds of people most keenly. One is the executive himself (and curiously enough the whole human relations program has had a much more profound effect on the executive than on the workers for whom the human relations were designed) because he is very beholden to the organization, even though he wishes to leave it himself one of these days.

The other group, of course, is the professional. More and more we're finding professionals of every kind in business — social scientists, librarians of course, the list is tremendous. And now we have a further conflict—not only the simple and very important conflict I spoke of earlier—the individual versus the organization—but also the conflict of the professional who now has two allegiances: one to the organization and the other to his profession. Now this is a real antithesis. It sometimes can be mitigated, but there is often a parting of the ways. The question is—to which allegiance must he remain most faithful?

I cannot speak for librarians but I do know something about research scientists, and there's been a great deal of talk recently about the comparative lack of good morale in many research laboratories. The reaction of the administrators (I'm talking now of the over-all company) is very frequently this: "Yes, we have had a bad morale problem in many respects. Our scientists are not as content as they should be, and one of the troubles is that they do not realize the over-all picture, the management point of view."

There is a subtle pressure to make the research scientist share the values of the administrator. In effect, many companies are asking the professional to be primarily a company man and a professional secondarily. This is a problem that in my estimation is going to become more pronounced as corporations and other institutions become even more beneficent in years to come.

MISS FERGUSON: That certainly rings a bell with librarians as professionals. I wonder if you would give us just as idea as to how you might approach the problem. You sort of indicated that you don't know the final solution, but haven't you a kind of psychological approach that will help us make an adjustment within our organization?

MR. WHYTE: I'm going to make several obvious comments but I do it without any apologies because I think there is a time when the obvious needs statement. First let me make the observation that, as you know, there is no real answer to this problem. But on the workaday, bread-and-butter level, I would suggest intelligent cheating on the part of the professional. I would say the same thing to the organization man himself. Now this often shocks people. In my book I have, as you may know, a whole section on how to cheat on personality tests and I have been fairly hit over the head by a great many people of good will who say, "Why, this

is terrible for a man to counsel—cheating."

All I was trying to do then was to illuminate and dramatize the obvious. Now most people cheat on personality tests when they are administered by the organization because they have a very healthy protective instinct. They don't say they cheat but they know that if they were to be completely honest, they would penalize themselves.

I would like to make another point and I think this has a lot to do with the professional—often you have to sell the right thing for the wrong reasons. If I may get a little garrulous, I had this first brought home to me when I was a young intelligence officer in the Marine Corps. I was, like most young officers, very keen about this work which, as you know, is staff work, and I had about 14 men in a little intelligence section. Our colonel didn't think much of staff work and he thought even less of me and my little outfit. So we consequently found ourselves being assigned to do all sorts of dog jobs—used for everything but intelligence.

One day I found the colonel's weakness, or rather my draftsman did—he loved great big maps. In this particular campaign I had a very good draftsman and we made good maps. But rather than simply do a good workmanlike job, on one particular map we went to a great deal of trouble. The draftsman spent night after night on beautiful hand lettering until the eventual result was the most beautiful thing you ever saw, and it had written at the top of it "Third Battalion, First Marines, so and so Commander." Well, the colonel just loved this. From then on our troubles were over. As long as we kept furnishing these maps, which in many cases were ridiculous, we had absolute *carte blanche*.

Now I'm sure that sort of thing has happened to many people. It would be nice if one could sell intelligence on its real merit, but I think candor should force us to admit that many of our achievements in staff or professional work must be over the dead bodies of our superiors. There is a constant struggle and often in winning our particular battles we must be, well, at the lowest language level, let's say that we must be very keen to merchandise the aspects of our particular specialty that are most attractive to our superiors, so that we may thereby keep the basic things intact.

I could go on forever and I don't want to seem to say that the solution is simply to become a very slick operator or anything like that. I am merely again trying to dramatize the thought that there must always be a conflict between the first-rate person, and most particularly the first-rate professional, and the organization in which he or she finds himself, no matter how intelligently run that organization. If we give ourselves a guilty conscience because of some of these conflicts, then we are that much less effective not merely in serving the organization but, much more important, in attaining what we talked about first—this sense of achievement that we all look for.

MISS FERGUSON: I find this very encouraging, Mr. Whyte, and I can't thank you enough for illuminating the problem. I think most of us will agree that the first thing we really want is to do our jobs and to do them with a certain amount of freedom and that that is sometimes hard to achieve. You have helped to show us how. Thank you again.

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Two basic facts which condition our business lives seem to me to stand out pretty obviously from this discussion: (1) Management, too, has problems and frustrations and finds it hard to achieve personal satisfactions; and (2) If we as professional specialists have difficulties in the business world, so do other professionals, even scientists.

Intelligent Cheating

Mr. Whyte's rather startling ideas on "operation by smoke-screen" really

aren't as fantastic as he made them sound. I believe he was merely giving frank credit to a lot of little ways and means successful librarians have always used but which they have tended to play down as unprofessional or excuse on the ground of public relations. It would be fascinating, for instance, to hear some of the subtle flattery librarians have brought to bear on recalcitrant officers who didn't want to let the library handle their private book collections.

Librarians starting work in the insurance business have found that taking the special study courses approved by the business not only speeds their grasp of the subject matter but also demonstrates their willingness to ally themselves with the business. Another librarian has a regular program for having individual visits with his management, in corridor or office. Mr. Whyte said, as I understood it, "These devices enable you to do your job better. Don't scorn them or feel guilty about them."

Librarians actually go far beyond Machiavellian smoke-screens and smart public relations in performing their dual roles in their companies. Many of SLA's most distinguished members do all sorts of non-library jobs which definitely contribute to their success but which they do not always think of as "professional" accomplishment. They have served as company secretaries and been active on management committees. They are editors of house organs and other company publications. They conduct exhibits and do other public relations jobs. They write company histories. Such activities not only assure more effective library service but also contribute constructively to the over-all company program.

There are obviously no set rules for this sort of thing. It depends entirely on the imagination and initiative of the individual librarian to make the most of the opportunities in his own bailiwick. For that matter, there aren't any rules or standards governing a librarian's status in a company either. Naturally it would be easier to make one's place in an organization if there were standards, because there is an additional conflict Mr. Whyte didn't have time to mention—the competition for relative status among the different professionals in a company. And this is a day of standards, ratings and, above all, competition for the professional as well as for the organization man.

Professional Status

The easily recognizable criteria of formal educational standards play a heavy part in the matter of status, to be sure, but here again there are complicated human factors involved. To illustrate, may I suggest in a more or less hit-or-miss fashion some of the reasons, spoken and unspoken, why librarians so faithfully assume the "professional duty" of attending SLA conventions: Belonging to a professional association carries with it considerable professional status. Companies by and large believe in supporting such professional activity. Attending out-of-town meetings on an expense account is not only a nice break in the year's work but also a coveted company privilege comparable to those enjoyed by other professionals. We obtain ideas which help us to do a better job. We like to see our friends and commiserate with them about our common problems. We meet people who have information that is important to us. We build up contacts which have public relations value to us and to the company (we like to think).

This candid array of mixed motives is real enough but it doesn't by any means resolve the librarian's difficulties in defining his relative professional status. So perhaps it might help to check our professional claims against a general yardstick. In the insurance business Dr. S. S. Huebner has waged a long, eloquent and successful campaign for education and a professional approach to life underwriting. He offers the following criteria:[3]

FUNDAMENTAL CHARACTERISTICS OF A PROFESSION

1. The calling must be a noble one from a service standpoint and be of real significance to the public.
(We meet this fairly well, I think.)

2. It must involve a science of substantial extent and of considerable difficulty . . .; likewise, continued study by the practitioner throughout the working period of life . . .
(This is the usual basis for standards.)

3. It should require of the practitioner a constant use of that science in daily practice.
(We easily meet this.)

4. It should emphasize a strict code of ethics upon all its practitioners in their relations to each other, to their employers (if any), to their public clientele and to the institution (as a whole) which they represent.
(We meet this.)

5.It should, where the effort is desirable and practicable, be reflected adequately in the nation's regular educational system . . .
(We can't claim much here.)

6. It should strive to attain public professional recognition of the calling as a whole . . . through a large and ever-growing percentage of its practitioners who in their daily work are meeting the adopted professional, educational and ethical standards. A calling cannot be made a profession by a public statement from some of its own practitioners. Nor can it be made a profession by a legislative act. The professional status must be earned by the calling.
(This, I think, we should take to heart.)

It seems to me that the library profession comes out with fair honor against this yardstick and that we are well entitled to think of ourselves as professional. True, we must admit that in the world at large as well as in our companies, our profession does not command the same rating as, for instance, medicine or law.

I believe this is because we are basically a *supporting* profession. We don't curselves save the baby's life, win the million dollar lawsuit, set insurance premiums, split the atom or control corporate policy. But, with our own special skills, we can and do help the people who do the headline jobs. And there is considerable satisfaction in taking part in big jobs.

Furthermore, the special librarian in a company holds a rather favored spot in many ways:

1. The librarian is in a position to have free and friendly contacts and associations with all the personnel in the company, high and low alike.

2. The very nature of library work often leads to inside information about important company projects which is always stimulating and interesting.

3. The librarian is in a free-wheeling position to devise extra services which greatly enlarge the interest and the scope of the job and often the rewards.

All in all, it seems to me that we librarians have quite a bit in our favor in coping with the "organization." We chafe at the "anonymity" of course and wish we had more formal recognition of our efforts. But we can take comfort in the knowledge that the organization men we work for and with suffer the same frustrations. In a world where committee and team work, "togetherness," are the order of the day, librarians are well fitted to be good team players. In addition, they often have the added interest of working for the creative brains of the firm as well.

CITATIONS

1. Library Service EL 5, Queens College, School of General Studies. Instructor—E. Ferguson; Sponsor—New York Chapter, SLA.

2. WHYTE, William H. Jr. *The Organization Man.* New York: Simon & Schuster, 1956, 429 p. $5.

3. HUEBNER, S. S. *Professional Progress in Insurance Education* (Insurance Lecture Series). University of Connecticut, School of Business Administration, Spring 1954.

The Profit Viewpoint In Library Management and Operation

De WITT O. MYATT, Manager of Development
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THE FIRST QUESTION management asks when faced with a request for a new library service is, "Is it worth the cost?" In profit-making organizations, management might well ask an even more explicit question, "Is the money spent in our library operations earning us a greater profit than the same money spent in some other company activity?" If the answer is "no," the obviously proper management action is to reduce the library budget and place the money in a more profitable operation.

Management has one, classically simple criterion: "Does it pay?" It also has a classically simple problem: seldom, if ever, can it obtain an unequivocal "yes" or "no" to this question. The ulcers, the grey hairs and the lined brows are the toll exacted when a manager faces the responsibility of making a decision despite incomplete facts, differing views and a continually shifting situation.

The economic justification for library and information searching activities is even harder to approach rationally than an estimate for a new plant installation or process development. A library is a formalized channel for information; this is almost its sole function. But there are other important information channels for most technical people, even those engaged in pure research.* To what extent and in what way will a library or formal information searching staff, with its peculiarly unique pattern of skills, personalities and activity, prove the best means of providing useful information for a specific organization?

Library Data Needed By Management

As he comes to grips with the practical matter of reaching a decision on a specific information service plan, there are several things a manager would like to know. They include:

1. Will the information be useful and will it be used?

He will have the greatest assurance that the service is truly useful if he knows the company staff has expressed a desire for information and if he knows how staff members need it in their activities. But he must also recognize that he must occasionally view the organization through his own private crystal ball and offer unrequested information he thinks will be used if it were available.

2. What is the most economical way of obtaining information?

Books borrowed are cheaper than books bought, but those that will be constantly in use should be on hand regularly. The probable use of information needs to be envisioned in its depth, its frequency, its need for immediate availability and in the number of users.

The human qualities of a staff must be appreciated. A staff member must exert greater initiative and feel greater

Paper sponsored by the Chemistry Section and presented before the Science-Technology Division, May 29, 1957 at the SLA Convention, Boston, Massachusetts.

* HERNER, Saul. Information-Gathering Habits of Workers in Pure and Applied Science. *Industrial and Engineering Chemistry*, vol. 46, 1954, p. 228-36.

need before he will request the purchase of a book or the loan of a document from another library, rather than use one in his own library. Even though loans may be cheaper in dollars than purchases, the manager must recognize that the organization will lose money if valuable information is not obtained and used because the wrong access route is provided for obtaining it.

3. How should documents be handled?

Highly specialized material may be of real value to only one person on the staff, or conversely, to several persons widely scattered through the organization. Some material may be used primarily by technical information specialists serving the organization. Some documents will serve their function best on a staff man's shelf or desk; placing a single document in the library may seriously impede its most economical use. Multiple copies of the same document can be a true cost-cutting solution in some situations when the document serves several functions or persons.

4. How can obsolete material and services be identified and eliminated?

Just as new requirements call for new activities, certain documents lose their value and procedures outlive their usefulness. The absence of a "pruning" viewpoint ultimately can harm operational efficiency seriously and thus waste money. One of the most insidious losses results when useful material is diluted with an increasing and distracting proportion of matter that has become economically worthless. We use the term "economically worthless" because many documents still having individual value become cheaper to borrow or repurchase on demand than to catalog, store, and periodically inventory. A volume of specialized material for which fewer and fewer requests are made as time passes becomes increasingly expensive and hinders efficient operation.

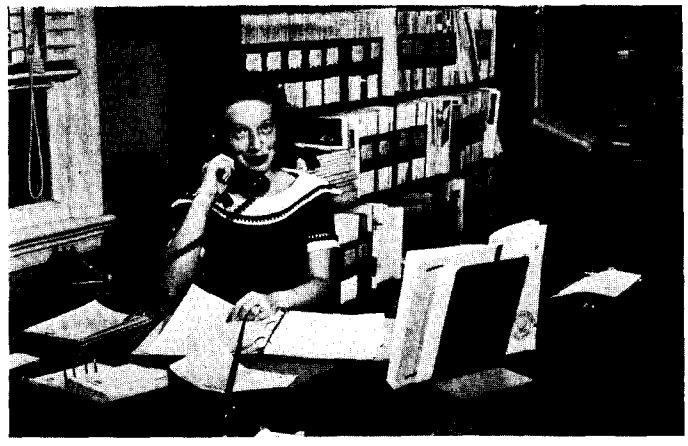
A manager must find adequate answers to these fundamental questions within the specific setting of his own organization and its communication environment. Some answers probably will be quite unconventional if he succeeds in perceiving the essential needs and the effective resources that exist.

Organization Situations That Influence Management Decisions

An illustration of the way this viewpoint was applied in one organization will be more useful than further generalization. In fact, the specifics of a given situation must be stated to show why and how the library operation is designed for the organization. The library we are best qualified to describe, naturally, is the library of Atlantic Research Corporation.

In telling what has been done at Atlantic Research, we would not claim that we are even near to a "solution" of all of our information needs. But we can report that neither the technical staff nor the top management are vocally dissatisfied with the operation, and the library people are functioning with a pretty well-defined philosophy that does not change violently from day to day. We have evolved some practices that we did not anticipate, and they seem appropriate for our needs.

For perspective, we must start with a description of Atlantic Research. The company primarily performs contract research and development project work, chiefly in the applied physical sciences. Most of this is security classified, particularly our work in the rocket and missile field. We also have undertaken a small amount of manufacturing, most of which has stemmed from earlier project work in the instrumentation field. Our major technical information needs relate to our R and D project activities. The company has been in a state of almost continual and rapid growth; it increased nearly 50 percent last year and currently employs about 200 people, 80 of whom are college graduate scientists and engineers. Almost all the



Locating documents for interlibrary loan by means of telephone inquiries is a major feature of the Atlantic Research Corporation's library service. Special report files is another.

demands made on the library come from these 80 technical people, although a few requests are handled for contract, legal and business management units.

Another significant factor is the geography of the library and technical staff locations. Because of the company's rapid growth, project groups are now housed in about six buildings, scattered over an area about five city blocks in extent. The library is housed about ten minutes' walk from the more remote portions of this territory; office space problems have prevented its location immediately adjacent to any major concentration of technical staff.

The technical information requirements of the organization relate rather sharply to the project activities under way at any given time. A steady use of basic handbook information is required, but a major information requirement consists of quite specialized reports, documents and papers, both classified and unclassified, that originate in related projects elsewhere.

The time factor is very important in some of the demands on the library, particularly when background documents for technical proposals are needed. Such information sometimes must be obtained within two or three days or it may as well not be obtained at all. These requests often deal with subject matter never needed previously.

We find ourselves particularly fortunate with respect to information sources. A local telephone call or a 20 minute automobile ride gives us access to the unmatched free information sources in the metropolitan Washington, D.C. area. We also benefit from a major communication windfall in our security-classified project fields. Here we can drawn on abstract and search services, major classified technical meetings and periodic abstract bulletins and accession lists, which constitute the bulk of specialized knowledge in the field. We can "subscribe" to technical progress reports of other workers by asking to be placed on distribution lists for such reports. The Armed Services Technical Information Agency (ASTIA) is one such source for all Defense Department technical matter. An even more effective source for our rocket projects is the Solid Propellant Information Agency, since its somewhat more specialized scope permits much greater integration and organization of source matter. These sources compensate for the deliberate omission of classified technology from the open literature.

Library Operations At Atlantic Research

With these facts to deal with, we have developed our own pattern of library operations. A picture of our library's current activity may be visualized with

SOURCES OF LIBRARY INFORMATION

Source of Item Processed	Percentage of All Items Processed	Relative Index of Cost Per Item to ARC*
"Mailing List" from outside sources (largely classified reports)	42	300
Borrowed from outside sources (principally periodicals, books, and reports)	20	500
Purchased (principally books)	3	7500
Available in ARC library (books and documents on shelves, information from handbooks, abstract publications, books, etc.)	35	100 (Base line)
	100%	

* Includes handling and labor cost of ARC library staff in obtaining and return, plus purchase price where pertinent.

respect to the origin of the information transmitted by the library to our staff, by the following chart.

This is the current picture of the library operation but it is only a partial picture of the information sources utilized by the professional staff. An approximate breakdown of the total documentary resources in the company's possession is also illuminating (see below).

It is clear that much of the documentary information used by company staff members is gleaned from material located in their own offices. The library staff is involved only in its original acquisition.

This operational pattern, while perhaps a shocking departure from the generalized picture of a technical library, is quite consistent with the realities of our own organization. As we have gained appreciation of our special advantages and handicaps, we have evolved the following guidelines:

1. The need for permanent documents is limited to basic reference materials that are consulted frequently. These include such items as *Chemical Abstracts* and handbooks, plus the records and reports of our own project activities.

2. Libraries in Washington are relied upon for reference materials not in constant demand. Information is obtained either by temporary loan of the reference or by a visit of the interested staff member after the library staff has located the reference.

3. Project-centered materials, whether books or special reports, are obtained on specific request and passed on for indefinite retention to the person requesting it. The library keeps a record

DOCUMENT RESOURCES OF ATLANTIC RESEARCH

Location of Documentary Resources in ARC	Percentage Located In Library	Percentage Located In Project Offices
Classified reports	60	40
Reference and specialized texts	40	60
Bound journals	90	10
Patents and miscellaneous documents	25	75

of the disposition and arranges transfers or interoffice loans should additional requests develop for the material. However, it exerts little or no pressure to have the material returned to the library for permanent retention.

4. Periodicals are circulated on a route list after the current copy has been received. For staff members willing to make personal efforts to read current issues, the library cooperates by retaining them for special loan. Only a few major periodicals are bound and retained permanently in the library. Unbound journals are kept for a few years and then discarded or donated.

5. When the same document or book is in active use in several project groups, additional copies are purchased to supply each center of active use. Before entering a purchase order, however, the librarian determines by personal consultation whether a temporary loan will serve the need. Inexpensive documents such as patents are simply purchased and sent to the requestor, with no record kept in the library. If other requests come in, additional copies are purchased from the Patent Office.

6. Documents returned to the library are treated according to their probable future usage. Books are usually kept until later editions come out. Specialized reports are filed for three years and then discarded if there is reasonable expectation that replacement copies can be obtained from the original source. We might add that our library has not received a single request in the past three months for any of these old stored reports that are more than three years old.

To summarize, the library concept that has evolved from our experience is one of a unit that acquires only those resources that cannot be obtained effectively through supplementary sources. The interesting point is that, in our particular situation, these supplementary resources provide the majority of our information needs.

While many of our library services start with requests initiated by our technical staff, it should be emphasized that the library operation is by no means a completely passive servant of the organization. The library staff takes initiative in improvement of procedures for distribution and control of documents, circulates accession lists and calls attention to the availability of new books and reports that appear to be useful in current project activities. Books and magazines are purchased when it is felt that they will be accepted as the company staff becomes familiar with them.

Finally, we should emphasize that we expect to continue to keep close watch on the changing information needs of Atlantic Research and to change the functional character of the library operation to serve the needs of the time. For example, within the next year we expect to consolidate most of our company staff in a new permanent headquarters building. This move will make such a radical change in our internal communication mechanics that a reappraisal—perhaps it will be an agonizing reappraisal—should be timely. In particular, we will re-examine closely our present unconventional practice of housing most of our documents in project offices. When we move to our new headquarters, it is possible that our staff can be much better served by greater consolidation of our resources in a readily accessible, centralized location which might prove to be a better environment than project offices for study and library staff assistance.

From this discussion it is obvious that we have not struck a dollars-and-cents balance of our library operation that would even start to satisfy a self-respecting cost accountant. However, it can be seen how the profit viewpoint has affected our approach to the library operational pattern in this organization. If there are even more profitable techniques for performing the library function, no matter how unconventional they are, we will certainly be glad to use them.

A Tool for Management Evaluation of Library Services

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THIS PAPER will discuss some of the techniques that have been developed by industrial engineers to give fairly accurate and reliable information about what work is, how it can be performed to obtain desired results, how much time it takes and how much it costs. The technique I shall emphasize is work measurement.

Work measurement and other management techniques are not scientific in the sense that they yield exact formulae demonstrable by laboratory experimentation and proof. One recognized writer on the subject[1] suggests that the loud trumpeting of the term "scientific management" is no more than the "technique of proof by proclamation," aimed at achieving acceptance by noise level rather than by verifiable content. Since I am not a management expert, scientific or otherwise, I do not wish to enter this debate.

However, I do not think that librarians need apologize for adopting the terminology of the industrial engineers who coined the phrase "scientific management" and for applying it to management in libraries. Indeed I would urge librarians to give more attention to understanding and using management engineering techniques in the analysis and control of library work. The January 1954 issue of *Library Trends*, devoted to "Scientific Management in Libraries,"[2] was in the nature of a survey of the state of the art at that time. It showed an appreciable concern with the application of management methods in libraries, probably more in public than in research and special libraries.

It is evident, however, that there still is no widespread acceptance or use of management engineering techniques in library administration. A recent article in SPECIAL LIBRARIES on work measurement[3] proposed that SLA establish a joint committee with the American Documentation Institute to develop measurement criteria for the technical information function. The viewpoint expressed was that special measurement techniques will have to be developed before work measurement can be applied to technical information activities.

I suggest that the standard techniques of work measurement are both adequate and applicable to library or technical information work and I question the necessity for another committee. What does seem needed is better acquaintance between the librarian or technical information specialist and the existing techniques. Much can be accomplished by individual initiative in studying the literature, consulting competent practitioners in the field, analyzing the work operations which one desires to measure and, most of all, by actual practice in using work measurement. Accounts of operating experience with work measurement in libraries, like the report on the Civil Service Commission Library plan which appeared in SPECIAL LIBRARIES[4], would be more valuable than a committee study.

The levels of management which will find the results of work measurement

Paper sponsored by the Engineering Section and presented before the Science-Technology Division at the SLA Annual Convention, May 29, 1957, in Boston, Massachusetts.

useful in evaluating library service extend from the supervisor of a unit in the library to top management of the firm, laboratory or agency. Top management is apt to be concerned chiefly with the end product of library effort—how useful it is and how much it costs.

Evaluating Library Service

To provide this information the librarian-manager must collect and analyze detailed data on each of the functions for which he is responsible. He must define those functions completely and clearly for himself and for his staff. He needs to know what percentage of the total effort is expended on each function. He must examine critically the work methods and procedures used to perform all operations. When he decides to change an operating procedure, he needs an objective measure to test the effectiveness of the new method against the old.

Management evaluation of library service is concerned with quality, quantity and cost and their interrelationship. How much does it cost to give so much service of such a quality? Quality goals will be determined ultimately by top management based on information submitted by the librarian-manager and the consumers or users of library services. What kind of a collection of information materials is required by the library clientele? In defined subject areas, what is the breadth and depth of coverage needed? What services will be provided to the users? What will "reference service" include and exclude?—or, if the presently popular term "retrieval" is preferred, how much and what kind of retrieval is desired? What kind of organization of the information collected will be required to provide this type of reference service or retrieval? How much and what kind of cataloging, abstracting and indexing are needed?

Top management must decide what library service is worth to the total organization and how much it will pay to have it. Much of the current discussion of the advantages of one retrieval system over another lacks any valid comparative cost data. It is not surprising to hear that a technical library organized and operated by untrained clerks or by a trained librarian without assistants does not give service satisfactory to engineers and scientists; nor is it surprising to hear that when management decides to assign to a team of highly trained specialists in technical and scientific subject areas the task of analyzing literature in the library, defining terminology and developing subject lists and codes, the results are more useful to the library clientele. It is surprising that such reports generally include neither information on the before and after costs of library service *per se* nor on the before and after cost of research or production in the total organization.

Standards of performance within the library that are required to achieve the goals set by top management are the responsibility of the librarian-manager. He is responsible for the organization of work, for methods and procedures and for staff selection, training and supervision. Principles of management, techniques of work simplification, methods and procedures of analysis and preparation and use of flow process charts are amply described in the literature. It is not the purpose here to discuss their use by library management other than to re-emphasize their importance in and applicability to library operations.

Procedures for recording and analyzing library costs will be influenced by the budget and cost accounting systems used in the organization the library serves. Mrs. Woodruff's article in SPECIAL LIBRARIES[1] described the work measurement program used by the Civil Service Commission for budget purposes. By this system a unit cost is determined for each library function, and budget estimates are derived by multiplying the unit cost by the anticipated

workload in each function. In other agencies work measurement may be a by-product of the cost accounting system. Determination of manpower requirements for budgeting and cost purposes is essential in any financial system.

Refutation of Criticisms

A work measurement reporting system is a recognized management tool available to librarians for determining manpower requirements. It has other uses too, some of which will be mentioned later. I have heard work measurement criticized by librarians chiefly on two counts: that it measures quantity of work only, not quality; and that it takes too much time. Both statements can be debated.

Classical work measurement includes the development of engineered standards by breaking operations down into their basic elements and giving workers the necessary training to produce the best results by the best method in the best time. The engineered standard, therefore, uses qualitative as well as quantitative factors. Work measurement as practiced in some nonindustrial activities does not attempt to develop engineered standards; rather it selects a statistical performance standard after work measurement data has been collected and analyzed over a long range of time. Obviously this does not represent ideal performance.

No claim is made by any advocate of work measurement that it is the *only* management tool needed or that it tells the whole story. It is not a substitute for well-trained personnel, good work methods and supervision. It will not automatically improve efficiency. It does, however, give a factual basis for management planning by pointing to the need for procedural improvements and providing a means of evaluating the effects of changes in organization, procedures, methods and training.

It is true that the designing, installation and use of a work measurement system takes management time. In my experience in collecting work measurement data in the library, I have not found that the time required for the daily recording of data on individual employee work reports is significant. When functions are clearly defined and the library staff has explicit instructions on how and when the production and time counts are to be made, accounting becomes a habit and is accomplished in no more time than was formerly spent in collecting traditional library statistics.

The usual statistics on circulation, reference, cataloging and so on were maintained for some years. Although they looked rather impressive, I seldom found they gave reliable information when I was required to justify personnel requirements or explain why there were backlogs in certain areas. Not infrequently I found it necessary to attempt a special study on short notice to obtain some needed piece of information about our work. We have used our present work measurement reporting plan for only two years and recognize that it is still tentative, but I believe it has already proved its worth in the time it has actually saved in preparation of reports to management. Also I have more assurance that I am reporting factual and reliable data.

Fundamentals Of A Plan

The plan used in the Bureau of Ordnance Technical Library was developed by the library staff after studying work measurement systems used elsewhere, especially the Civil Service Commission plan, and after listing and analyzing all library activities. A draft of the definitions of functions, the work units selected to measure each function and the plan for making the work unit and manhour count was then submitted to the Bureau Management Branch for review, suggestions and final approval.

The reporting period is the calendar month. Unit costs for the separate functions are not computed but this can be

done if it is used in the agency as a basis for budget estimates. The emphasis is on operating time and on developing standard time rates for the measured functions.

Each library employee has a copy of the definitions of functions and the instructions for counting time and production in each function. All employees use the same work report form, regardless of the kind of work assigned to each. This simplifies the monthly summary of total time and production by functions and eliminates confusion when work assignments change or employees are detailed to special duties.

Recommendations For Initiating Plan

The suggestions I would make to a library interested in starting a work measurement plan are these:

1. Don't hesitate to start in the present situation. Don't be apprehensive that some weak spots in organization or methods will show up. That is one of the chief benefits to be derived from the plan. Begin with the idea that you want to find out *what* you do, *how much* of it you do and *how much time* it takes to do it under present conditions. As areas in need of improvement are identified and changes instituted, there will be graphic evidence of their effect and a valid measure of their success. The analysis of operations required to define functions and work units is itself a salutary exercise for the library staff. It will probably lead to questions such as "Why do we do this?" or "Why do we do it this way?"

2. Be sure that all effort is reflected in the report. Not all work is measurable, but the measurable work should be separated from the nonmeasurable, and time spent in nonmeasurable effort should be reported as nonoperating time. Annual and sick leave should be included as nonoperating time. In the functions identified as measurable, be sure that all related operations, including planning and supervision of the function, are reported in the time count.

3. Establish as few functions as possible and define exactly what these include and exclude. Typical measurable functions in science-technology libraries might be acquisitions, cataloging, publication processing, circulation, distribution (which may or may not need to be defined as a function distinct from circulation), reference, abstracting and editing publications. When all of the activities or operations performed within a function are listed, questions will arise as to whether they represent a single function or if further subdivision is needed. The answer will depend on what library management wants to find out about the work.

In general, it is more practical to start the program with broad functions. This will more quickly give an over-all picture of the main purpose of the library's effort, which is apt to be the thing that interests top management. When a function shows the need of further analysis to identify problem areas, subdivisions can be made to collect more detailed data during the time necessary to obtain the desired information.

4. Determine the item that will best measure the amount of work in the function. This is the work unit. It may be the end product of the function, or in some cases it may be the single most significant operation performed in the function. The important criterion for a work unit is that the number of work units increases or decreases in direct proportion to the increase or decrease in workload and the number of manhours expended in completing the work.

5. Decide who counts what when. For example, our library lends a great many technical reports to other agencies. One person may make the charge record and another person type the necessary transmittal letter. Both persons will record a time count, but only one should record the work unit count. Which one? If "items cataloged" is the work unit for

the cataloging function, should titles or copies be counted as an "item?" When work is revised, will the production count be made before or after revision? Make decisions in each case, write them down and give copies to all staff members.

Individual and Comparative Objectives

The development of standard performance rates is a long-range objective of the program. The library's performance rate for a function is computed by dividing the number of work units completed during a reporting period by the number of manhours spent on the function. If the program aims to develop statistical standards from collected work measurement data, only tentative standards can be set until some degree of work standardization has been attained. This includes adequate working conditions, adequate training and procedural improvements created by alert employees and good supervision.

If performance rates follow an even line from the beginning of the program, there might well be a question as to whether library management is attentive to possible ways of increasing efficiency or if it is making full use of the work measurement data. On the other hand, if there are significant variations in performance rates, it is important to find out why. Can the cause be identified as due to known changes in conditions—a new employee not yet fully productive, misunderstandings or inaccuracies in the way the work count is recorded or perhaps a need for reexamination of the definitions of functions and work units?

Work measurement data obtained in a library are applicable only to that library. They cannot be used as standards or criteria in other libraries unless the work performed and working conditions and procedures are the same.

A library-manager must design his own measurement plan to fit his own organization. If cataloging costs are 50 per cent lower in one library than another, no conclusions can be drawn until it is known what kind of materials are being cataloged, for what use and how well the cataloging fulfills the need. The least expensive method is not necessarily the most effective.

It would, however, be extremely valuable for special library management to have available for study and analysis work measurement data collected in similar types of libraries performing similar functions and using varying methods. Evaluation of systems could then be based on analysis of results in relation to cost and time expended.

My recommendation to science-technology librarians is to start using the known techniques of work measurement in order that the profession may accumulate some of the important data needed for management evaluation of library services.

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SCHEDULE OF CHAPTER VISITS BY SLA PRESIDENT ALBERTA L. BROWN, 1957-1958

1957

Georgia — October 5
New Jersey — October 7
Montreal — October 10
Minnesota — November 6
Heart of America — November 11
Greater St. Louis — November 13
Indiana — November 15

1958

Louisiana — January 11
Oak Ridge — January 14
Alabama — January 16

To Be Visited in March and April

New York	Baltimore
Michigan	Oklahoma
Rio Grande	Texas

Contributing to SLA's Publication Programs

THE SPECIAL LIBRARIES Association recognizes publication as one of the most distinctive elements of professional life. The Association believes that publication not only serves its members as a productive means of self expression but also that the products are equally important to all members as research tools. Such publications are similarly useful to a broad public and consequently bring honor to both author and publisher. A strong diversified publications program will improve and strengthen the general public understanding of the place special libraries, special librarians and the Association have in our way of life.

For these reasons Special Libraries Association accepts the responsibility for inspiring, encouraging and actively promoting the production of bibliographic, monographic and other types of serial publications.

Nonserial Publications

To be sponsored by the Association, a nonserial publication must be of significant content, be organized in good bibliographical form and embody a real contribution to the literature of special librarianship. Publications may be initiated by Chapters, Divisions, Sections or individual members or nonmembers. Section V of the *Procedure Manual* of the Nonserial Publications Committee describes how to submit manuscripts or ideas for publications:

When the manuscript, or the idea, for a publication is sufficiently developed:

1. Obtain Publication Project Proposal forms from the Association Publications Officer, Special Libraries Association, 31 East 10 St., New York 3, N. Y.

2. Prepare 7 copies of the forms and forward 6 copies (1 copy for each member of the Committee on Nonserial Publications and one for the Association Publications Officer) to the Publications Officer, Special Libraries Association. The seventh copy is for the author's file. The Publications Officer will add to the proposal forms a suggested method of reproduction and a rough estimate of cost of publication and send the copies to the members of the Committee.

3. Submit 6 copies of the manuscript, if readily available, with the proposal form. If this is not practical, 6 copies of the following portions of the manuscript must be submitted for review to the Committee on Nonserial Publications:

   a. Outline of chapters
   b. One or two completed chapters to show style and treatment
   c. Indexes or lists (For this type of publication, sufficient sampling to show the content of the publications should be presented.)
   d. Preliminary draft of the preface.

After the proposal forms and manuscripts or outlines are received, they are carefully reviewed and evaluated by members of the Committee on Nonserial Publications.

Special Libraries

As the Association's official journal, it is the policy of SPECIAL LIBRARIES to publish articles and news of professional interest, valuable primarily to SLA members. Manuscripts and ideas should be submitted to the editor who will confer with members of the Committee on SPECIAL LIBRARIES before accepting or rejecting material. Full length features of practices, policies and problems of special libraries, how-to-do-it explanations for the new page entitled "This Works for Us . . .," brief reports on new equipment and processes, descriptions of the layout and planning of new libraries and other contributions relating to special librarianship are always welcomed for consideration.

Have You Heard . . .

Research Grant Awarded To Aslib

The United States National Science Foundation has awarded £10,000 to the Association of Special Libraries and Information Bureaus for research into the comparative efficiency of various indexing and information retrieval systems. The two-year research program will be conducted at the College of Aeronautics, Cranfield, England, under the direction of Mr. C. W. Cleverdon, librarian of the college.

Russian Journals To Be Translated

The National Science Foundation has awarded a grant of $70,000 to the Massachusetts Institute of Technology for the translation into English of three Russian electronics journals, *Radio Tekhnika i Elektronika, Radio Tekhnika* and *Elektrosviaz.* The translations will be prepared by a commercial agency under contract to MIT. Directors of the project will be Dr. William N. Locke, director of libraries; Dr. Jerome B. Wiesner, director of the Research Laboratory of Electronics; and Dr. Robert M. Fano, professor of electrical engineering.

British Research Agency

Translations, extracts, photostatic copies, bibliographic information and similar assistance with academic projects is now available from the Research Agency, 10 Clorane Gardens, London, N.W. 3. The services of specialists in medical, legal, economic, historical and other fields in tracing materials from British and European sources are available. Inquiries should be addressed to the Secretary, Mrs. E. Finer.

Directory of Japanese Libraries

The Special Libraries Association of Japan has published *A Directory of Research Libraries* (1956). The entries, in Japanese and English, give the name and address of each library and information on its history, holdings, public use and publications. The libraries are arranged according to the type of material they handle, and alphabetical indexes to the features of the collections and periodical publications are included. For further information write to SLA Headquarters.

Coming Events

AMERICAN PUBLIC HEALTH ASSOCIATION will hold its 85th annual meeting in Cleveland, Ohio, from November 11 to 15, 1957. More than 40 other organizations interested in various aspects of public health will also meet at the same time, and it is expected that some 400 papers will be presented during the 75 scheduled sessions. Further information may be obtained from Dr. Reginal M. Atwater, executive secretary, American Public Health Association, Inc., 1790 Broadway, New York 19.

The METALS DIVISION of SLA will hold its fall meeting during the Second World Metallurgical Congress to be held in Chicago November 6, 7 and 8, 1957. A library display booth and information center will be set up at the International Amphitheater. Speakers from five countries will be on the program, which will also include tours through Armour Research Foundation Laboratories and several other research organizations in the Chicago area.

THE LIBRARY ZOO

Mr. Biblio Maniac

The hoarder: he keeps everything on or in his desk. (Try to get it back.)

Courtesy of Dr. Margaret Holtman, Stan Hasse and Machine Design.

Member In The News

C. E. ZERWEKH has been named head of the new technical information section of the Research and Development Division at Humble Oil and Refining Company's Baytown (Texas) Refinery. The technical library, patent coordination and clerical groups in that division are under his supervision. He is president of SLA's Texas Chapter and past chairman of the Petroleum Section of the Sci-Tech Division.

In Memoriam

BEATRICE ELIZABETH CARR, a charter member of SLA and one of the first women to hold an important position in the financial field, died in August. For 25 years she served as statistician and chief investment analyst for Robinson & Company, Wall Street securities brokers.

Film On Metals Literature

Machine searching of metallurgical literature is the subject of a film produced by the Documentation and Communication Research Center of Western Reserve University in cooperation with the American Society for Metals. The 16mm color film, to be shown at the World Metallurgical Congress in Chicago in November 1957, is entitled THE METALS INFORMATION CENTER OF TOMORROW. It runs for 13½ minutes and features an experimental computer developed by Western Reserve for providing pilot searching service to industrial, governmental and educational organizations. Interested groups can view the film after its Chicago showing.

Two New Military Bibliographies

The Military Librarians Division of Special Libraries Association has recently published two new titles in its series of bibliographies: *Canadian Service History, Ten Titles for the Small Library* (Bibliography No. 10) and *Canadian Service History, Thirty-five Titles for the Large Library* (Bibliography No. 11). Copies can be obtained from the Air University Library, Maxwell Air Force Base, Alabama.

SPOTTED

● Although editors and writers of non-library periodicals and newspapers are devoting an increasing amount of space and words to the growing importance of libraries in modern life, many libraries are taking the initiative and presenting their own stories in print and pictures. ● Bell Telephone Laboratories of Murray Hill, New Jersey, and New York City, for instance, has published *The Technical Information Library: Its Services and How To Use Them.* This 32 page booklet, which is generously illustrated with photographs and diagrams, was designed primarily to acquaint the Laboratories' personnel with the resources and tools of the firm's three libraries, but a limited number of copies are available to other libraries upon request. ● The services and holdings of the research library of the Universal Oil Products Company, Des Plaines, Illinois, are described with text and photographs in *Your Library.* The fact that this is a *special* library is emphasized as is the fact that it is a proud member of SLA. ● Wayland Laboratory, Raytheon Manufacturing Company, Wayland, Massachusetts has also recently issued a piece entitled *Your Library.* A double spread floor plan locates the variety of reference materials explained in the front pages and the later pages report briefly on the library's services and operation methods. ● To help students learn the procedures and collections of their library so that they may use it more effectively, Rose Zakarin Sellers has prepared *CLUE to the Resources and Services of Brooklyn College Library* (New York). Single copies of a newly revised edition are available without charge. ● *The Library . . . Foundation of Research,* a well-printed, informative pamphlet, defines for the technical staff the functions, holdings and facilities of the General Electric Research Laboratory Library, The Knolls, Schenectady, New York.

Off The Press . . .

Book Reviews

DOCUMENTATION AND INFORMATION RETRIEVAL: AN INTRODUCTION TO BASIC PRINCIPLES AND COST ANALYSIS. *J. W. Perry* and *Allen Kent*. New York: Interscience Publishers, jointly with The Press of Western Reserve University, 1957. 158 pages, illus., $5.

Since its inception, the Center for Documentation and Communication Research at Western Reserve University in Cleveland, Ohio, has been actively pursuing a program to add to the fundamental theory of librarianship. The most recent contribution is *Documentation and Information Retrieval* by Perry and Kent.

After a general introductory statement, the authors present a mathematical model of classification and retrieval systems and a short chapter on selectivity criteria for systems evaluation. Approximately half of the book is devoted to an analysis of cost factors. Here the authors are concerned with theoretical methods of computing storage costs of graphic records, searching and reclassification costs in a compartmentalized classification, a description of cost factors in the use of alphabetized indexes, and cost considerations in the construction and maintenance of indexes and files.

Chapter 5, Correlation of Methods and Systems, uses the mathematical model to describe and compare two classification systems and two characterizing systems. The last chapter, Resume of Systems Design, is, at least for this reviewer, misleadingly entitled. The reader is cautioned that consideration of capabilities of various systems is not enough because organizational information requirements must also be considered before a system is selected. Consideration is given to a centralized information operation which manufactures and uses a stylized abstract.

The objective of augmenting the fundamental theory of librarianship by directing attention to basic principles and thereby contributing "to placing the development of information methods and systems on a firmer basis, especially with regard to analysis of costs and the forecasting of capabilities and limitations" is highly commendable. Commendable also is the intent "to provide encouragement to engineers and scientists who have concerned themselves with these [documentation] problems—encouragement that the seemingly amorphous problems of dealing with non-numerical, conceptual data are capable of exact expression and thus amenable to mathematical analysis similar to that encountered in science and engineering."

Unfortunately neither the objective nor the intent is achieved to the degree each merits. When I caught the authors muffing a magnificent opportunity by careless work, failing to reread what they had written, passing up the services of a proofreader, I became irritated. Regardless of how much of a contribution the authors made, I was going to be uncertain of the accuracy and validity of what they wrote.

For example, in the chart on page 12 in which the number of subdivisions of a classification system are listed, there are arithmetical errors in the j2 and j3 level. Inasmuch as the errors are compounded in the fourth and fifth level, they can not be assumed to be typographical errors.

In Chapter 3 the text definitions of certain symbols (w and x) are such that they are assumed by the reader to be synonomous, and it isn't until the figures on page 29 are checked that the reader realizes that the text has given him an erroneous impression.

There probably is much of value in the book, but from my experience, I doubt that any analytical evaluation of possible systems could be made by a management team using their equations without first reestablishing the validity of the equations. In one case I suspect the equations are built on insufficient personal knowledge of searching techniques as they are and must be used.

In one of the equations, a searching cost is based on the number of non-pertinent items included in the group produced by the classification system. Now if I'm looking for books on jet engines for aircraft I go to the "TN 701" section. This section includes both conventional internal combustion and jet engine information. Assuming I had 30 books in that classification and I didn't know how many books I had on jet engines, it would be necessary for me to examine *every* book to make certain that I gave the requester everything I had on jet engines and nothing on conventional internal combustion engines. The searching time would not be any different, theoretically, if there were 10 books or 20 books on jet engines for all 30 would have to be examined. If this criticism is valid, then the searching cost is determined by the number of the items in the selected group rather than by the imperfection or inadequacy of the system.

The book cries for proofreading for minor typographical errors are frequent. The preface is dated 1951; the symbol $N\Sigma$ also appears as $n\Sigma$ (page 26) and N (Figures 5 and 6).

The mathematical treatment is described as being on the elementary level early in the

book and it isn't until page 38 that this is defined as the undergraduate engineering level. The very appearance of the equations may have, moreover, an adverse psychological effect on the non-mathematically inclined librarian reader. This might have been offset, in part, if less complicated symbols had been employed and if more care had been exercised in defining all of the symbols used.

In summary, the authors had an opportunity to make a basic contribution to information theory. The effectiveness has been minimized by inadequate editing, errors of carelessness and either lack of intimate knowledge of library techniques or inept translation of that knowledge into equations.

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ON HUMAN COMMUNICATION: A REVIEW, A SURVEY, AND A CRITICISM. *Colin Cherry.* New York: The Technology Press of Massachusetts Institute of Technology and John Wiley and Sons, Inc., 1957, 333 p., $6.75.

Dr. Cherry is a Reader in Telecommunication at the Imperial College, University of London, and is well known to specialists in communication studies, having made noteworthy contributions to the study of hearing. His present contribution of seven essays are reworked lectures edited by W. N. Locke, L. L. Beranek and R. J. Jakobson.

The author has an unusual style in presenting this erudite work. Mingled with Zipf's and Mandelbrot's statistical treatments of language units, among equations and symbolic expressions, one finds a tone of kindness and simplicity, developed perhaps to encourage the uninitiated in this broad field of science. "And in this little ship, our book, we shall be taking no experts amongst the passengers. It is a cruise for novices only, but they will be introduced to the professional crew. All aboard then—and watch out for the rocks!"

The above quotation from page two of Dr. Cherry's book invites readers who wish to be informed of developments in communications to undertake the task eagerly. However, the "general reader" to whom the book is directed, finds that for thorough comprehension he needs experience in psychology, physics, acoustics, linguistics, semantics and the theory of signs in order to relate the concepts and developments in these fields to the mathematical theory of communication.

The glossary of technical terms is helpful, all seven chapters are well documented, and 367 references are listed, but a scientist in any one of the categories mentioned would probably have difficulty in writing a satisfactory review because of the many fields covered.

Dr. Cherry has provided, in this first of a series entitled Studies in Communication, a general survey and a review for scientists, an excellent guide to the literature and a valuable introduction to studies in communication for the neophyte who needs to be aware of the broad span of this subject. In addition and conclusion, Dr. Cherry also makes one reexamine the education of the "general reader."

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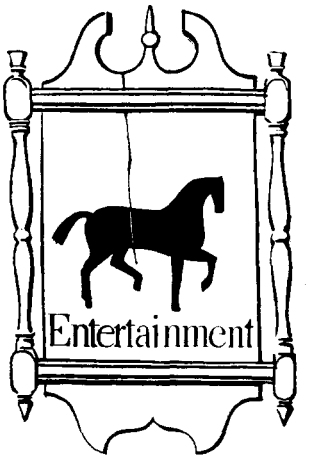

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