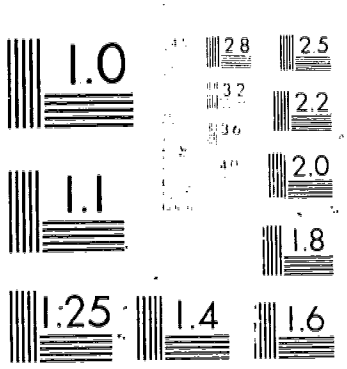

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ABSTRACT

Use studies were conducted at the main libraries and science branches at the Davis and Santa Cruz campuses of the University of California to gather data for use in the detailed planning for establishing regional compact shelving facilities for infrequently circulated library material. Analysis of preliminary data on the three areas examined--unrecorded use, browsing, and immediacy of need--suggest that (1) collection usage may be six times greater than indicated by circulation statistics; (2) unrecorded use is not synonymous with at-the-shelf discovery; (3) differences exist in recorded and unrecorded use rates between broad categories of materials; (4) techniques are available for recording use of materials consulted in the library and reshelved by library staff; (5) some library users are aware of differences in the immediacy of their needs; and (6) further investigation of browsing and/or immediacy of needs is unwarranted at this time. This report provides an executive summary as well as a detailed description of the methodology and findings in each study area. Appendices include reports on a questionnaire response rate experiment and a regression analysis of the relationship between circulated and unrecorded use, a glossary, and a list of 27 references. (RAA)

THE USE OF GENERAL COLLECTIONS AT THE UNIVERSITY OF CALIFORNIA:

A Study of Unrecorded Use, At-the-Shelf Discovery, and Immediacy of Need for Materials At the Davis and Santa Cruz Campus Libraries

FINAL REPORT

Gary S. Lawrence and Anne R. Oja

Research Report RR-80-1

January 30, 1980

Library Studies and Research Division
Office of the Assistant Vice President—Library Plans and Policies
University of California Systemwide Administration

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No list of contributions would be complete without mention of the Library Studies and Research staff, who spent many long days on the road, supervising data collection activities; we are especially indebted to Barbara Hahn, Richard King, and Michael Okajima. We also wish to acknowledge the many suggestions made by the entire staff, which have greatly improved this report.

Finally, we wish to express our appreciation to the members of the Advisory Committee on Library Studies of the University of California Library Council, whose enthusiastic and constructive participation from the inception of the study has strengthen both the substance and presentation of this report.

THE USE OF GENERAL COLLECTIONS AT THE UNIVERSITY OF CALIFORNIA

Executive Summary

OBJECTIVES OF THE STUDY

During the development of the University's policy establishing regional compact shelving facilities for infrequently-circulated library material, it was recognized that detailed planning would be improved by information about three issues: the unrecorded use of library material, at-the-shelf discovery of library material (i.e. browsing), and the library user's immediacy of need for material in the library collections.

The objectives of this study were (1) to collect and analyze preliminary data about these three issues in order to direct further research, and (2) to test the methodology for data collection.

METHODOLOGY

The test sites were the main libraries and science branches at the Davis and Santa Cruz campuses of the University of California. The samples studied consisted of monographs and bound periodicals randomly selected from the library catalogs of these campuses in 1974 and 1975 for studies of collection overlap and circulation history. The data-collection instrument was a questionnaire, placed in each book in such a way that, if the book were removed from the shelf and consulted, the questionnaire would be moved and the use could be detected. Questionnaires were placed in the volumes at the beginning of the Spring Quarter, 1978. All volumes in the sample were checked thereafter at three-week intervals, to record the incidence of moved or missing questionnaires and to replace or reposition questionnaires as

required. At the end of the academic quarter, questionnaires were removed from the volumes, and the number of Spring Quarter circulations for each volume was recorded.

Two types of data were obtained. Information on the recorded and unrecorded use of sample volumes came from the data on missing and moved questionnaires and from Spring Quarter circulation records. Data on at-the-shelf discovery and immediacy of need, as well as additional information on unrecorded use, were derived from patron responses to the questionnaires that they found inserted in the books.

The study was supplemented by a brief experiment at the Graduate Social Science Library at the Berkeley campus that investigated a method of improving questionnaire response rates.

FINDINGS

Unrecorded Use of Library Material

1. The data indicate that there are about six unrecorded uses for every recorded use (pages 17 to 19).

2. The unrecorded/recorded use ratio is greater for bound periodicals than for monographs (pages 17 to 19).

3. There is a statistically measurable relationship between the number of times a volume circulates in a given period and the number of times it is used in-house during the same period, but the relationship is weak,

explaining less than 10 percent of the variance in rates of unrecorded use (pages 18 to 23).

4. The longer a volume has been dormant (i.e. has not circulated), the less likely it is to receive use of any kind, recorded or unrecorded (pages 23 to 31).

5. If a dormant volume is used at all, it is much more likely to receive unrecorded use than recorded use (pages 31 to 36).

6. Items which have circulated in the past are more likely to receive current use than are volumes which have never circulated, even when dormancy period is taken into account (page 37).

7. A short-term study of unrecorded use cannot safely be generalized to describe the long-term patterns of unrecorded use of library collections (page 52).

At-the-Shelf Discovery of Library Material

8. Thirty-two percent of the uses reported by questionnaire respondents were unknown items (items selected by browsing) (pages 60 to 61).

9. There is a statistically measurable difference in the mode of discovery for periodicals and monographs, but the relationship between mode of discovery and form of material is weak, and shows little sensitivity to the dormancy period of the material (pages 61, 69 and 70).

Immediacy of Need for Library Material

10. Nineteen percent of volumes used were needed immediately, and 24 percent were needed within 24 hours (page 73).

Methodology

11. The rate of response to the questionnaires was only 15.7 percent; a simplified questionnaire can improve the response rate to some extent (pages 88 to 92).

CONCLUSIONS

Unrecorded Use of Library Material (pages 55 to 58)

Introduction. There is considerable disagreement in the library field about the relative importance of the various kinds of library use investigated here. Particularly, the assumption frequently made by library researchers that at-the-shelf use is casual and of little importance to library users has often been disputed, especially by faculty users. This study does not differentiate between the various forms of use in terms of importance, and we neither assume that all forms of use can be equated or that some forms can be discounted as valueless.

1. The use of the collections of research libraries is greater than would be indicated by circulation statistics alone, perhaps as much as six times greater.

2. There is a natural tendency to equate unrecorded use with at-the-shelf discovery, but the data do not support this belief. In the absence of further research, one should treat the two phenomena as entirely independent.

3. The study shows that there are differences in recorded and unrecorded use rates between broad categories of materials, defined by characteristics such as circulation history and form of publication; however, use within such categories is random with respect to the variables we can measure. The present line of research could be expanded to increase the number of categories under investigation, but only at considerable expense; uncertainty about the future use of individual volumes could not be entirely eliminated thereby, and we expect that the results of additional study would have only marginal practical value for planning and collection management. Large-scale cross-sectional studies also have a methodological shortening, in that they fail to measure rates of unrecorded use over long periods of time. For these reasons, continuation of large-scale research into unrecorded use in general collections seems unwarranted. Studies of the use of narrowly-defined special collections, however, may be desirable, depending on the specific nature of the collections to be investigated and the specific questions to be addressed.

4. Several techniques are available for recording the use of materials consulted in the library and reshelved by library staff. Though these techniques miss uses in which the users reshelve their own materials, the adoption of these systems could (1) solve the problem of measuring rates of uncirculated use over time, (2) provide clear documentation of a

portion of library use which is not now recorded or verifiable, and (3) identify the specific volumes which are or are not used at tables. Considerable benefits could result for research, budgeting, planning, and collection management.

At the Shelf Discovery of Library Material (pages 69 to 71)

5. At-the-shelf discovery is a conceptually complex phenomenon, and there is little theoretical basis to guide empirical investigations. Therefore, continued study of at-the-shelf discovery in general collections seems unwarranted at this time. It may be possible and desirable to conduct research under more closely controlled conditions, and to address more specific questions, however. For example, the relation between at-the-shelf discovery and remote compact shelving could be clarified by comparing use rates of materials housed in the present Richmond facility or the new regional compact shelving facilities with identical items housed in open-stack libraries, or by establishing continuous programs to monitor the utilization of materials transferred to regional facilities.

Immediacy of Need for Library Material (pages 82 to 84)

6. In at least some circumstances, library users are aware of difference in the immediacy of their needs for library material. It appears that about 24 percent of materials used in general collections are needed within 24 hours.

7. As with at-the-shelf discovery, there is a lack of conceptual clarity in our present approach to immediacy of need, especially when there is not a

direct relationship between a user's need and the book selected to meet that need. Lacking a sound theoretical basis for further research, the continuation of empirical studies of the overall concept of immediacy of need for materials in general collections is not justified. There is reason to believe, however, that studies of more narrowly-defined situations would yield valid and useful results. For example, surveys of users who request books that they do not find on the shelf (to place a hold or search, request items from a remote location, or ask for retrieval by a library delivery service) would involve needs for specific items that in fact were not immediately available when needed, thus overcoming major problems in the current methodology. The resulting information would have limited applicability, but could be reliable and useful for specific decisions or programs.

CHAPTER I

I. INTRODUCTION

THE PHYSICAL GROWTH OF LIBRARIES

In 1977, the University of California administration estimated that it would cost over $89 million to build new libraries to house the University's growing collection through 1988 (University of California, 1977). It has been evident since the early 1970's that the State of California was unlikely to appropriate such a sum in addition to the $50 million annual operating budget for the University libraries. An obvious alternative, disposing of books that cannot fit in available library space, was unacceptable from the University's viewpoint: it would be necessary to weed out almost 6 million books by 1988, and there are few who believe that the University has 6 million worthless books to throw out.

The University has therefore chosen to follow a middle road. The University of California Libraries: A Plan for Development (University of California, 1977) proposes the establishment of two regional compact shelving facilities for library materials which are used infrequently. The combination of low-cost construction and high book-storage densities possible in such facilities means that over $30 million can be saved when compared to the cost of housing of the collections entirely in campus libraries. At the same time, the valuable bibliographic resources of the University can be retained and made available to California's scholars, students and the general public. Finally, adverse effects on the teaching and research programs of the University can be minimized, because only infrequently-used library materials would be relegated to the regional facilities.

A recent cost study conducted by this office confirms the economic benefit of regional compact shelving. For books that circulate less often than once in about ten years and more often than once in about 34 years, it is more economical to provide housing in compact shelving facilities than to retain the books in campus libraries or discard them (Lawrence and Oja, 1979). While the economic argument for regional compact shelving is unequivocal, however, economic criteria are not the only relevant concerns for library planning. Dialogue with the University community during the evolution of the Plan for Development isolated three non-economic issues which appear to have important implications for the planning of the regional compact shelving facilities: the unrecorded use of library material, at-the-shelf discovery of library material, and the library user's immediacy of need for material in the library collections.

UNRECORDED USE OF LIBRARY MATERIAL

It is generally believed that a substantial amount of the use of materials goes undetected and unrecorded, through use at the shelves or at tables and carrels within the library. If a book is not charged out of the library, there is no record of its use in the book itself, the library files or (in recent years) the computerized circulation system. Compact shelving policy involves materials which are infrequently used. Presently, we must rely solely on recorded (i.e., circulated) use of the collection to identify infrequently used materials for both planning and operations. The inability to capture information on unrecorded use suggests the possibility that planning estimates for compact shelving facilities may be in error, and that individual books may be inappropriately selected for housing in compact shelving facilities. Current methods of measuring use and assessing the frequency of use may therefore be inadequate for collection management in the immediate future.

AT-THE-SHELF DISCOVERY OF LIBRARY MATERIAL

Some proposals for the regional facilities have suggested that materials be shelved in the order in which they were received, without expansion space on the shelves, and arranged in categories by size. This "maximum density" approach to shelving would reduce the cost of the facilities, but materials would have to be retrieved by locating a special serial number in a catalog, since the books would no longer be in call-number order. The University's academic community has expressed its belief that the maximum density proposal would inhibit scholarship, because research materials are often discovered first at the shelf, rather than in a catalog, index or bibliography. It is evident that the capability to browse in the collection was highly valued by the University's scholars, and subsequent proposals for the regional facilities have incorporated the concept that at least some books might best be shelved by call number, and would be physically accessible to users.

The fact remains that provision for at-the-shelf discovery, or browsing, in the regional facilities is costly. Further knowledge about the characteristics of at-the-shelf discovery could permit the development of more sophisticated and efficient shelving policies for the regional facilities that would save both space and money and make browsing in the regional facilities more productive for the scholar and student.

IMMEDIACY OF NEED FOR LIBRARY MATERIAL

A recurring theme of the Plan for Development is that materials and services that are needed immediately by library users should be available immediately. Conversely, where users are willing to wait for the delivery of materials and services, it may be beneficial to design systems that take advantage of the economies of

slower response times, remote physical locations, and the sharing of library resources among the campuses. The Plan for Development declares that materials and services that are likely to be needed within 24 hours should be available on the user's home campus. It follows that materials that may be needed within 24 hours should not be relegated to regional compact shelving facilities, regardless of the economics of library construction or the frequency of use of such material. It is obvious, then, that this policy can only be implemented if we can define a class of materials that are likely to be needed by users in 24 hours or less.

THE UNIVERSITY OF CALIFORNIA STUDY

The major motivation for the study reported here was the need to investigate unrecorded use of library material. Early in the design stage of the study, it became evident that the proposed method for data collection could easily be expanded to encompass the issues of at-the-shelf discovery and immediacy of need as well. Because the proposed method was untried, an inquiry was designed with two objectives in mind: (1) to collect and analyze preliminary data on the three issues of interest as a means to direct further research, and (2) to evaluate the data-collection methodology. In keeping with the exploratory nature of the inquiry, the design made use of an existing sample of volumes from the University collections, rather than a new sample of books drawn for this purpose.

Because this study was motivated by an interest in regional compact shelving policy, the analysis was designed to address questions which might be relevant to compact shelving issues. However, the policy environment has changed considerably since the study was conceived (and continues to change rapidly) and the limitations of the methodology prevent us from drawing conclusions in several areas which are

perceived to be important for compact shelving. Therefore, this report limits itself to evaluating the methodology and suggesting directions for further research. Policy implications of the study's findings will be addressed in separate documents as required.

Chapter II of this report describes the data-collection methodology. In Chapters III, IV and V, findings on unrecorded use, at-the-shelf discovery, and immediacy of need for library materials are reported. Because the evaluation of the methodology relies to some extent on the substantive findings in Chapter III - V, this evaluation will be found in Chapter VI.

CHAPTER II

II. METHODOLOGY

GENERAL FRAMEWORK

To gather information on the topics of unrecorded use, at-the-shelf discovery, and immediacy of need, one can ask users three questions about the materials they select and use: (1) how did you discover it? (2) where did you consult it? (3) how long could you have waited to receive this material? Several approaches to securing the required information were investigated and rejected. Direct interviewing of users is too expensive on any but the smallest scale. Giving questionnaires to patrons entering the library is inefficient, because many users do not actually consult a book on any particular visit (Thompson, 1978). Recording information about materials left on tables (to measure unrecorded use) is fairly expensive, and the technique misses the uses in which patrons themselves reshelve the materials they use. Harris (1977) reported that, in a brief study of in-house use of materials at Newcastle-upon-Tyne Polytechnic, only 5.2 percent of the volumes used inside the library were used at tables and eventually reshelved by the library staff. Apparently the remaining 94.8 percent were reshelved by the patrons and would be missed by a study of materials left on tables.

We decided, therefore, to adopt an approach in which questionnaires are placed in a selected sample of books. This approach, patterned after studies conducted by Fussler and Simon at Chicago and Urquhart and Urquhart at Newcastle, has several notable advantages. First, the questionnaire is delivered only to patrons who actually use materials during their library visit. Second, questionnaire responses relate to a

specific item, which the user can consult while answering questions; the patron need not rely on memory. Finally, the method provides an unobtrusive and unambiguous measurement of in-house use: if the questionnaire is moved or missing, the use of the book can be inferred, even if the user fails to cooperate in completing the questionnaire.

Approximately 6,000 questionnaires were placed in bound volumes at the main libraries and science branches of the University of California, Davis (UCD) and the University of California, Santa Cruz (UCSC). Questionnaires were placed before the start of Spring Quarter, 1978, and removed after final examinations.

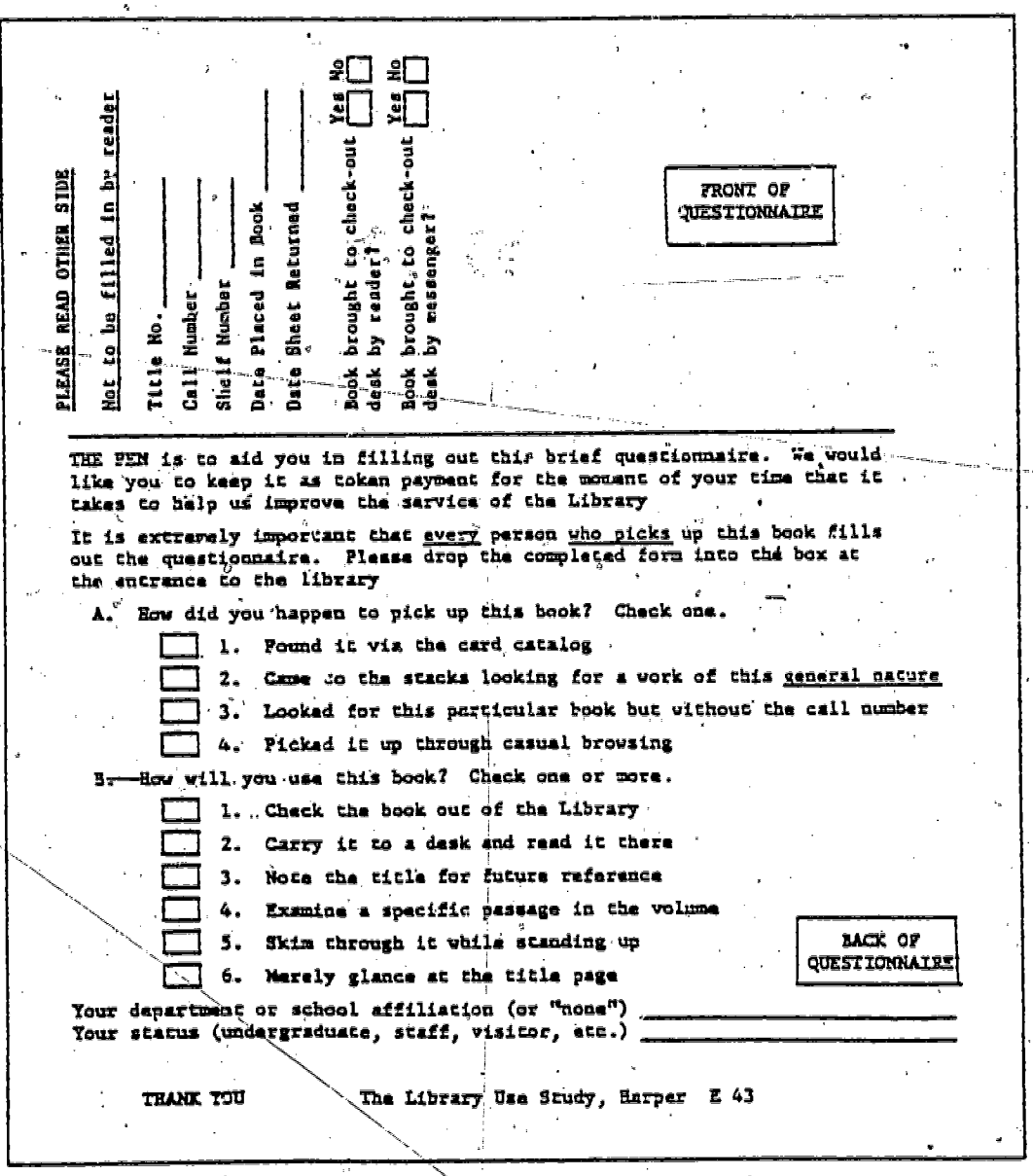
THE QUESTIONNAIRE

The questionnaire used by Fussler and Simon (Figure 1) was the starting point for the design of the one used in this study (Figure 2). However, the questionnaire underwent major changes and additions in the course of developing questions relevant to the issues of this study: at-the-shelf discovery of materials, unrecorded use, and immediacy of need.

Although each question has a clear function in the framework of this inquiry (Questions B, D and E relate directly to at-the-shelf discovery, unrecorded use and immediacy of need respectively; Question C was intended to "set up" the reader for the hypothetical situation in Question E), we felt justified in taking the broadest possible approach to each issue in the study. The instrument could always be simplified in subsequent studies (in fact, an experiment in simplification was conducted in a related study, which is described in Chapter VI and Appendix A).

FIGURE 1

Fussler and Simon Questionnaire



PLEASE READ OTHER SIDE

Not to be filled in by reader

Title No. _____

Call Number _____

Shelf Number _____

Date Placed in Book _____

Date Sheet Returned _____

Book brought to check-out desk by reader? Yes ☐ No ☐

Book brought to check-out desk by messenger? Yes ☐ No ☐

FRONT OF QUESTIONNAIRE

THE PEN is to aid you in filling out this brief questionnaire. We would like you to keep it as token payment for the moment of your time that it takes to help us improve the service of the Library

It is extremely important that every person who picks up this book fills out the questionnaire. Please drop the completed form into the box at the entrance to the library

A. How did you happen to pick up this book? Check one.

☐ 1. Found it via the card catalog

☐ 2. Came to the stacks looking for a work of this general nature

☐ 3. Looked for this particular book but without the call number

☐ 4. Picked it up through casual browsing

B. How will you use this book? Check one or more.

☐ 1. Check the book out of the Library

☐ 2. Carry it to a desk and read it there

☐ 3. Note the title for future reference

☐ 4. Examine a specific passage in the volume

☐ 5. Skim through it while standing up

☐ 6. Merely glance at the title page

BACK OF QUESTIONNAIRE

Your department or school affiliation (or "none") _____

Your status (undergraduate, staff, visitor, etc.) _____

THANK YOU The Library Use Study, Harper E 43

SOURCE: Fussler and Simon (1969), page 108.

FIGURE 2

University of California Questionnaire
(Front of Page, Actual Size)

LIBRARY SURVEY

Dear Library User:

HELP!!!!!! As you probably know, inflation and other factors are eroding the value of library dollars. The University Libraries have less buying power to meet your needs. If we can find out more about which books you are using and how you use them, we will be able to do a better job of providing the best service for the money available. WE NEED YOUR HELP!!!!!! Please take a few minutes to give us information about your library visit and what you use—on both sides of this paper—and leave it in the box next to the exit.

A. Please check your status and institutional affiliation for this library visit.

STATUS (Check one only)

____ 1. Faculty
____ 2. Faculty proxy (acting for faculty member)
____ 3. Doctoral Student
____ 4. Masters or Certificate student
____ 5. Undergraduate
____ 6. Library Staff (Your own use)
____ 7. Library Staff (Acting for a user)
____ 8. Other

AFFILIATION (Check one only)

____ 1. This UC campus
____ 2. Another UC campus
____ 3. Other College or University
____ 4. Other

B. Were you looking for this specific book when you came to the shelf? (Check "YES" or "NO")

____ 1. YES: How did you find the book? Check one.

____ a. Had call number before coming to the library.
____ b. Found call number in the library catalog or periodical list.
____ c. Did not have call number, but knew about where to find the book on the shelf.
____ d. Other. Please explain:

____ 2. NO: Why did you select this particular book? Check one.

____ a. Selected it as a replacement for another book that I wanted but could not find on the shelf.
____ b. Selected it in addition to another book that I looked for and found.
____ c. I was looking through this part of the library for a book on this general subject.
____ d. I was making a systematic survey of the library's holdings in this subject area.
____ e. Other. Please explain:

FIGURE 2 (Continued)
(Back of Page, Actual Size)

C. For what purpose did you select this book? What will you use it for?

D. What will you do with this book? (Check one only):

____ 1. Charge it out of the library.

____ 2. Photocopy all or part of it, and leave it in the library.

____ 3. Use it at a desk or table and leave it in the library.

____ 4. Examine it while at the shelf and leave it there.

____ 5. Other. Please explain:

E. If this book had not been on the shelf at this moment, how long could you have waited before it ceased to be useful to you for your stated purpose? Circle your best estimate of your maximum waiting time on only one of lines 1 to 5, or check one of lines 6 and 7.

1. MINUTES 0 15 30 45 60

2. HOURS 1 3 5 7 9 11 13 15 17 19 21 23 24

3. DAYS 1 2 3 4 5 6 7 8 9 10 11 12 13 14

4. WEEKS 2 3 4 5 6 7 8 9 10 11 12

5. MONTHS 3 4 5 6 7 8 9 10 11 12

___ 6. More than 12 months from now.

___ 7. Does not apply (Please explain):

F. If you have comments or suggestions about this questionnaire, library service, or availability of materials, please note them here:

PLEASE LEAVE THIS QUESTIONNAIRE IN THE BOX NEXT TO THE EXIT

This study is being conducted by the University of California Systemwide Administration, in cooperation with your local campus library.

Staff Use Only:
1. Record Number
2. Date Returned
3. How Returned:
___ In box
___ Found in book
___ Found in library
4. Replacement:
___ Replaced
___ Book not on shelf
5. COMMENTS:

Thus, some questions (notably B and E) are intentionally complex, both conceptually and visually. The consequences of this choice will be discussed in Chapter VI.

THE SAMPLE

Because of cost and time constraints, samples of monograph and periodical collections drawn for earlier studies of collection overlap and circulation history in University of California libraries were recycled for this study. Those samples were randomly drawn from the campus library catalogs in 1974 and 1975.

The original data base included 2,828 volumes from UCD and 3,265 volumes from UCSC. Some volumes listed in the original data file could not be located. Unbound periodical volumes were deleted from the list to assure the homogeneity of the periodical sample. Other volumes were excluded if they were in storage, officially missing, etc. Finally, all volumes that were not on the shelf or in circulation at the beginning and the end of the study were eliminated from the analysis. The final total was 5,008 volumes in the sample: 2,373 at UCD, and 2,635 at UCSC.

QUESTIONNAIRE PLACEMENT

Questionnaires were placed in each volume in such a way that (1) a user would see the questionnaire when the book was consulted, (2) the book could not be effectively used without removing or disturbing the questionnaire, and (3) such disturbance could be detected by inspecting the book. These criteria were met by first folding the questionnaire in half, and then wrapping it around the pages so that one end of the questionnaire touched the first arabic-numbered page in the volume,

and the other end touched the last arabic-numbered page (see Figure 3). With this simple decision rule, it was considered extremely unlikely that a patron, having moved the questionnaire to consult the book, would return it to its original placement. In the very few cases where a volume had no arabic numbered pages, the questionnaire was wrapped around all the pages in that book.

Each volume had a unique serial number assigned to it, which was entered on the corresponding questionnaire. A computer listing of serial numbers with matching call numbers enabled local campus staff to place new questionnaires in the appropriate volumes as the original questionnaires were completed and placed in the return boxes. Missing questionnaires were also replaced during the periodic stack checks described in the next section.

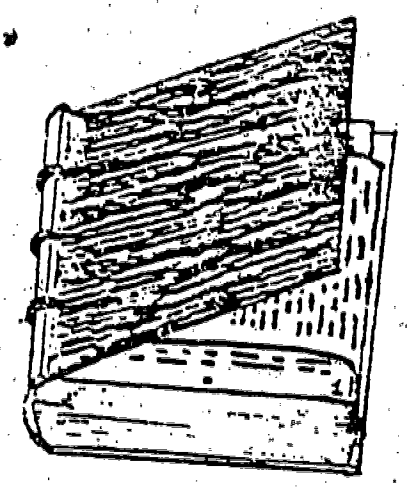
An additional procedure at this first phase was to insert a specially marked date due slip in each volume. In addition to recording the circulation count for the study period, the slips would also provide identification of the volumes as members of the study sample. For non-circulating items, the serial number was lightly penciled inside the back cover to provide the same identification.

STACK CHECKS

The methodology required periodic checking of the volumes to record instances of moved or missing questionnaires. The staff returned to each campus at three-week intervals. Although multiple uses of any single volume within this time span might be missed, budget constraints precluded more frequent checking.

FIGURE 3

Method of Questionnaire Placement



SOURCE: Urquhart and Urquhart (1976), page 68.

All volumes in the sample were looked up on each visit, and their status recorded on a worksheet. The categories used for recording data were: (1) volume not found in the stacks; (2) volume found, with questionnaire intact in its original placement; (3) volume found, with questionnaire in it, but no longer in its original placement; and (4) volume found and identified as part of the sample by the special date due slip or serial number, but with the questionnaire missing. The last two categories were interpreted as indicating that a volume was used. If the volume was not found, it was presumed to be in use--either charged out or somewhere in the library. In either case, a subsequent check would record that use.

After the first stack check, a minor change was made in the recording of the questionnaire status. Some doubt had arisen as to whether questionnaires whose placement was off by only one or two pages should be recorded as having been disturbed (i.e., recorded as an in-house use). Inspecting the volumes in question suggested that errors had been made in the original placement in a significant number of cases. Therefore, a "maybe moved" category was added to the worksheets for the remaining stack checks to reflect these dubious cases. "Maybe moved" questionnaires were not counted as used in the analysis of the data.

QUESTIONNAIRE REMOVAL AND CIRCULATION RECORDING

The last visit to each campus took place after Spring Quarter final examinations. At this time questionnaires were removed after their status was again recorded. In addition, a count was taken of the number of circulated uses each volume had received during the quarter. For this purpose, only the date due stamps appearing on the specially marked slips were counted.

All volumes not found on the shelves on this last visit were first checked in the reshelving areas, and then in the circulation files at Santa Cruz. Due to the large backlog of materials to be reshelved at Davis, this was deemed impractical. Instead, two staff members returned to Davis after ten days to recheck the shelves and the circulation records.

EVALUATION

Because our discussion of the methods used relies to some extent on the substantive findings reported in Chapter III - V, an evaluation of the methodology described above will be found in Chapter VI of this report.

CHAPTER III

UNRECORDED USE OF LIBRARY MATERIALS

THE RELATIONSHIP BETWEEN RECORDED AND UNRECORDED USE

Finding 1: The data indicate that there are about six unrecorded uses for every recorded use.

Finding 2: The unrecorded/recorded use ratio is greater for bound periodicals than for monographs.

A number of studies, including Urquhart and Schonfield (1971, 1972), Morse (1968), Bowen (1961), Shaw (1976), Bush (1956), McGrath (1971), Schonfield (1975), Jain (1966), Harris (1977), and the University of Pittsburgh (1978), have provided data on the rates of recorded and unrecorded use in libraries. These studies have employed two generic methodologies. One group (McGrath, Schonfield, Jain, University of Pittsburgh) collected data about books left on library tables, carrels, etc., to measure unrecorded use, and used aggregate data on circulation during the same time period to measure recorded use. The other group (Urquhart and Schonfield, Morse, Bowen, Shaw, Bush) has relied on some form of user questionnaire to determine the rates at which a group of respondents had either used materials within the library or checked them out. Harris used variants of both approaches. We shall refer to the first approach as the sweep method, and the second approach as the questionnaire method (see Glossary, Appendix D).

Harris' study provides a benchmark for comparing the two methods. Having used both methods, he noted that all forms of unrecorded use yielded use counts more than 19 times as great as use at the tables alone.

Because the University of California study uses a variant of the questionnaire method, its findings are properly compared to those of other questionnaire studies. The results of nine such studies are shown in Table 1. During the University of California study, there were 1,788 total uses of items eligible for circulation, of which 254 were recorded uses, and 1,534 were unrecorded uses. The ratio of unrecorded to recorded uses is 6.04:1. This ratio is greater than most such ratios reported in Table 1, but is comparable to the ratio of 8.90 reported by Bush (1956), which also included both periodicals and monographs. It is notable that both Bush (1956) and Urquhart and Schoenfield (1972) report that the unrecorded/recorded use ratios for periodicals are greater than those for monographs (Table 1). The pattern is replicated in the University of California data, with ratios of 9.85 for periodicals (Urquhart, 5.00; Bush, 27.21) and 3.65 for monographs (Urquhart, 1.50; Bush, 4.08).

Finding 3: There is a statistically measurable relationship between the number of times a volume circulates in a given period and the number of times it is used in-house during the same period, but the relationship is weak, explaining less than 10 percent of the variance in rates of unrecorded use.

While it is useful to know the aggregate relationship between recorded and unrecorded use, it is more important to know whether the materials used in-house are the same materials that circulate. Several studies approach this question without quite answering it. McGrath correlated the number of books charged out and picked up in sweeps within classification-number groups and found high correlations. He found, in other words, that over a given period of time, the number of in-house uses (at tables) of a subject class of books can be fairly well predicted by the number of circulated uses of that class. This finding does not assure us that the same books are used in both modes.

TABLE 1

Findings of Previous Studies of Unrecorded Use

Source	Ratio of Items Used In-House to Items Circulated	Comments
Urquhart & Schonfield (1972)	5.00	Periodicals
	1.50	Monographs
Urquhart & Schonfield (1971)	1.64	"Library A"
	6.70	"Library B"
	11.20	"Library C"
Morse	4.00	All items
Bowen	1.94	
Shaw (1976)	1.27	
Bush	8.90	
Harris	4.47	
Mean	4.66	
(standard deviation)	(3.39)	

SOURCES: See text, page 17, and Appendix C, "References."

The sweep portion of Harris' study is more illuminating. Since Harris' library actually date-stamped the materials picked up in sweeps, Harris was able to relate circulation history to the history of in-library use on a book-by-book basis. Harris showed that, of 1,549 volumes used at tables in one year, 418 (27 percent) were not charged out during the same period of time. In the present study, 1,095 volumes that were eligible for circulation received one or more unrecorded uses over the study period. Ninety-four percent of these were not charged out during the UC study, and therefore hold no record of use during the Spring Quarter, 1978. Certainly one reason for the wide discrepancy in the findings is the expanded definition of unrecorded use in the present study. Harris used the sweep method to secure these data, and his in-house use data include only uses at tables in the library. The UC data on unrecorded use include shelf uses as well--in fact, include as an unrecorded use any event which had the effect of displacing a questionnaire.

Harris provides further analysis of the data, comparing the total number of in-house and circulated uses for each volume, and reports that "a statistically significant connection is found between the number of issues /circulated uses/ and the number of in-library uses a book is likely to get" (Harris, p. 119). Harris' analysis illustrates a serious analytical ambiguity in studies of this sort. It is probably true that, in the aggregate, in-house use is related to circulated use: if a book has circulated five times in a year, it is likely to have been used in-house, say, between three and six times. If a volume circulated only once, it is much less likely to have been used six times in-house, but probably has been used more than once. This is the kind of interpretation that follows from a statistical analysis of the relationship between the number of in-house and circulated uses of a sample of books. For compact shelving purposes, however, one is relatively uninterested in differentiating between volumes used twice a year and those used five times a year: both cases

represent frequent use in a research library. Rather, one must develop the capacity to distinguish between volumes that are used only once in five, ten, or fifteen years.

To illustrate the problem, Harris' raw data were reconstructed, using his cross-tabular presentation of in-library and circulated uses (Harris, p. 119). The data were analyzed with a linear regression model in which circulated use was presumed to predict the level of in-house use (see Appendix B for details of the analysis). As with Harris' analysis, a "statistically significant connection" was found, but the relationship is extremely weak. Only nine percent of the variance in in-house use is accounted for by the level of circulated use.

The regression analysis clearly illustrates the weak relationship between circulated and in-house use. It is possible to predict with some accuracy that, for a large collection, a certain number of volumes will receive use of a particular type during a particular period. However, the expected use of any single volume in that collection is relatively unpredictable. For example, the regression analysis indicates that, for any single volume that circulated four times in one year, one can predict that it will be used in-house somewhere between zero and three times. More important, for those books that do not circulate at all during a year, the regression model suggests that only about 15 percent will be used in-house during that year, but there is a good chance that any single volume in this group could be used in-house as often as two times. Thus, Harris' data do not provide strong support for the hypothesis that, if a volume is not charged out, it is unlikely to be used in-house.

The same regression model was applied to the UC data. Table 2 compares the regression results from the two analyses. There are evident differences in the results, which may be attributable to differences in the data sources. However, both

TABLE 2

Regression Analysis of the Relationship
Between Rates of In-House and Circulated Use

Source	Constant	Coefficient	F-Ratio	Significance	R^2
Harris	0.145	0.115	818.17	0.001	0.088
UC	0.315	0.295	35.62	0.001	0.008

The model tested was: $I_i = a + b\ C_i$

where: I_i is the number of unrecorded uses of volume i

C_i is the number of recorded uses of volume i

a is a constant to be estimated

b is a coefficient to be estimated

analyses clearly support the belief that, while there appears to be a measurable statistical relationship between recorded and unrecorded use, the relationship is too weak to have predictive value for individual volumes.

THE RELATIONSHIP BETWEEN CURRENT USE AND CIRCULATION HISTORY

Finding 4: The longer a volume has been dormant, the less likely it is to receive use of any kind, recorded or unrecorded.

Urquhart and Urquhart (1976) used the questionnaire method developed by Fussler and Simon (and used at UC) to measure all uses of a sample of monographs over a period of time. Urquhart and Urquhart discovered that 1) monographs which have not been circulated recently have a fairly high likelihood of being used, and 2) the rate of use is not sensitive to the number of years since last use, but rather to the subject matter of the material. Their findings are displayed in Table 3. It would appear that, in the aggregate, about 15 percent of materials that have not circulated within the last six or more years will receive current use, regardless of their exact period of dormancy.

In Table 4, UC data are compared with the Urquhart and Urquhart findings for dormancy periods of 6, 10 and 12 years.[1] Use rates are somewhat lower in the UC sample, but the difference is small and relatively constant, as the last column of Table 4 indicates. Although Table 4 indicates strong similarities between the present study and Urquhart results, detailed analysis of UC data does not support Urquhart's finding that the rate of current use is insensitive to dormancy period.

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[1]The maximum dormancy period recognized in this study is 13 years. Since the Santa Cruz campus officially opened in the 1965 academic year, it is impossible for a Santa Cruz volume to have been dormant for more than 13 years (excepting pre-1965 acquisitions by the Lick Observatory, which could represent only an insignificant proportion of the UC sample).

TABLE 3

The Relationship Between Current Use and Last Circulation Date: Urquhart Findings

Subject	Years Since Last Circulation	Number of Volumes	Number of Volumes Used	Percent of Volumes Used[1]
Physics	6	191	54	28.00
	10	125	32	26.00
	12	107	23	21.00
	15	61	17	28.00
Politics	6	161	27	17.00
	10	104	18	17.00
	12	86	14	16.00
	15	76	14	18.00
English Literature	6	235	22	9.00
	10	159	12	8.00
	12	122	10	8.00
	15	101	8	8.00
Medicine	6	215	35	16.00
	10	143	17	12.00
	12	117	14	12.00
	15	76	9	12.00
All Subjects[1]	6	802	138	17.21
	10	531	79	14.88
	12	432	61	14.12
	15	314	48	15.29
Unweighted Mean[2] (standard deviation)				15.38 (1.32)

SOURCE: Urquhart (1976), p. 87, Table 4.

NOTES: (1) Calculated from Urquhart data.
(2) For "All Subjects" data only.

TABLE 4

Rates of Current Use of Dormant Materials in the Urquhart and University of California Studies

Volumes Having a Dormancy Period (in Years) Equal to or Greater Than:	Percent of Volumes Used		Difference
	Urquhart & Urquhart	UC	
6	17.21	15.97	1.24
10	14.88	13.68	1.20
12	14.12	12.75	1.37

The discrepancy may arise from the way in which the Urquhart data are presented. The complete presentation of UC data in Table 5 leaves little doubt that use rates decline as dormancy period increases. The decline is most marked in the first few years. From dormancy periods of zero to seven years, the use rate declines almost 12 percent, from 27.55 percent to 15.63 percent. In the last six rows of Table 5, the rate changes only 2.75 percent, from 15.63 percent to 12.88 percent.

The form of the data invites the attempt to fit a smooth curve to the findings. Since the rate of change is not constant, some non-linear function must be involved. The relationship between dormancy period and proportion of materials used can be described by an exponential function.[2] The actual data and the exponential curve are shown in Figure 4.

It is notable that the cumulative presentation used by Urquhart and Urquhart, and adopted for the presentation of UC data in Table 5, tends to obscure a rather dramatic difference in the use rates of dormant and recently-circulated materials. In Table 5, for instance, we see that, for the entire UC sample (dormancy periods of zero years or more), the total use rate was 27.55 per cent; for materials with dormancy periods of 13 years or more, the total use rate was only 12.88 per cent. However, for volumes with dormancy periods of exactly zero years (i.e. volumes for which the most recent circulation--prior to the beginning of the UC study--was in 1978), the total use rate during the present study was 69.94 per cent. Table 6 and Figure 5 indicate the wide differences in use rates, which are obscured in Table 5.

Table 6 also shows the presence of a statistical problem which arises when a random sample is used to study this issue: for dormancy periods greater that five

[2] Least-squares estimates yield the equation P=23.6229 (e exp -0.054Y), where P=proportion used, Y=dormancy period in years. R-square for the estimated equation is 0.9161.

TABLE 5

Rates of Recorded and Unrecorded Use of Dormant Library Materials During the University of California Study

Volumes Having a Dormancy Period (in Years) Equal to or Greater Than:	(1) Number of Volumes	(2) Percentage of Volumes That Received One or More Recorded Uses	(3) Percentage of Volumes That Received One or More Unrecorded Uses	(4) Percentage of Volumes That Received One or More Total Uses[1]
0 (All Items)	3,666	4.09	25.34	27.55
1	3,503	2.11	24.44	25.58
2	3,079	1.53	21.68	22.54
3	2,387	0.88	18.82	19.19
4	2,162	0.65	17.48	17.85
5	1,946	0.41	16.80	17.01
6	1,760	0.23	15.91	15.97
7	1,427	0.21	15.63	15.63
8	1,278	note 2	15.41	15.41
9	1,167		14.31	14.31
10	1,067		13.68	13.68
11	977		12.59	12.59
12	918		12.75	12.75
13	862		12.88	12.88

NOTES: 1. Column 4 is not the sum of Columns 2 and 3, since some volumes received both recorded and unrecorded uses. See Appendix D, Glossary, for operational definitions of recorded, unrecorded, and total use.

2. Beyond this dormancy period, the number of volumes receiving recorded use falls to a low level (2 volumes or less). The proportion of volumes receiving recorded use can be assumed to be approximately constant beyond this point.

FIGURE 4

Use Rate by Cumulative Dormancy Period:
Actual Percentages and Fitted Curve

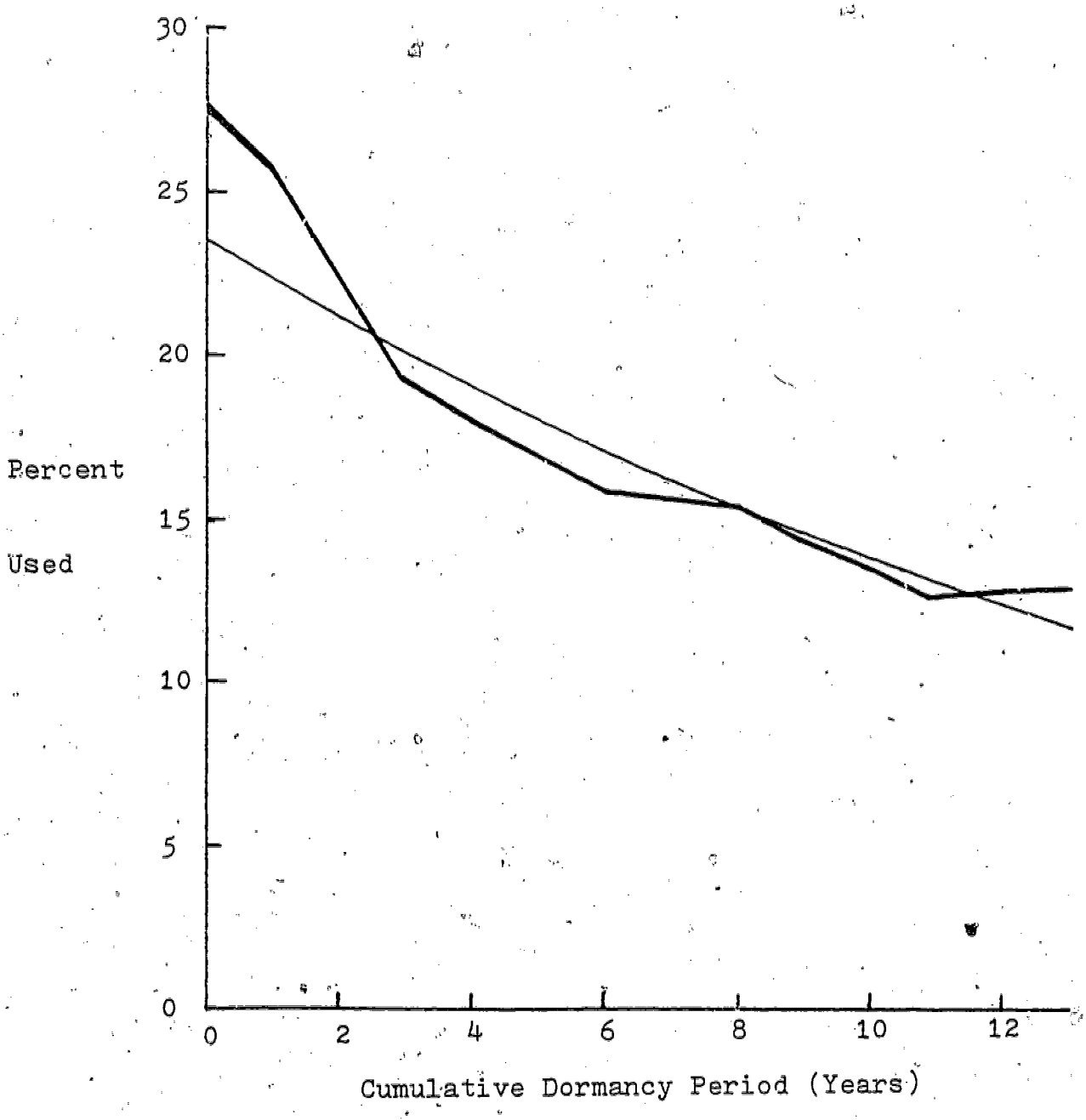


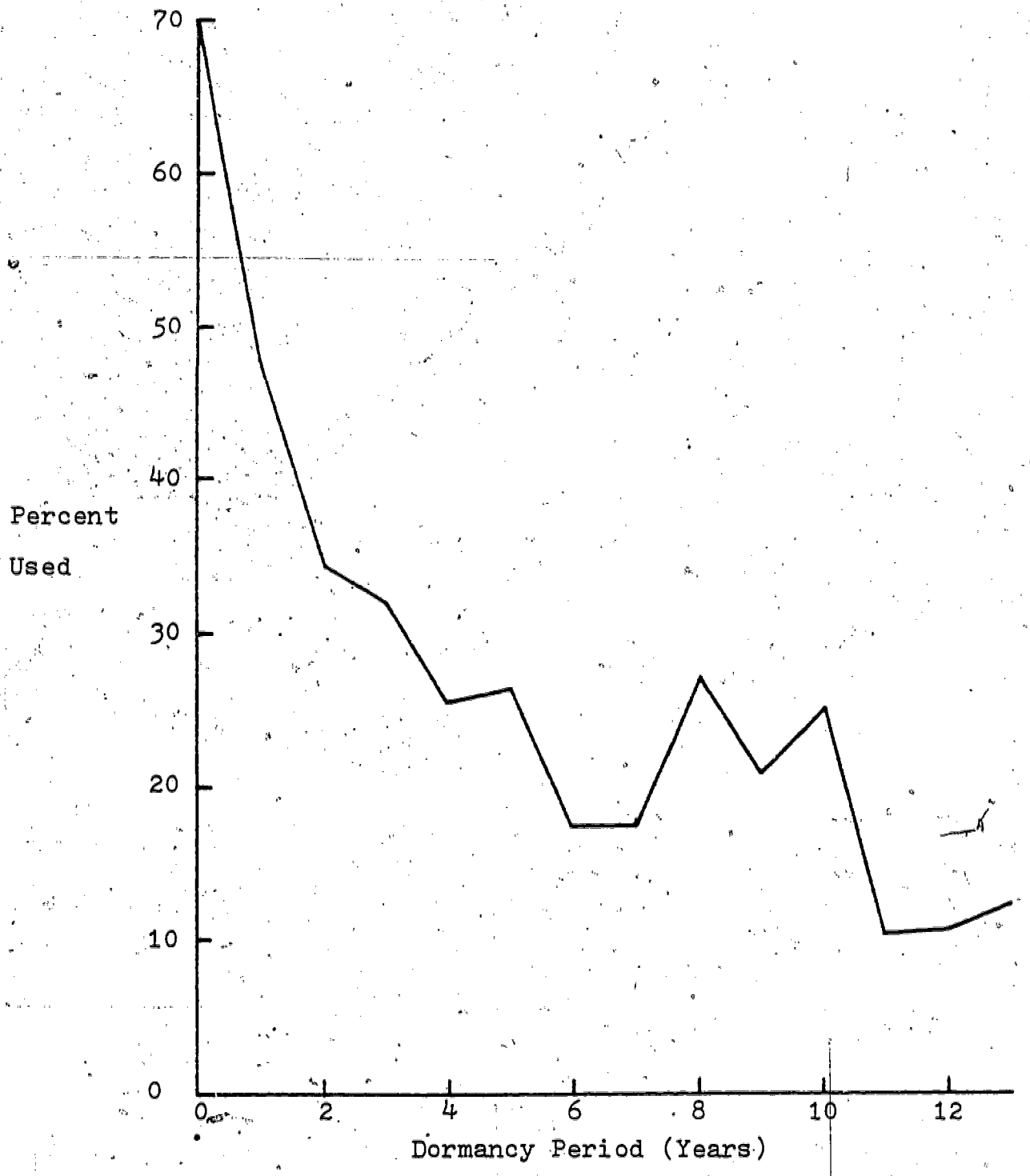
TABLE 6

Rates of Use of Library Material by Discrete Dormancy Period

Volumes Having a Dormancy Period (in Years) Exactly Equal to:	Number of Volumes	Percentage of Volumes that Received One or More Total Uses
0	163	69.94
1	424	47.64
2	692	34.10
3	225	32.00
4	216	25.46
5	186	26.88
6	333	17.42
7	149	17.45
8	111	27.03
9	100	21.00
10	90	25.56
11	59	10.17
12	56	10.71
13 or more	862	12.88

FIGURE 5

Use Rate By Discrete Dormancy Period



years, the sample sizes for individual dormancy periods generally become too small to be statistically useful. Comparison of Figures 4 and 5 shows that when individual, rather than cumulative, dormancy periods are used in the analysis, the pattern of measured use rates is considerably more erratic. A curve fitted to the data in Table 6 provides less satisfactory results.[3] Naturally, the problem of small sample sizes is aggravated when one begins to subdivide the UC sample by form of material or some other characteristic (as we will do in the following sections). To assure that the problem of small sample size does not obscure the underlying patterns of use which we have discovered in the UC data, only cumulative distributions will be used in the subsequent analyses of dormancy periods.

Finding 5: If a dormant volume is used at all, it is much more likely to receive unrecorded use than recorded use.

The most striking characteristic of the unexpectedly high current use rate for long-dormant materials is that it is composed almost entirely of unrecorded uses. Table 5 shows that current circulated use is virtually negligible for materials that have not circulated in 6 or more years--less than one-quarter of one percent during the period of study. The proportion of total use which is accounted for by unrecorded use rises consistently as the period of dormancy increases. Table 7 shows that, for the entire sample, there were 6.2 volumes used in-house for every volume circulated.[4] For volumes that had not circulated in the last seven years or more, there were 74 with unrecorded use for every one receiving recorded use.

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[3] R-square=0.7674, as contrasted with 0.9161 for the cumulative data.

[4] A few volumes are used both ways (see Table 5). These volumes are double counted in Table 7--i.e., counted as having both recorded and unrecorded use. See Appendix D, Glossary, for operational definitions of recorded and unrecorded use.

TABLE 7

Ratio of Volumes with Unrecorded and Recorded Use
by Cumulative Dormancy Period

Volumes Having a Dormancy Period (in Years) Equal to or Greater Than:[1]	(1) Percentage of Volumes That Received One or More Recorded Uses[2]	(2) Percentage of Volumes That Received One or More Unrecorded Uses[2]	Unrecorded Uses per Recorded Use (Col. 2 ÷ Col. 1)
0	4.09	25.34	6.20
1	2.11	24.44	11.58
2	1.53	21.68	14.17
3	0.88	18.82	21.39
4	0.65	17.48	26.89
5	0.41	16.80	40.98
6	0.23	15.91	69.17
7	0.21	15.63	74.43

NOTES: 1. Beyond a dormancy period of seven years, the number of volumes receiving recorded use falls to a low level (2 volumes or less). The proportion of volumes receiving recorded use can be assumed to be approximately constant beyond this point.

2. From Table 5, page 27.

Fussler and Simon (1969) address this question indirectly. The data presented in Tables 37 and 38 of their book appear to indicate that materials are more likely to be used in-house than charged out if they have never been charged out before, or if they have not been charged out recently, and they report that "there does seem to be some tendency for low-use books to get proportionally more /unrecorded use/" (p. 114).

A graphic presentation of the unrecorded/recorded use ratios (Figure 6) suggests the existence of a functional relationship.[5] The strength of this functional relationship lends considerable support to Fussler and Simon's conclusion. Dormant volumes are less likely to be used, but if they are used at all, they are more likely to be used in-house.

To say that long-dormant library materials have a fairly high probability of receiving unrecorded use is not to say that the unrecorded use of dormant materials composes a large share of current use of the libraries. Table 8 and Figure 7 show the cumulative percentage of volumes receiving one or more uses of any kind, by dormancy period. About 14 percent of the circulating volumes which were used during the present study had dormancy periods of 10 years or more. Because of the characteristics of the sample used for this study, it would not be appropriate to infer that this proportion holds for a typical collection of monographs and bound periodicals in a university library.

[5] R=7.049 (e exp 0.3541Y), where R=ratio of unrecorded to recorded uses, and Y is the dormancy period in years; R-square=0.9841.

FIGURE 6

Ratio of Unrecorded to Recorded Use by Cumulative Dormancy Period: Actual Ratios and Fitted Curve

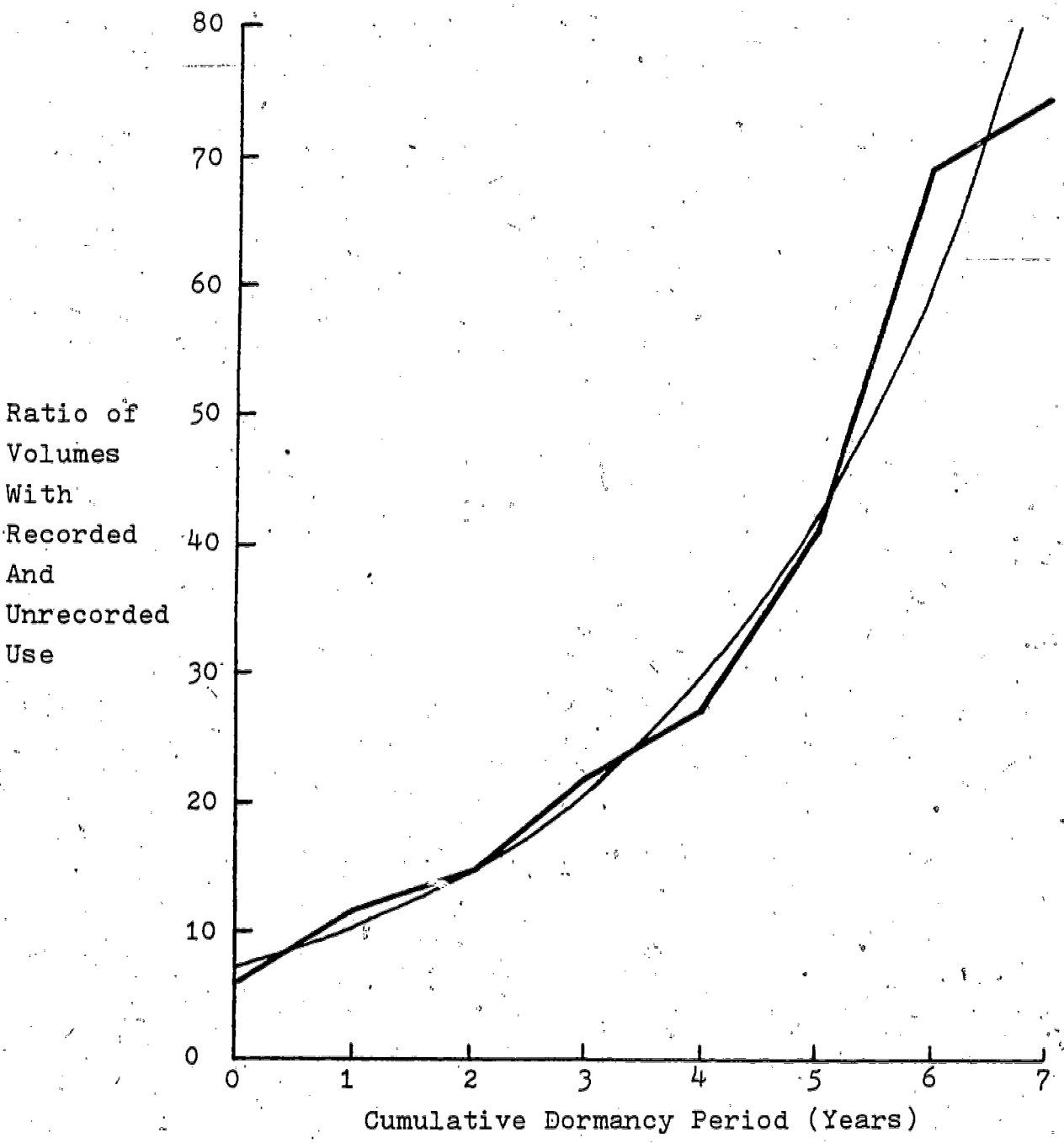


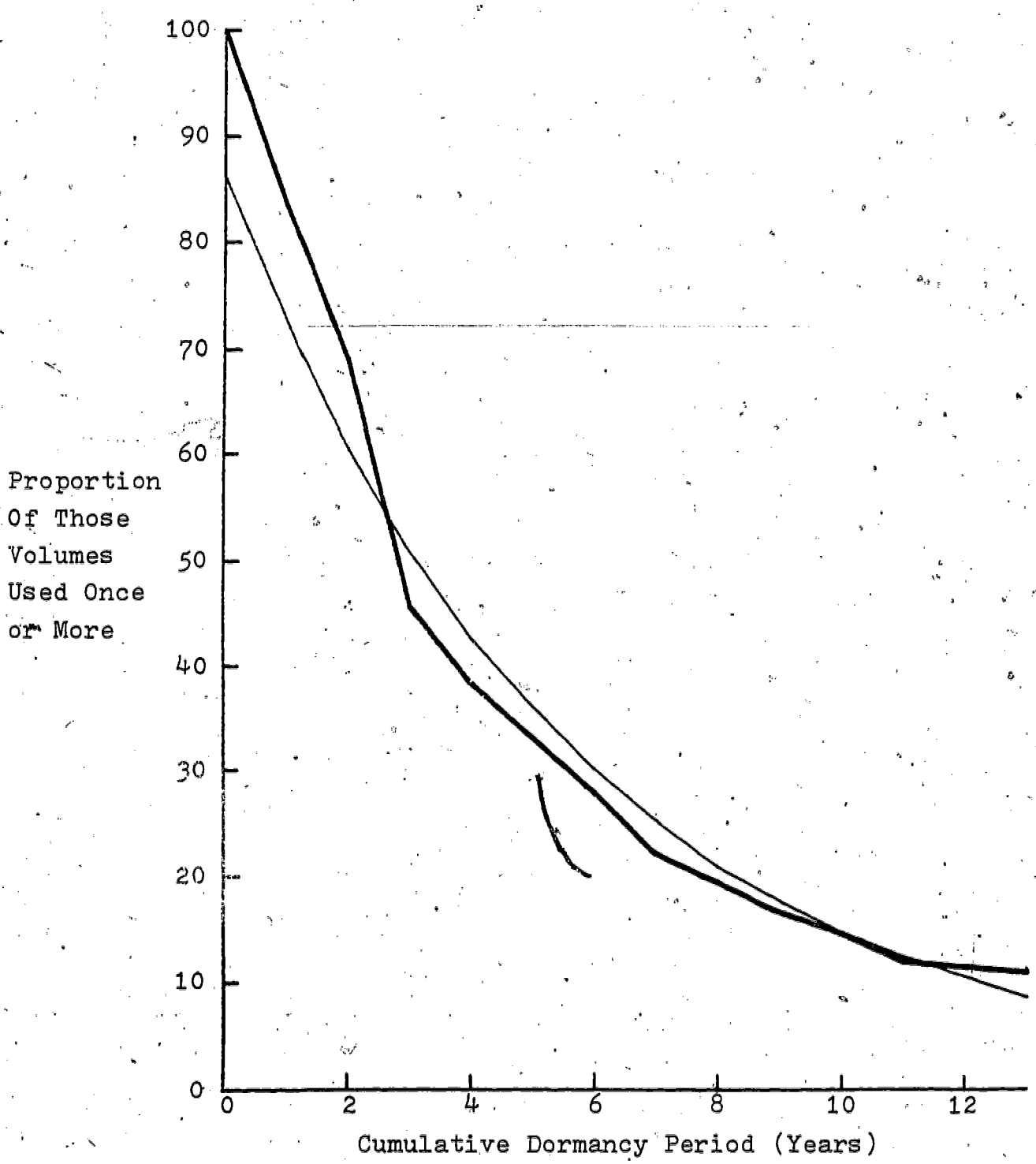
TABLE 8

Cumulative Proportion of Volumes With One or More Uses by Cumulative Dormancy Period

Volumes Having a Dormancy Period (in Years) Equal to or Greater Than:	Percent of All Sample Volumes Used During the Study
0	100.00
1	83.60
2	68.71
3	45.35
4	38.22
5	32.77
6	27.82
7	22.08
8	19.50
9	16.53
10	14.46
11	12.18
12	11.58
13	10.99

FIGURE 7

Cumulative Proportion of Volumes With One or More Uses By Cumulative Dormancy Period: Actual Values and Fitted Curve



THE EFFECT OF CONTROL VARIABLES ON THE RELATIONSHIP BETWEEN DORMANCY PERIOD AND CURRENT USE

Prior Circulation

Finding 6: Items which have circulated in the past are more likely to receive current use than are volumes which have never circulated, even when dormancy period is taken into account.

Table 9 presents data on volumes used by dormancy period separately for volumes which have circulated in the past and those which have no record of prior circulation. Within both groups, there is an obvious tendency for use rate to decline as the dormancy period increases, but the relationship between dormancy and use rate is noticeably weaker for items with prior circulation.[6] Figure 8 shows estimated exponential curves for materials with and without prior circulation.

Form of Material

Table 10 presents use data separately for periodicals and monographs. Here one sees strikingly different patterns. Use rates for periodicals drop off in a familiar and consistent pattern as dormancy periods increase, and a curve fitted to these data is consistent with the pattern for the sample as a whole.[7] This is not surprising, since periodicals comprise 75 percent of the UC sample. Monographs show a quite different pattern. First, use rates are considerably higher. Second, recorded use rates are negligible for materials which have been dormant for a year or more.

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[6] For uncirculated books, P=17.4360 (e exp-0.0295Y), R-square=0.906. For previously circulated books, P=30.7623 (e exp-0.0497Y), R-square=0.795.

[7] P=23.1572 (e exp-0.0539Y); R-square=0.9294.

TABLE 9

Volumes Used by Cumulative Dormancy Period: Volumes With and Without Previous Circulation

Volumes Having a Dormancy Period (in Years) Equal to or Greater Than:	(1) Number of Volumes	(2) Percentage of Volumes That Received One or More Recorded Uses	(3) Percentage of Volumes That Received One or More Unrecorded Uses	(4) Percentage of Volumes That Received One or More Total Uses
Volumes With Previous Circulation				
0 (All Items)	1,995	4.63	32.06	35.79
1	1,932	3.38	30.93	32.75
2	1,408	2.49	26.83	28.27
3	1,023	1.86	24.27	25.12
4	815	1.47	21.84	22.82
5	639	0.94	21.44	22.07
6	482	0.41	20.12	20.33
7	348	0.29	20.11	20.11
8	253	Note 2	21.34	21.34
9	178		19.66	19.66
10	126		18.25	18.25
11	91		15.38	15.38
12	70		18.57	18.57
13	51		19.61	19.61
Volumes Without Previous Circulation				
0 (All Items)	1,671	0.72	17.35	17.71
1	1,671	0.72	17.35	17.71
2	1,671	0.72	17.35	17.71
3	1,364	0.15	14.74	14.74
4	1,347	Note 2	14.85	14.85
5	1,307		14.54	14.54
6	1,278		14.32	14.32
7	1,079		14.18	14.18
8	1,025		13.95	13.95
9	989		13.35	13.35
10	941		13.07	13.07
11	886		12.30	12.30
12	848		12.26	12.26
13	811		12.45	12.45

NOTES: 1. Column 4 is not the sum of Columns 2 and 3, since some volumes received both recorded and unrecorded uses. See Appendix D, Glossary, for operational definitions of recorded, unrecorded, and total use.

2. Beyond this dormancy period, the number of volumes receiving recorded use falls to a low level (2 volumes or less). The proportion of volumes receiving recorded use can be assumed to be approximately constant beyond this point.

FIGURE 8

Use Rate by Cumulative Dormancy Period for Volumes With and Without Previous Circulation: Fitted Curves

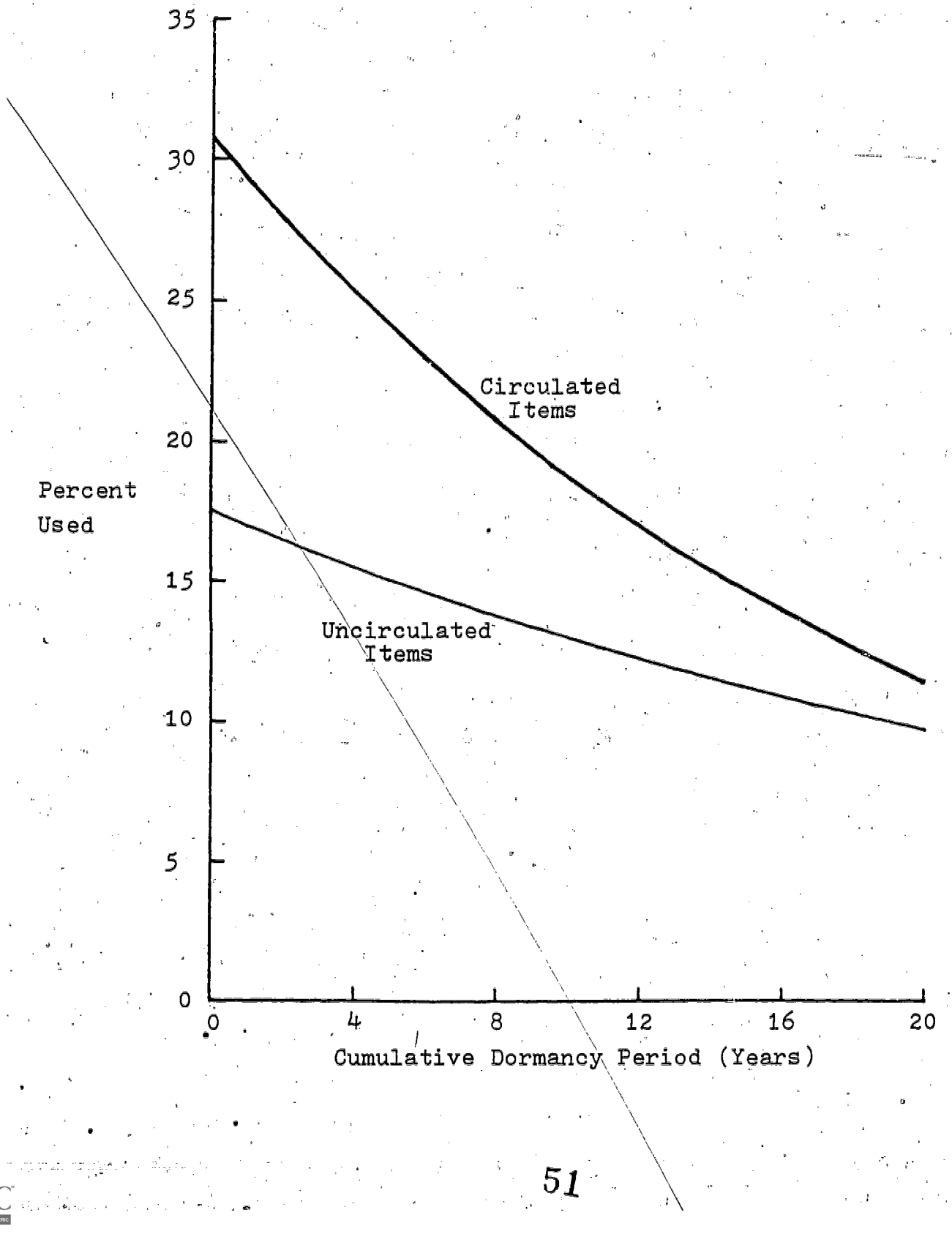

TABLE 10

Volumes Used by Cumulative Dormancy Period:
Periodicals and Monographs

Volumes Having a Dormancy Period (in Years) Equal to or Greater Than:	(1) Number of Volumes	(2) Percentage of Volumes That Received One or More Recorded Uses	(3) Percentage of Volumes That Received One or More Unrecorded Uses	(4) Percentage of Volumes That Received One or More Total Uses[1]
Periodicals				
0 (All Items)	2,763	2.68	23.28	24.68
1	2,757	2.61	23.15	24.56
2	2,522	1.82	20.56	21.61
3	1,975	1.01	17.93	18.38
4	1,851	0.70	16.80	17.23
5	1,711	0.47	16.54	16.77
6	1,582	0.25	15.68	15.74
7	1,288	0.23	15.30	15.30
8	1,182	Note 2	14.97	14.97
9	1,105		14.12	14.12
10	1,023		13.49	13.49
11	947		12.46	12.46
12	897		12.49	12.49
13	847		12.75	12.75
Monographs				
0 (All Items)	903	8.42	31.66	36.32
1	746	0.27	29.22	29.36
2	557	0.18	26.75	26.75
3	412	Note 2	23.06	23.06
4	311		21.54	21.54
5	235		18.72	18.72
6	178		17.98	17.98
7	139		18.71	18.71
8	96		20.83	20.83
9	62		17.74	17.74
10	44		18.18	18.18
11	30		16.67	16.67
12	21		23.81	23.81
13	15		20.00	20.00

NOTES: 1. Column 4 is not the sum of Columns 2 and 3, since some volumes received both recorded and unrecorded uses. See Appendix D, Glossary, for operational definitions of recorded, unrecorded, and total use.

2. Beyond this dormancy period, the number of volumes receiving recorded use falls to a low level (2 volumes or less). The proportion of volumes receiving recorded use can be assumed to be approximately constant beyond this point.

Third, the total use rate declines only for the first five or six years, and then begins to behave quite erratically.

It may be plausible to suggest that for monographs dormant for more than about six years, the use rate is about constant regardless of dormancy period. This notion gains some support from curve-fitting analysis, and it can be shown that, if the actual average use rate for any monograph with a dormancy period of three or more years is 20 percent regardless of the exact period of dormancy, the data shown for the longer dormancy periods in Table 10 could have resulted from chance.[8]

Subject of the Material

Sample volumes were classified into 28 subject areas using the coding algorithm presented in Figure 9. The 28 specific subjects are based on the schema developed at the University of California, Berkeley (1975). The Berkeley schema was modified somewhat to allow classification solely by the first one or two letters of the Library of Congress (LC) class number, without regard to the numeric portions (to expedite data processing). Where fine distinctions appeared not to be analytically useful, subject categories were combined--for example, four categories of languages and literature in the P classifications were reduced to a single class (Class 14 in Figure 9). Finally, recognizing that many of the 28 subject classes would be poorly represented in the sample for statistical purposes, a higher level of classification was imposed.

[8] The 95% confidence interval of use proportions for all dormancy periods equal to or greater than three years contains the value 20 percent. This is not true for aggregate dormancy periods of one or two years. For instance, the 95% confidence interval for volumes with dormancy periods of two or more years is 26.75 ± 3.68 percent, or 23.07 to 30.43 percent. For N's greater than 100, the standard formula, $P + 1.96\sqrt{P(1-P)/N}$ was used to estimate the 95% confidence interval. For N's less than 100, a small sample nomograph was used (Wonnacott and Wonnacott, 1972, p. 176).

FIGURE 9:

CALL NUMBER CODING ALGORITHM

(0) GENERAL WORKS

- 00 General works: Ax
- 01 Books, bibliographies, library science: Z
- 02 Sports, games, recreation: GV
- 03 Military science: U,V

(1) HUMANITIES

- 10 Philosophy: B-BD, BH-BJ
- 11 Religion: BL-BX
- 12 Music: Mx
- 13 Arts, architecture, environmental design: Nx, TR
- 14 Languages and literature: Px
- 15 History: C-CB, CD-Fx

(2) SOCIAL SCIENCES

- 20 General: H
- 21 Psychology: BF
- 22 Archeology and anthropology: CC, GN-GT
- 23 Geography: G-GF
- 24 Economics, business, management: HB-HJ
- 25 Sociology: HM-HX
- 26 Political science, law: Jx,Kx
- 27 Education: Lx

(3) GENERAL SCIENCE

- 30 General Science: Q
- 31 Mathematics and statistics: HA, QA

(4) PHYSICAL SCIENCES

- 40 Astronomy: QB
- 41 Physics: QC
- 42 Chemistry: QD
- 43 Geology: QE
- 44 Technology and engineering: T-TP, TS-TX

(5) BIOLOGICAL SCIENCES

- 50 Biological sciences: QH-QR
- 51 Health sciences and professions: Rx
- 52 Agriculture and natural resources: Sx

NOTE: "x" indicates that all single- and double-letter combinations beginning with the capitalized letter are included, e.g. Ax includes A, AC, AP, etc.

Initially, the authors attempted to classify the 28 subjects into four disciplines--Humanities, Physical Sciences, Social Sciences, and Biological Sciences. The attempt to compose this macro-classification led to the creation of two more "disciplines"--General Works and General Science. The assignment of subject classes to disciplines is arbitrary--history, for instance, is often considered as a social science discipline, but was classified with the humanities in this analysis in the belief that the library use patterns of historians might be more like use patterns in the humanities--but it was expected that real differences in use patterns by discipline, if they existed, would not be seriously obscured by occasional mis-classification.

A summary analysis of the characteristics of book use by discipline is presented in Table 11. The upper section lists the proportion of volumes which were used during the study, for each dormancy period. The lines labelled N(0) and N(13) show the numbers of sample volumes for each discipline group for the entire sample and for dormancy periods of 13 or more years, respectively. These data are provided to indicate the sample sizes on which the reported proportions and subsequent trend analyses are based. The relatively small sample sizes and the arbitrary nature of the method of subject grouping suggest that conclusions not be drawn from this data. The following discussion is intended only to suggest directions for further research in this area.

Following the sample sizes, the ratio of in-house to circulated use for volumes in each discipline is reported. A high ratio of in-house use is not surprising for the General Works category, since it is largely composed of bibliographies and other materials in the Z class.[9] The bottom section of Table 11 reports the results of attempts to fit an exponential curve. The results of the trend analysis suggest that

[9] It should be remembered that the data and findings in this chapter of the report relate entirely to materials eligible for circulation.

TABLE 11

Volumes Used by Cumulative Dormancy Period: Subjects

PROPORTION USED DURING THE STUDY

Volumes Having a Dormancy Period (in Years) Equal to or Greater Than:	General Works	Humanities	Social Sciences	General Science	Physical Sciences	Biolcgical Sciences
0 (All Items)	19.10	26.93	33.03	22.27	26.76	29.11
1	18.41	23.71	29.59	20.99	24.45	27.81
2	17.51	21.12	27.16	20.18	22.65	19.57
3	16.25	18.39	22.72	16.37	19.16	17.21
4	16.30	16.58	21.83	17.72	17.04	16.21
5	16.06	14.35	21.16	16.20	18.15	15.12
6	15.38	13.39	20.12	15.75	16.80	14.20
7	16.40	13.66	20.15	12.50	15.92	13.03
8	17.65	14.58	19.03	12.79	15.03	11.03
9	16.67	14.67	18.64	12.50	12.18	10.75
10	14.94	15.11	17.80	13.16	10.56	8.95
11	13.99	13.94	18.24	11.84	8.73	8.84
12	15.04	13.78	18.71	13.04	8.62	9.28
13	14.40	13.90	17.93	14.29	9.52	8.79
N(0)[1]	356	1,047	778	247	527	711
N(13)[2]	125	187	145	63	105	237
I/C[3]	9.44	4.87	5.54	7.30	9.02	6.95
Exponential Fit:[4]						
a	18.2065	21.7896	28.2925	20.4380	26.7500	25.3829
b	-0.0177	-0.0445	-0.0426	-0.0440	-0.0878	-0.0933
R^2	0.6560	0.6792	0.8203	0.7590	0.9508	0.9358

NOTES:
1. Number of volumes with cumulative dormancy period = 0 (i.e. all volumes in the discipline area).
2. Number of volumes with dormancy period = 13 or more years.
3. "In-house/circulated" ratio for all volumes in the discipline area.
4. Fitted to the equation P = a(e exp bY) where P = proportion used, and Y is the cumulative dormancy period.

there may be two or three obvious groupings of disciplines. The slope coefficients, or rate-of-change coefficients (coefficient "b" in Table 11) are very similar for the Physical and Biological Sciences. The slope coefficients of these two disciplines, in turn, are very different from those of the other subject groups. The exponential curves provide very good fits to the Physical and Biological Science data; goodness-of-fit is considerably lower for the other disciplines.

Among the remaining discipline groups, General Works seems to stand out as a separate category, inasmuch as the slope coefficient for this "discipline" is markedly different from the others. It is not clear why the last three groups-- Humanities, Social Sciences, and General Science--should show such similarity, but the existence of these multi-discipline groupings and the differences between them seem quite evident from the quantitative findings and from the graphic presentations in Figure 10 (actual data) and Figure 11 (fitted curves).

THE COMPOSITION OF RECORDED AND UNRECORDED USE

Three hundred and fifteen questionnaire responses provide greater detail about the forms of recorded and unrecorded use. Table 12 presents the basic data provided by the questionnaire respondents. Among questionnaire respondents, the unrecorded/recorded use ratio was 2.44:1. Recalling that the overall ratio for the present sample was 6.04:1 (page 18 above), there is reason to believe that either (1) many of the unrecorded uses measured in the UC study were spurious (e.g., results of stack shifts, inadvertent displacement of questionnaires, etc.) or (2) users who made unrecorded use of a volume were less likely to complete and return questionnaires.

FIGURE 10

Use Rate by Cumulative Dormancy Period by Subject: Actual Values

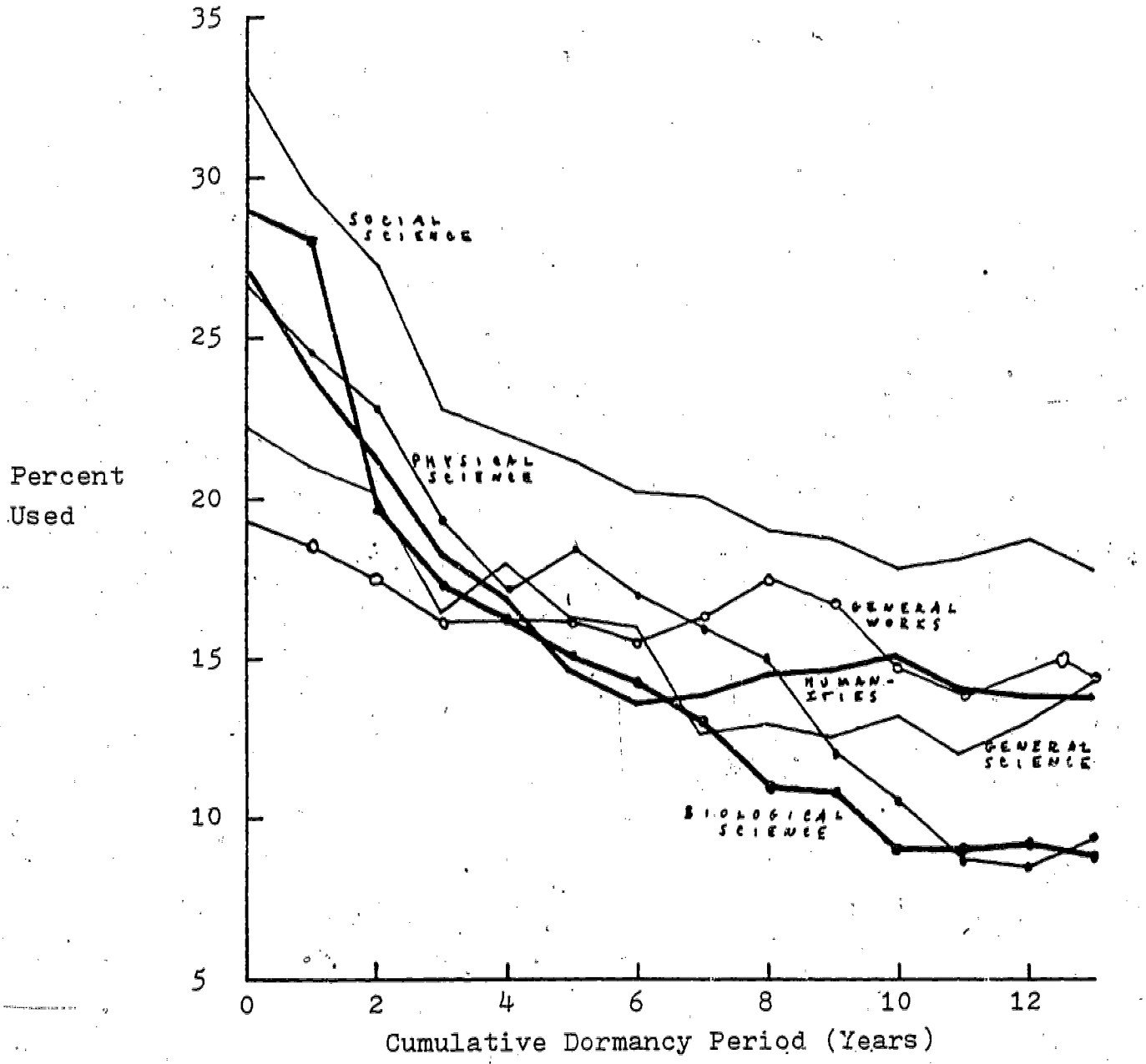

FIGURE 11

Use Rate by Cumulative Dormancy Period by Subject: Fitted Curves

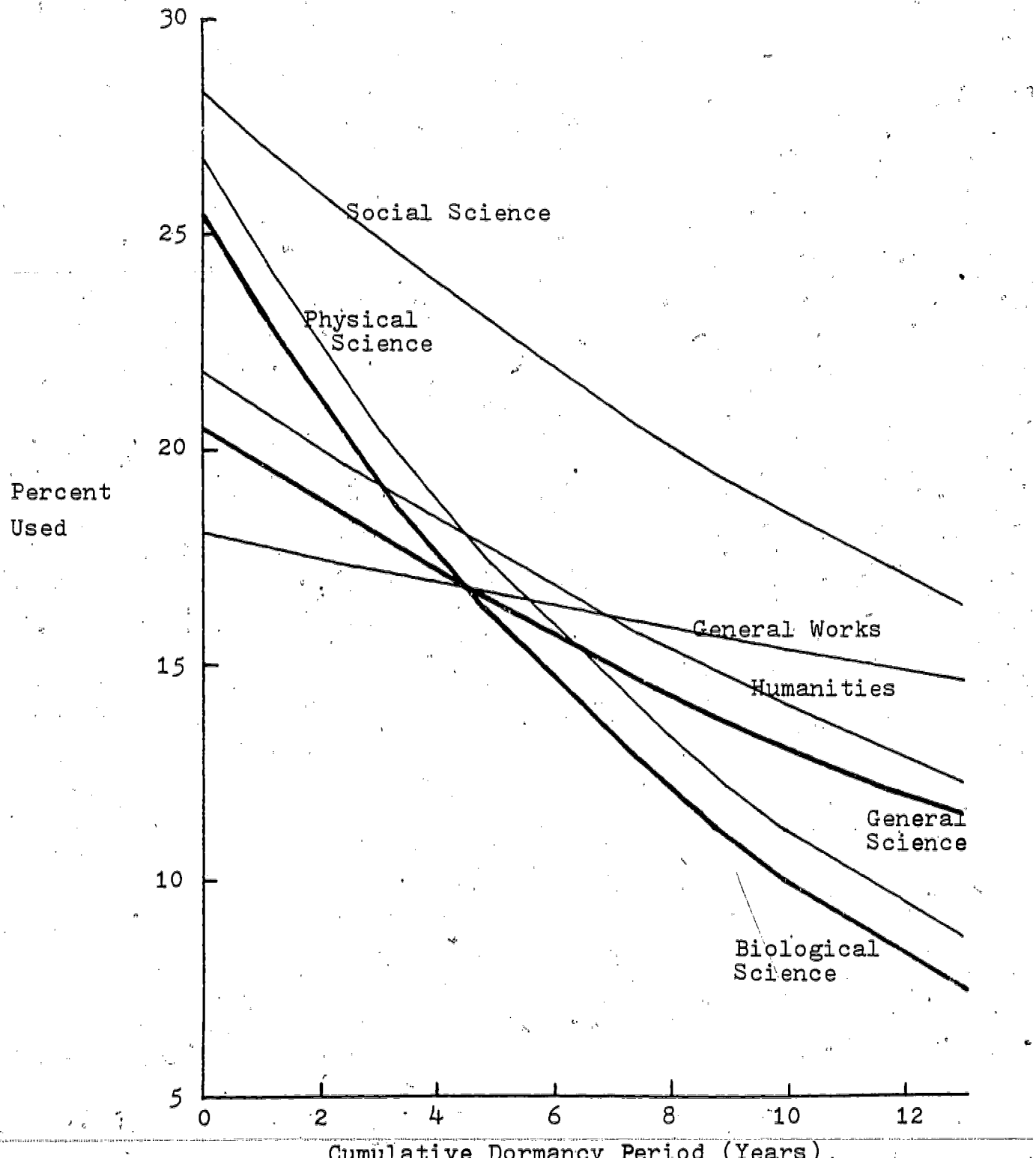

TABLE 12

Modes of Use Reported by
Questionnaire Respondents

MODE OF USE	NUMBER	PERCENT
Charge out	85	29.1
Photocopy	36	12.3
Use at table	103	35.3
Use at shelf	68	23.3
TOTAL	292	100.0

While the first hypothesis cannot be discounted, the second hypothesis derives some support from the discovery that the ratio of all unrecorded uses to table uses in the questionnaire responses is 2.01:1 (if photocopying is treated as a table use, the ratio is 1.49:1). This ratio contrasts markedly with the ratio of 19.43:1 reported by Harris in a similar study (page 17 and Table 1, above). There are two plausible reasons for the difference in UC and Harris findings. The first reason, fundamental differences between the two studies in the user behavior being measured, is not strongly supported: UC stack-check data are similar to Harris' data in terms of the ratio of unrecorded and recorded uses (Table 1) and the strength of relationship between recorded and unrecorded use (pages 21 to 23 above). The second reason is that users who used materials at the shelf were significantly less likely to complete and return their questionnaires. Since Harris did not rely on voluntary completion of questionnaires to determine this ratio,[10] his data were not contaminated by a response bias. This bias seems highly likely considering the difficulty involved in filling out a long and complex questionnaire while standing at the shelf. The phenomenon could also be explained by the hypothesis that a large number of the shelf uses constituted acts of casual browsing or "consult-and-reject" transactions in which users may have felt that it was not worthwhile to complete an extensive questionnaire. In any case, there seems to be a strong possibility that the questionnaire responses are biased against complete reporting of at-the-shelf uses.

[10] Harris used specially-placed book slips, like the UC questionnaires, and measured total use by displacement (or disappearance) of the slips. He then subtracted the book stamps associated with (1) charges and (2) items reshelved by library staff, which all received special date stamps, to determine the number of at-the-shelf uses (i.e., items reshelved by the user). The number of table uses was obtained directly from the number of staff reshelving stamps. Thus, Harris' data are prone to overstating at-the-shelf use in exactly the same way as the stack-check data from the UC study.

DETERMINANTS OF THE MODE OF USE

Table 13 shows the distribution of mode of use by cumulative dormancy period (columns 3-7). Given the previous findings, it is not surprising to discover that as the cumulative dormancy period increases, the percentage of use accounted for by circulation decreases (column 3) while (with the exception of photocopying) the percentage accounted for by in-house use increases (columns 4-6, 8, 9). If one assumes that photocopied volumes, like volumes used at tables, are generally reshelved by staff (column 9), one may combine photocopy and table uses. The data suggest that the relative proportions of in-house use accounted for by table use and photocopying and by at-the-shelf use are not particularly sensitive to dormancy period (columns 10, 11). There is some tendency for at-the-shelf use to increase for materials with longer dormancy, but the trend is erratic and not statistically reliable. Thus, it appears from the limited data that (1) unrecorded use comprises a larger share of total use for dormant materials, but that (2) the mix of unrecorded use as between table and photocopy use and at-the-shelf use is about constant with respect to dormancy period.

Not surprisingly, at-the-shelf use tends to be associated with at-the-shelf discovery of unknown items; searches for known items are somewhat more likely to result in circulated or table use (see Glossary, Appendix D). The predictive relationship is not strong, however;[11] 53 percent of unknown items are charged out, used at tables, or photocopied (82 percent of known items are used in these three modes).

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[11] Asymmetric lamda is 0.12 with mode of use dependent. The asymmetric lambda statistic (cf. Nie, 1975, pp. 225-226, or any text on non-parametric statistics) relating mode of discovery to mode of use is 0.12 when mode of use is the dependent variable; that is, our ability to predict the mode of use of a particular book is improved by 12 percent if its mode of dormancy is known. If the two variables were completely independent, the value of lambda would be zero; if we could predict the mode of use from the critical date without error, the value of lambda would be one.

TABLE 13

Mode of Use by Cumulative Dormancy Period

(1) Volumes Having a Dormancy Period (in Years) Equal to or Greater Than:	(2) Number of Volumes	(3) Charged Out	(4) Photo-copied	(5) Used at Table	(6) Used at Shelf	(7) Total[2]	(8) All In-House (4+5+6)	(9) Reshelved By Staff (4+5)	(10) Proportion of All In-House Use (%): Reshelved By Staff	(11) Used at Shelf
		Proportion of Volumes by Mode of Use (%)								
0 (All Items)[1]	212	29.25	15.09	33.02	22.64	100.00	70.75	48.11	68.00	32.00
1	186	24.73	16.13	36.02	23.12	100.00	75.27	52.12	69.28	30.72
2	147	19.73	13.61	40.82	25.85	100.01	80.27	54.43	67.80	32.20
3	85	18.82	12.94	43.53	24.71	100.00	81.18	56.47	69.56	30.44
4	67	17.91	13.43	40.30	28.36	100.00	82.09	53.73	65.45	34.55
5	58	17.24	13.79	39.66	29.31	100.00	82.76	53.45	64.58	35.42
6	47	14.89	12.77	44.68	27.66	100.00	85.11	57.45	67.50	32.50
7	40	17.50	12.50	47.50	22.50	100.00	82.50	60.00	72.73	27.27
8	33	12.12	9.09	51.52	27.27	100.00	87.88	60.61	68.97	31.03
9	26	15.38	3.85	53.85	26.92	100.00	84.62	57.70	68.19	31.81
10	25	16.00	4.00	52.00	28.00	100.00	84.00	56.00	66.67	33.33
11	22	9.09	4.55	54.55	31.82	100.01	90.91	59.10	65.00	35.00
12	20	10.00	5.00	50.00	35.00	100.00	90.00	55.00	61.11	38.89

NOTES: 1. 80 questionnaire responses are excluded due to absence of data required to compute dormancy period of the volume.

2. Deviations from 100 per cent are due to rounding.

Modes of use show moderate differences according to the status of the users.[12] Graduate students show some propensity to charge materials out; library staff and non-UC users tend to favor in-house use, undergraduates generally eschew photocopying, and faculty use emphasizes photocopying and use at tables. As Table 14 indicates, these differences are not strong: despite, for instance, the tendency of masters-level students to charge materials out, 21.7 percent of their use of materials is at tables or at the shelf. Looking specifically at shelf use, we see that almost half of this mode of use is accounted for by undergraduates (Table 15).

PATTERNS OF UNRECORDED USE OVER TIME

Finding 7: A short-term study of unrecorded use cannot safely be generalized to describe the long-term patterns of unrecorded use of library collections.

Table 4 showed that 13.68 percent of the sample volumes with dormancy periods of 10 or more years received unrecorded use during an academic quarter. One can expect that in the subsequent academic quarter, about 13 percent of materials with 10-year dormancy periods will show unrecorded use. One cannot, however, be sure that the same volumes are used in both quarters. Cross-sectional methodologies of short duration cannot reveal the truth of this matter. There are only two sure methods to determine how many volumes are used once or more in-house over, say, a ten-year period--either run a study of in-house use for ten years, or find ways to convert unrecorded uses into recorded ones.

[12] Asymmetric lamda is 0.04 with mode of use dependent.

TABLE 14

Mode of Use by Status of User

Mode of Use	Status of User (%)						All Users
	Faculty[1]	Doctoral	Masters	Undergrad	Lib Staff	Other[2]	
Charge Out	24.2	35.4	56.5	31.1	10.0	11.5	29.1
Photocopy	21.2	18.8	21.7	7.6	6.7	11.5	12.3
Use at Table	27.3	31.3	17.4	36.4	50.0	46.2	35.3
Use at Shelf	27.3	14.6	4.3	25.0	33.3	30.8	23.3
TOTAL[3]	100.0	100.1	99.9	100.1	100.0	100.0	100.0
Number of Respondents	33	48	23	132	30	26	292

NOTES:
1. Includes "Faculty Proxies," i.e. graduate students and others who responded that they were acting in behalf of a faculty member.
2. This category consists primarily of non-UC users, but includes a few UC respondents.
3. Percentages may not sum to 100 due to rounding.

TABLE 15

At-the-Shelf Use by Status of User

Status	Number of At-the-Shelf Uses	Percent of At-the-Shelf Uses
Faculty	9	13.2
Doctoral	7	10.3
Masters	1	1.5
Undergraduate	33	48.5
Library Staff	10	14.7
Other	8	11.8
Total	68	100.0

CONCLUSIONS

Introduction

Before proceeding to review the findings of this study on unrecorded use of library material, it is important to note that there is considerable disagreement on the relative importance of the various kinds of library use investigated here. In the past, for instance, it has been common for library researchers to assume that at-the-shelf use is casual and of little importance to library users; this assumption has often been disputed, especially by research scholars. The arguments on both sides of this question are highlighted in the recent debates over the Pittsburgh studies of library use (see, for instance, Shad, 1979). The University of California study does not differentiate between the various forms of use in terms of importance, but we do not assume that all forms of use can be equated.

The Level of Unrecorded Use

The findings of this study, supported by those of previous research, clearly show that the use of the collections of research libraries is greater than would be indicated by circulation statistics alone, perhaps as much as six times greater.

Unrecorded Use and Circulation History

It is evident from the findings of this study and previous research that the least-recently circulated library materials are the least-frequently used library materials, even given a very broad definition of the term "use."

Unrecorded Use and At-the-Shelf Discovery

There is a natural tendency to equate unrecorded use with the at-the-shelf discovery. This often implicit assumption is made explicitly by Fussler and Simon (1969, p. 107):

> Non-recorded use is the use of books that does not result in an entry on the book cards, because the book is used in a book stack, an open shelf reading room, etc. Browsing is the use of books that are not brought to readers by messenger. Substantially all non-recorded use is browsing.

Fussler and Simmon collected data on both the method of finding the book and the mode of use (see the Fussler and Simon questionnaire, Figure 1, page 9, above), but did not use their data to test this assumption.

Although relevent data in the UC study come from a small number of questionnaires, they do not support the belief that there is a strong association between use within the library and initial discovery at the shelf. In the absence of further research, one should treat the two phenomena as entirely independent.

Large-Scale Research in General Collections

Findings 2, 4 and 6 show that differences in the characteristics of materials (form of material, circulation history) are associated with measurable differences in their rates of unrecorded use. Within particular categories of material, however, use appears to be random with respect to the variables that we can readily measure (e.g. Finding 3). Expansion of the present line of research could lead to development of a

greater number of useful categories, including perhaps language, subject and other characteristics. However, linear increases in the number of categories investigated require geometric increases in sample sizes and research costs. Such research could not eliminate uncertainty about the future use of individual volumes and, we believe, would have only marginal practical value for planning and collection management. Further, cross-sectional studies of the sort reported here cannot entirely overcome the problem of measuring unrecorded use over time (Finding 7). For these reasons, we conclude that continuation of the present line of investigation of general collections would not be warranted.

Although extended study of the unrecorded use of general collections is not recommended, there may be merit in studying the use of narrowly defined special collections. The nature of such studies would depend on the characteristics of the collections to be investigated and the specific policy or operating questions to be addressed.

Programs to Record Unrecorded Use

Several techniques exist for recording the use of materials consulted at tables and carrels and picked up for reshelving by library staff, including stamping the circulation slips of the books (Harris, 1977) and marking the spines of the books with colored labels (Shaw, 1978a, 1978b). Although these techniques do not capture and record uses in which users reshelve their own material, their adoption by the University of California Libraries could bring at least three benefits: (1) overcoming the problem of measuring use over time (Finding 7) by creating a graphic record of the current and past table uses of individual volumes; (2) clearly documenting a portion of the use of

library collections which is not now measured or verifiable, for budgeting and planning purposes; and (3) identifying the specific volumes which are and are not used at tables, for the purpose of collection management, particularly to aid in selection of materials for relegation to regional compact shelving facilities.

CHAPTER IV

AT-THE-SHELF DISCOVERY OF LIBRARY MATERIAL

At-the-shelf discovery (browsing) is a complex and controversial subject. As Hyman (1972) has pointed out, browsing as an activity of library users is inextricably bound together with the science and technology of bibliographic control and access, the philosophical and practical problems of book classification and direct access to the shelves, and the question of the ultimate value of materials secured through browsing. The subject is so complex that Hyman devotes 134 pages of literature review and etymological analysis to develop a "functional definition" of browsing. The result of this effort is the rather unilluminating statement, "Browsing is that activity, subsumed in the direct shelf /or open-shelf/ approach, whereby materials arranged for use in the library are examined in the reasonable expectation that desired or valuable items or information might be found among those materials as arranged on the shelves" (p. 131).

Everyone agrees that browsing occurs, but there is little consensus on its value. When Hyman asked 152 librarians and library educators to assess the statement, "Browsing is essential for academic research above the beginner's level," only 45.6 percent agreed. Thirty-eight percent disagreed with the statement, and a bit over 16 percent were undecided or gave another answer.

In a study at Georgia Tech, faculty members rated browsing as one of the least probable ways to secure useful library material (Greene, 1973). In two tests (before and after institution of a microfiche catalog/telephone request system called LENDS), the average value of items discovered through citations, colleagues, library

catalogs (including the microfiche catalog), book reviews and the users' memories were all judged to be more valuable than materials discovered through browsing (Greene, p. 89).

Despite considerable ambiguity about the value of browsing, it appears that almost no one wants to live without it. In Hyman's study, "over 81 percent agreed that 'browsing provides a valuable learning experience' "--the second highest percentage of agreement in the study (Hyman, p. 376-377). "More than three-fourths disagreed with a categorical statement that nothing could be accomplished by browsing in a general research collection that could not be done better by indirect bibliographic means" (Hyman, pp. 377-378). However, "the defense for browsing was little couched in terms of intellectual benefits for subject study in classified stacks. The commonly mentioned advantages were. . .the determination of works' availability /on the shelf/ and the inspection of their indexes to identify information not revealed by the card catalog" (Hyman, p. 378).

THE INCIDENCE OF AT-THE-SHELF DISCOVERY

Finding 8: Thirty-two percent of the uses reported by questionnaire respondents were of unknown items (items selected by browsing).

Regardless of what the term means, or how highly the results of the activity are judged, there is no doubt that browsing accounts for a substantial portion of the use of the materials in a research library. Table 16 summarizes the findings of several relevant studies of the proportion of library use accounted for by discovery of library materials at the shelf. These studies suggest that between 14 and 77 percent he material used in academic libraries is first discovered at the shelf.

TABLE 16

Findings of Previous Studies of At-the-Shelf Discovery

Source	Percentage of Library Material Found by Browsing	Notes
Johns Hopkins	18.1%	Patrons who claimed to browse Science/Engineering
	16.1	Humanities/Social Science
	12.1	Main Reading Room
Schonfield	14.0	
Jain	37.0	
Raisig, et al.	23.0	Circulated materials only
Dubester	38.0	Library of Congress
Fussler and Simon	77.0	Physics monographs
	75.0	History monographs
	34.0	Physics serials
	49.0	History serials
		(Note: includes all forms of use)
Greene	32.1	Before fiche catalog/delivery system - circulation only
	30.6	After catalog/delivery system - circulation only
Bowen	53.0	
University of Pittsburgh	30.3	Science branches

The UC questionnaire asked users whether, when they came to the shelf, they were looking for the specific books in which they found the questionnaires. Questionnaire respondents indicated that 32 percent of the books they used were previously unknown items (Table 17), i.e., were not specifically sought by the users when they arrived at the shelf. This proportion is similar to those reported by Jain, Dubester, Greene and the University of Pittsburgh (Table 16). Among respondents who were seeking known items, the source most often used to locate needed materials was the card catalog (at Santa Cruz, the book catalogs, accounting for 54 percent of responses for known items and 37 percent of all responses. Thirty-one percent of respondents looking for known items apparently were seeking items they had used before and were familiar with, as they claimed they "did not have (the) call number, but knew about where to find (the book) on the shelf." The largest category of users of unknown items appeared to be engaged in open-ended browsing, directed only by the need for material on a general subject: 47 percent of respondents who found previously unknown items were "looking through this part of the library for a book on this general subject" (Table 18).

DETERMINANTS OF AT-THE-SHELF DISCOVERY

Finding 9: There is a statistically measurable difference in the mode of discovery for periodicals and monographs, but the relationship between mode of discovery and form of material is weak, and shows little sensitivity to the dormancy period of the material.

Fussler and Simon (1969, Chapter 7) report on a statistic that they call "loose core browsing," which includes all instances in which an item was discovered at the shelf except the cases in which the volume was used only to "glance at the title page"

TABLE 17

Proportions of Known and Unknown
Items Reported by Questionnaire Respondents

	Number	Percent
Known Items	185	68.0
Unknown Items	87	32.0
Total[1]	272	100.0

NOTE: 1. 43 responses (of 315) were excluded--answers were missing or ambiguous (e.g., respondent gave multiple answers).

TABLE 18

Known and Unknown Items by Specific Mode of Discovery

Mode of Discovery	Number	Percent of Subtotal	Percent of Total
Known Items			
Card/book catalog	100	54.1	36.8
Knew "about where to find it"	57	30.8	21.0
Other responses[1]	28	15.1	10.3
Subtotal, known items	185	100.0	
Unknown Items			
Book on "general subject"	41	47.1	15.1
"Systematic survey" of subject	22	25.3	8.1
Other responses[2]	24	27.6	8.8
Subtotal, unknown items	87	100.0	
TOTAL	272		100.1[3]

NOTES: 1. "Already knew call number" (17); local bibliography (4); from librarian (2); other (5).

2. Replacement for a known item not found on shelf (5); in addition to a known item which was found (7); other (12).

3. Total does not add to 100% due to rounding.

or "skim through it while standing up." "Loose core browsing" represented 42.16 percent of uses in which users retrieved their own books (computed from data presented by Fussler and Simon, p. 112). Of 295 volumes discovered by "loose core browsing" in 1959-1960, 75 (25.42 percent) had no recorded use during the period 1949-1953 (computed from data presented by Fussler and Simon, pp. 113-114). Undoubtedly, some of those 75 volumes circulated between 1954 and 1958, but the study's presentation does not indicate how many of them were or were not charged out. Bowen (1961) reported on a survey conducted as a follow-up to the Fussler and Simon study. Using the same site (the University of Chicago library), Bowen interviewed users in the stacks and asked each of them to complete questionnaires about the next four (or fewer) volumes they removed from the shelves. Bowen reported that 20 percent of the volumes selected by browsing had not circulated in the previous ten years.

Although the evidence from questionnaire responses in the present study suggests that materials which were recently acquired or recently circulated are somewhat less likely to be discovered by browsing (Table 19 and Figure 12), the data are entirely consistent with the hypothesis that the browsing rate is constant for all dormancy periods. The last column of Table 19 shows the percentage distribution of unknown items by cumulative dormancy period. This column shows, for instance, that about 19 percent of unknown items had not circulated in the last 10 years. This figure is consistent with the proportions found by Fussler and Simon and by Bowen.

The UC data suggest that faculty are not unusually intensive browsers. As Table 20 indicates, undergraduate students are the group most likely to locate materials by browsing, followed by the "other" group (primarily non-UC users) and by library staff. Among research-oriented users--faculty and graduate students--

TABLE 19

At-the-Shelf Discovery by Cumulative Dormancy Period

Volumes Having a Dormancy Period (in Years) Equal to or Greater Than:	Number of Items Used	Number of Unknown Items	Unknown Items as a Percent of Items Used	Percent of All Unknown Items
0 (All Items)[1]	270	85	31.48	100.00
1	241	72	29.88	84.71
2	200	64	32.00	75.29
3	126	43	34.13	50.59
4	108	38	35.19	44.71
5	97	35	36.08	41.18
6	86	29	33.72	34.12
7	64	21	32.81	24.71
8	57	20	35.09	23.53
9	51	18	35.29	21.18
10	48	16	33.33	18.82
11	45	16	35.56	18.82
12	43	15	34.88	17.65
13	42	15	35.71	17.65

NOTES: 1. 45 (of 315) cases missing due to absense of data on mode of discovery and/or dormancy period.

FIGURE 12

Unknown Items as a Proportion of Items Used,
By Cumulative Dormancy Period

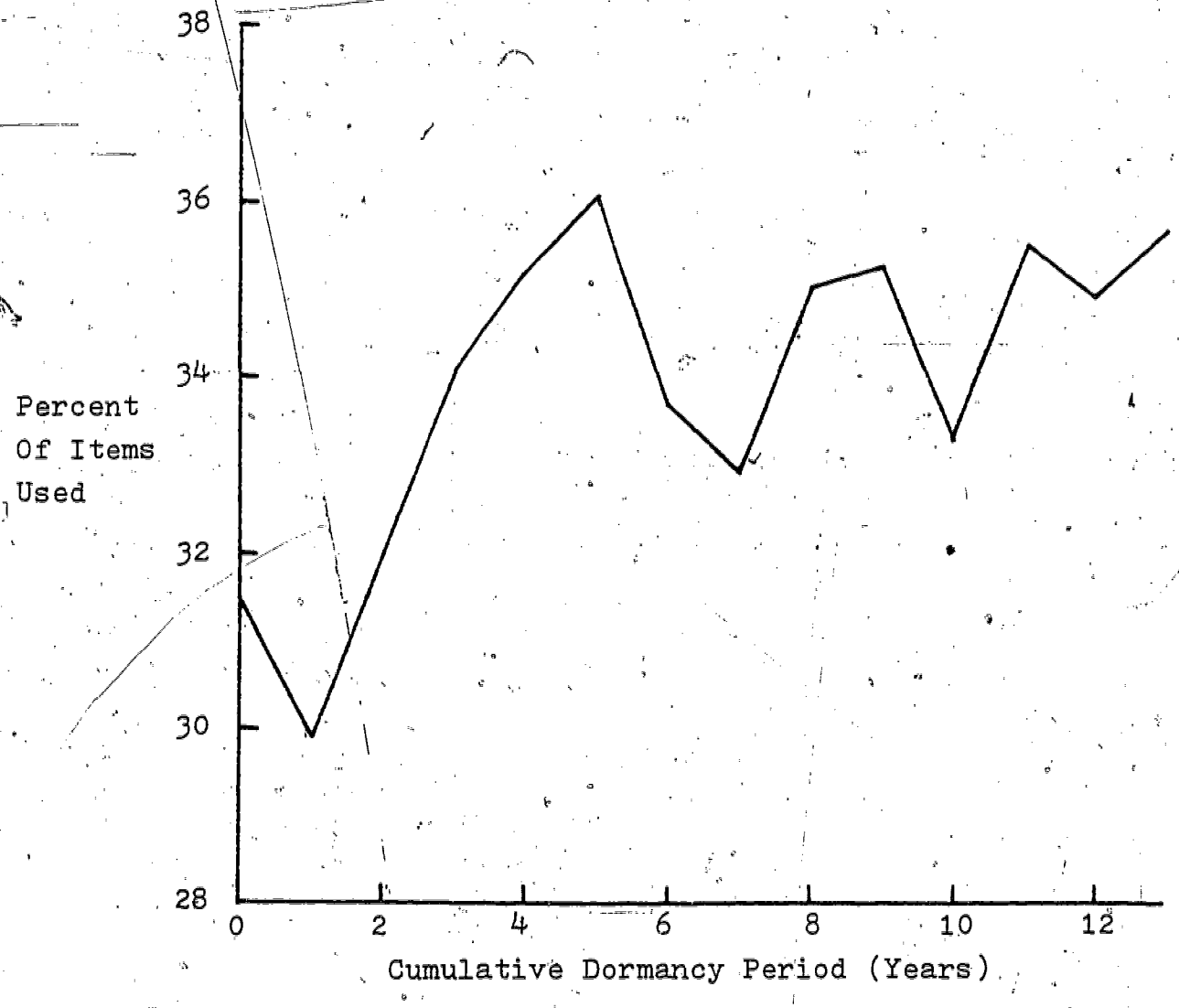

TABLE 20

Proportions of Known and Unknown Items Used by Status of User

	Items Used by Status of User (%)						
	Faculty	Doctoral Students	Masters Students	Under-Graduates	Library Staff	Others	Total
nown tems	80.0	83.7	90.0	56.5	71.0	66.7	68.0
nknown tems	20.0	16.3	10.0	43.4	29.0	33.3	32.0
otal	100.0	100.0	100.0	99.9	100.0	100.0	100.0
umber f esponses	25	43	20	129	31	24	272

faculty are the most likely to select unknown items but the differences within the research categories are not very great. Twenty-one percent of questionnaire responses (56 of 272) represented browsing by undergraduates; only 2 percent (5 of 272) were attributable to browsing by faculty.

There is a statistically measurable difference in the modes of discovery for periodicals and monographs but the relationship between mode of discovery and form of material is not strong: only 7.3 percent of the variance in mode of discovery is accounted for by the form of material. As the top section of Table 21 shows, periodicals are more likely to be known items, while monographs are somewhat more likely to be unknown items. There is little difference in the incidence of browsing by form of material when dormancy period is taken into account. Among items that have been dormant for more than 10 years, periodicals are slightly more likely to be discovered at the shelf than is the case for materials that have been dormant for less than ten years (Table 21), but the statistically measurable difference is quite small.

CONCLUSIONS

The failure of this study to discover patterns in the incidence of at-the-shelf discovery may be attributable to the small sample and low response rate in the questionnaire portion of the study. However, it is by no means clear that more data, or an amelioration of bias, would lead to more useful findings in this area. There may be no simple empirical relationship between browsing behavior and the variables that are commonly used for analytic planning and policymaking. To understand why users browse, and what programs and technologies might adequately substitute for, or even improve the productivity of, this particular searching strategy, would appear to involve a major research effort in the best traditions of the social and behavioral

TABLE 21

Known and Unknown Items by Form of Material and Dormancy Period

	FORM OF MATERIAL		
	Periodicals	Monographs	All Items
All Dormancy Periods			
Known Items (%)	76.1	48.0	68.5
Unknown Items (%)	23.9	52.0	31.5
Total (%)	100.0	100.0	100.0
Number of Observations	197	73	270
Items Dormant Less Than Ten Years			
Known Items (%)	76.8	46.6	68.9
Unknown Items (%)	23.2	53.4	31.1
Total (%)	100.0	100.0	100.0
Number of Observations	164	58	222
Items Dormant Ten Years or More			
Known Items (%)	72.2	53.3	66.7
Unknown Items (%)	27.3	46.7	33.3
Total (%)	100.0	100.0	100.0
Number of Observations	33	15	48

sciences. It is not our impression that such research is forthcoming from the academic community, although we may find that projects relating to the organization and operation of automated catalogs and information-retrieval systems have relevance to this problem.

We cannot recommend continued investigation of at-the-shelf discovery in general collections. It may, however, be feasible and desirable to conduct studies of specific aspects of at-the-shelf discovery under conditions that are more controlled than those that obtain in general collections. For example, an experiment might be devised to compare the utilization of items stored at the University's present storage facility in Richmond with the use of identical items housed in open stacks at other University of California campuses, to determine whether differences in use can e attributed to the effect of housing materials in a remote, closed-access facility. Useful findings could also be derived from similar experiments using the collections of the new regional compact shelving facilities, or from continuous programs to monitor the utilization of the regional facilities and evaluate the effectiveness of their policies and programs.

CHAPTER V

IMMEDIACY OF NEED FOR LIBRARY MATERIAL

DISTRIBUTION OF IMMEDIACY OF NEED

Finding 10: Nineteen percent of volumes used were needed immediately, and 24 percent were needed within 24 hours.

Table 22 shows the distribution of perceived immediacy of need for materials for which questionnaires were returned.[13] The UC findings differ somewhat from those of a study by Thompson (1978) conducted at the Riverside campus (Table 23). Respondents in the present study appear to show a somewhat higher immediacy of need: more materials are needed immediately and fewer items appear in the "more than one month" category than was the case at Riverside. Because the Riverside study did not resemble the present study in scope or method, it is not surprising that the findings differ. There is, however, one point on which the two studies agree: a bit less than 25 percent of respondents claimed that the items sought are needed in 24 hours or less. The 24-hour division is significant in that it represents, under present UC policy, the response-time demarcation between materials that should remain on the local campus and materials that could be housed at other sites in the University Library system (University of California, 1977, p. 50).

DETERMINANTS OF IMMEDIACY OF NEED

It is hypothesized that expressed immediacy of need for library material can be explained by the joint action of three kinds of variables: characteristics of the

[13] As measured by responses to the question: "If this book had not been on the shelf at this moment, how long could you have waited before it ceased to be useful to you for your stated purpose?"

TABLE 22

Distribution of Immediacy of Need in the UC Study

Immediacy of Need	Number	Percent
Less than one hour	49	19.37
One hour to one day	11	4.35
(Subtotal: One day or less)	(60)	(23.72)
One to two days	35	13.83
Two days to one week	39	15.42
One week to one month	88	34.78
More than one month	31	12.25
(Subtotal: More than one day)	(193)	(76.28)
Subtotal: Valid responses	253	100.00
"Does Not Apply"	49	
No answer	13	
Total	315	

TABLE 23

Distribution of Immediacy of Need in the Riverside Pilot Study[1]

Immediacy of Need	Number	Percent
Only Immediately	188	14.90
Less than 24 hours	117	9.30
(Subtotal: One day or less)	(305)	(24.20)
Less than 48 hours	56	4.40
Less than one week	149	11.80
Less than one month	155	12.30
More than one month	594	47.20
(Subtotal: More than one day)	(954)	(75.80)
Total	1,259	100.00

1. Thompson (1978), page 30.

materials used (some classes of material are typically needed more immediately than others), characterics of the users (some classes of users typically have more immediate need), and characteristics of the use transaction (including all kinds of "environmental variables"--the purpose for which the material is sought, the time of year, the physical facilities of the library and the convenience of its charge-out system, etc.). Analysis of Variance (ANOVA) was used in an attempt to relate an extensive number of variables to reported immediacy of need. Only four variables were found to have a statistically reliable relationship[14] with immediacy of need: user status, the institutional affiliation of the user, the way in which the item was discovered (known or unknown items), and the year of most recent circulation (critical year--see Glossary, Appendix D,—or, conversely, dormancy period). The small sample size and the possibility of biased responses limit the applicability of these statistical relationships. The following discussion of the statistical relationships found in these data should be taken only as a guide to further research.

Status and affiliation are characteristics of the user; the mode of discovery is a characteristic of the use transaction; and the year of most recent circulation can be considered a characteristic of the material used. Subsequent analysis indicated that the two user variables are highly correlated with each other.[15] Choosing the strongest of the two variables (user status), the analysis was continued using three variables to represent the three hypothetical components of immediacy of need: dormancy period, user status, and mode of discovery.

Before continuing, it may be worthwhile to take note of the variables which the statistical analysis indicated were not related to immediacy of need. The mode of

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[14] At the 0.05 level.

[15] In a two-way ANOVA, the effects of the status and affiliation variables are not statistically reliable at the 0.05 level; the two-way interaction between these variables is statistically reliable at the 0.05 level or better.

use (charged out, used at table, etc.)--a characteristic of the use transaction--was not statistically related to immediacy of need either alone or in conjunction with mode of discovery or user status. The following characteristics of the material were found not to have a statistically reliable relationship to immediacy of need: campus, form of material (periodical or monograph), language, type of branch (main library or science branch), subject of the material (using the coding in Figure 11, page 47), circulation status (eligible for circulation or library use only), or year of publication.

The variable most strongly related to immediacy of need is user status. Table 24 shows the average immediacy of need by user group. Non-UC users ("others") as a group, have a relatively low immediacy of need (i.e., are willing to wait longer to have their requests satisfied.) Among UC affiliates, faculty have the second-lowest immediacy of need: only library staff show a greater willingness to wait for library material. While user status is the strongest of the variables relating to immediacy of need, the relationship is not exceptionally strong in the absolute sense: only about eleven percent of the variance in immediacy of need is explained by the status of the respondent.[16]

The second strongest relationship with immediacy of need is shown by the mode of discovery. Known items are wanted more immediately than unknown items: the mean immediacy for known items is 27.08 days (N = 148) and for unknown items, 59.94 days (N = 50). Again, the relationship is not particularly strong: only about three percent of the variance in immediacy of need is accounted for by mode of discovery.[17]

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[16] R=0.326, R-square=0.106.

[17] R=0.166, R-square=0.028.

TABLE 24

Average Immediacy of Need by User Group

User Group	Mean Immediacy of Need (Days)	Number of Cases
Faculty and Faculty Proxies	37.72	18
Doctoral Students	27.54	37
Masters Students	11.05	21
Undergraduates	26.19	107
Library Staff	41.62	21
Others	128.61	18
Grand Mean	35.68	222

The weakest of the three variables is dormancy period, with a correlation coefficient of 0.118. The sign of the correlation coefficient indicates that materials which were recently acquired and/or recently circulated have a lower immediacy of need than materials which have been dormant. This surprising result--that dormant materials are needed more immediately than active materials--is not of much practical importance, however. Only about one percent of variance in immediacy of need is attributable to the dormancy period of the items used.[18]

Consideration of the joint effects of mode of discovery and user status brings about an improvement in the ability to "explain" immediacy of need. Table 25 indicates that when the joint effects of status and mode of discovery are accounted for, (1) undergraduate and masters students display the greatest immediacy of need, (2) faculty show the least immediacy of need among UC affiliates, and (3) user status, rather than mode of discovery, continues to be the strongest determinant of immediacy of need. Even consideration of the joint effects of these variables does not allow one to predict immediacy of need with much confidence, however: only 17 percent of the variance in immediacy of need is explained by user status and mode of discovery.[19]

Analysis of questionnaire responses concerning immediacy of need is vitiated by a high incidence of missing data--117 of 315 cases (37.1 percent) were excluded from the multiple ANOVA analysis because data for one or more variables were missing. The major culprit is the immediacy of need variable itself, for which 13 respondents failed to answer the question, and 49 (15.6 percent of respondents) claimed that the

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[18] R-square=0.014.

[19] For the two-factor ANOVA, R=0.408, (R-squre=0.166) as compared with R=.326 for status alone and 0.166 for mode of discovery alone. Main effects are reliable at the 0.05 level or better. Interaction effects are not statistically reliable.

TABLE 25

Average Immediacy of Need by User Status and Mode of Discovery

Group	Mean Immediacy of Need (Days)	Number of Cases
User Status		
Faculty and Faculty Proxies	46.86	15
Doctoral Students	34.66	33
Masters Students	21.28	17
Undergraduates	20.12	96
Library Staff	27.13	20
Others	136.64	17
(Correlation Coefficient)	(0.37)	
Mode of Discovery		
Known	26.10	148
Unknown	62.84	50
(Correlation Coefficient)	(0.19)	
Grand Mean	35.38	198
(Correlation Coefficient)	(0.408)	

question did not apply to their particular case. A review of the written comments from the "does not apply" respondents suggested that the preponderance of users who felt that they could not respond to the immediacy question were browsers--i.e., had discovered the item at the shelf. Table 26 shows that browsers were in fact less likely to give a quantitative response to the immediacy question, but the strength of the relationship is not great.[20]

Adding the third significant variable to the analysis of immediacy of need does not add to predictive ability.[21] Dormancy period does not appear to be a statistically reliable variable when analyzed in conjunction with the other two factors. Apparently, the independent statistical relationship between dormancy and immediacy is entirely accounted for by user status and mode of discovery--adding knowledge of dormancy period does not contribute any new information that would help to predict immediacy of need.

We do not have great confidence in the validity of the statistical relationships analyzed above, for three reasons that have been discussed previously: (1) the small sample size; (2) the possibility of response biases, for the questionnaires generally and the data on immediacy of need particularly; and (3) the low explanatory power of the variables related to the status of the user and the use transaction. The foregoing analysis, however, provides little support to the hypothesis that immediacy of need can be predicted by the characteristics of the materials needed.

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[20] The relationship is statistically reliable at the 0.01 level or better; R=0.216.

[21] In an analysis of variance and covariance using status and modes of discovery as variates and critical year as a covariate, R=0.410, as contrasted with R=0.408 for status and mode of discovery alone.

TABLE 26

The Relationship Between Mode of Discovery and Response to the Immediacy of Need Question

Mode of Discovery	Users Who: Responded Quantitatively		Responded "Does Not Apply"		Total	
	Number	Percent	Number	Percent	Number	Percent
Known Items	161	72.9	23	46.9	184	68.1
Unknown Items	60	27.1	26	53.1	86	31.9
Total	221	100.0	49	100.0	270	100.0

CONCLUSIONS

Differences in Immediacy of Need

The fact that only 24 per cent of questionnaire respondents claimed to need the material they sought within 24 hours (Finding 10) provides support for the hypothesis that at least in some circumstances. library users are aware of differences in the immediacy of their needs for library material.

Further Research in Immediacy of Need

The absence of other significant findings in this area can be attributed in part to the small sample size (253 valid responses--Table 22, page 74), but there is reason to believe the small samples are not the only reason for the lack of significant findings. First, we note that a previous study of this issue, with a much larger sample size (724 users reporting on 1,561 items used) was also unable to produce significant findings on immediacy of need (Thompson, 1978). Second, the analysis of questionnaire data in this study indicates that the characteristics of the users and the circumstances of the use, rather than characteristics of the materials used, are the only variables with measurable relationships to immediacy of need. Unfortunately, the user and use variables are of little value in collection management decisions, though they are undoubtedly important in other aspects of library service.

It appears that, in a great many cases, the relationship between the user's need and the book selected to satisfy that need is very tenuous (page 91). It may be true that only in the cases where a user knows in advance that a particular book contains specifically needed information can one expect to obtain unambiguous data on a

user's immediacy of need for the specific book. To understand the operational implications of immediacy of need in a more general way, it seems necessary to develop understanding of a complex, and so far unexplored, relationship between the nature of the user's need, the range of documentary resources that might satisfy the need, and the alternative methods by which the library could supply those resources in a cost-effective manner.

A concept of immediacy of need which adequately captures the informational needs that are not strongly associated with specific books should include three components: defined classes of users, defined forms of need, and defined classes of materials in which the several classes of users might expect to satisfy their various needs. One might hypothesize, for instance, that professors of physics, in their roles as researchers (as distinguished from their roles as teachers), may have needs related to ongoing and proposed research projects and, separately, "current awareness" needs (among others). Further, one might be able to define a body of library material which is commonly used by physicists to meet these needs. There may be separately defined "collections" for each of the two needs: further, there may exist frequently-used "core" collections and infrequently-consulted "peripheral" collections for each kind of use.

Immediacy of need may be understood by attempting to determine (primarily through interviews and experiments) the effects on the satisfaction of defined needs of varying the time required to access the relevant collections. Building and testing this conceptual structure would require an extensive period of time--at least two or three years of interactive conceptual development, testing and reformulation. It is worthwhile to point out that at least one aspect of the program, the identification of collections which are associated with defined classes of users, would be greatly

expedited by a proposed feature of the University's automated circulation system: the capability to obtain machine-readable records, transaction by transaction, of the characteristics of the user and the material charged out. This feature could be used to develop "collection profiles" for defined user classes.

Therefore, we do not recommend continued empirical investigation of the overall concept of immediacy of need in the context of general collections. However, the fact that in a great many cases users are aware of differences in the immediacy of their needs holds out the promise that, in narrowly-defined situations valid assessments of immediacy of need are possible. For example, immediacy surveys could be conducted among users requesting holds or searches on specific books, asking for books to be retrieved from the present Richmond facility or the new regional compact shelving facilities, or making use of campus delivery programs like the Berkeley BAKER service. These examples focus on the cases in which need is expressed for a specific book, therefore avoiding a major conceptual problem in our current approach to immediacy of need. Most of these examples also represent cases in which needed books are in fact not immediately available, and should provide more reliable information than the responses to the hypothetical situation in the present survey instrument. It must be recognized that data derived from such "special cases" have limited applicability, but the resulting information could nevertheless be quite valuable for specific collection management and policy decisions.

CHAPTER VI

EVALUATION OF THE METHODOLOGY

LOGISTICAL FINDINGS

Costs

Table 27 presents estimated costs of conducting this study as of December 31, 1978. It is evident that data collection is the costliest part of the methodology, comprising about 60 percent of the total expenditure. The key factor in the expense of data collection is the frequency of stack-checking (see Chapter II). As noted in Appendix A, a three week interval appears to miss a substantial number of uses (i.e., the cases in which a volume is used more than once in the three-week period). If the objective of this methodology were to provide accurate accounting of the total number of unrecorded uses, more frequent checking would be necessary, and total cost would increase considerably. If one is only interested in identifying those volumes which either are or are not used during a particular period, the rate of stack-checking can be considerably reduced, and total cost would be noticeably lower. For example, if one wanted to differentiate between volumes that were used once or more in a year and volumes that were not used at all during the year, one stack check per year would be sufficient.

If the objectives of this study could only be met through the analysis of returned questionnaires, we would have found it very expensive indeed. With 315 usable questionnaires returned, the cost per questionnaire is $67.30. However, most

TABLE 27

Estimated Cost of the University of California Study

Cost Category		Estimated Cost
I. PLANNING AND PREPARATION		$ 2,400
II. DATA COLLECTION		
Professional and Support Staff	$4,700	
Travel and Subsistence	2,700	
Campus Staff	3,500	
Computing and Key Entry	1,900	
Subtotal, Data Collection		$12,800
III. DATA ANALYSIS AND REPORTING*		
Professional and Support Staff	$3,400	
Computing and Computer Staff	2,600	
Subtotal, Data Analysis and Reporting		$ 6,000
TOTAL		$21,200

*Through December 31, 1978

of the useful data came not from the questionnaires, but from the stack checks themselves. In this light, the cost per observation is considerably less. In addition, information was obtained on the methodology itself, an important objective of the study.

Staffing

Data collection activities at the two campuses used different staffing methods. At Davis, the students who collected the data normally work part-time in the library, and are thus presumably familiar with LC classification and the arrangement of their own stack areas. The composition of this group was quite stable, with only one or two new workers at each stack check who needed complete training. At Santa Cruz, however, the students were hired through the campus student placement office. None had had any library experience, and the composition and total number of the work crew varied considerably each time. The effectiveness of the operation at Santa Cruz was considerably lower; more time was required to complete each stack check, complete training sessions were required at each visit (often, more than one session per visit, due to staff turnover within a single stackcheck), and it is the impression of the investigators that the rate of failure to locate volumes which were in fact in their proper locations on the shelf was noticeably higher than at Davis.

Concluding Comments

The logistical findings should be interpreted in the light of the factors which they exclude. Records were not maintained of the time required for campus staff to process returned questionnaires and replace them with new survey forms (a process entirely independent of stack-checking); therefore, this cost is not reflected in the

accounting on Table 27. It is also important to note that this study did not incur the substantial costs associated with designing and drawing a new random sample of the collections involved. Further, the use of an existing data base avoided the necessity of recording, keying and editing bibliographic and circulation history data for each sample volume; these data were already available in the source data files.

METHODOLOGICAL FINDINGS

Finding 11: The rate of response to the questionnaires was only 15.7 percent; a simplified questionnaire can improve the response rate to some extent.

The methodology described in Chapter II had two objectives--measuring unrecorded use through the displacement of questionnaires (for which any paper similarly inserted would suffice) and investigating the issues of concern through an analysis of questionnaire responses. This study pointed out flaws in both facets of the methodology.

In theory, it should be possible to determine with certainty whether or not a questionnaire placed in a book has been disturbed. In practice this turned out to be difficult. Even the simple placement rule used in this study is subject to various interpretations (e.g., is page B-13 of an appendix the last arabic numbered page, or is it page 478 of the text?). This problem can be ameloriated by thorough training of workers and the development of less ambiguous procedures for placing questionnaires. Another difficulty with this method of measuring unrecorded use is the time between stack checks. If one wanted to obtain a record of every unrecorded use, volumes should be checked every day. This is prohibitively expensive for a large sample. Some multiple uses of a given volume will inevitably be missed if checking is less frequent. An estimate of the amount of use missed can be inferred from an

experiment conducted at the Berkeley campus concurrently with this study. (For the complete report, see Appendix A.) Daily checking of 1,180 volumes, selected for their high use, showed that 21% of the uses would have been missed had a count been taken only at the end of the two-week experiment. This percentage is not directly applicable to the Davis and Santa Cruz study, because there are significant differences in the sampling techniques used. It does, however, point up the need for more frequent checking if one objective of such a study is an accurate accounting of total use.

The second objective of this study, an analysis of the issues through questionnaire responses, was also subject to methodological problems. The first was the very low rate of user cooperation in filling out questionnaires. Of 2007 uses of sample items (including "Library Use Only" materials), 315 usable questionnaires were received, for a return rate of 15.7 percent. Unless that rate can be increased substantially, a very large sample has to be drawn to generate enough responses for meaningful analysis. But even with a large enough sample size, a low response rate by itself raises serious questions of response bias, irrespective of the actual number of completed questionnaires.

A very limited publicity attempt at Davis (posting flyers throughout the Main and Physical Sciences Libraries) nad no measurable effect in increasing the response rate. However, the potential benefits of a publicity program should not be discounted merely on the evidence of this modest experiment. The Questionnaire Response Rate Experiment at Berkeley (see Appendix A) did demonstrate a significant improvement in the response rate through the use of a greatly simplified questionnaire. Unfortunately, complex issues, such as immediacy of need, do not lend themselves to an overly simplified format.

The desirability of a simplified questionnaire to improve the response rate is reinforced by an inspection of the replies received on the questionnaires. They show a high degree of anomalous responses--questions left blank, multiple answers, and semantic confusion. A brief description of the major problems encountered with each question follows.

Question A (Status and Affiliation of the User, Figure 2) had 27 anomalous responses of 315 total responses, of which the majority were blank in the affiliation column. A format change might correct this defect. The only semantic misunderstanding arose with the "Library Staff" categories. The attempt to distinguish between staff use in direct response to a user request (e.g., for a reference question) and other forms of official or personal use by library staff was often misunderstood by respondents. There appears to be no virtue in attempting to maintain this distinction in similar studies.

There were 62 anomalous responses to Question B (Mode of Discovery, Figure 2), of which 42 were multiple answers. The format of this question is confusing and the question attempts to elicit more information than necessary. The simplified approach taken in the Berkeley experiment (see Appendix A) would have been preferable here.

Question C (Purpose for Selecting the Volume) was inserted to focus the patron's thoughts on his purpose for this library visit, and to serve as a lead-in to the following questions. The question was rarely answered, and the responses were not tabulated.

Question D (Mode of Use) had 33 anomalous answers. The choices given were intended to be mutually exclusive, but on a quick reading this may not be apparent--

twelve respondents gave multiple answers (e.g., "use a volume at the shelf" and "check it out"). The problem can perhaps be corrected through better phrasing, or by encouraging multiple responses to reflect actual use of a volume. The multiple responses highlight a significant ambiguity in this methodology: one cannot know whether a questionnaire was completed before or after the volume was used. It is possible that a patron could have answered the question, then consulted the volume and changed intentions, without revising the questionnaire response. It is our impression that this was an infrequent occurrence, but the ambiguity should be remembered, both in interpreting these findings and in planning any similar studies.

Question E (Immediacy of Need) with 65 anomalous answers, gave respondents the most difficulty. Thirteen questionnaires were returned with no response to this question. Eighteen respondents apparently could not identify a "need," and thus could not answer the question: they checked the "does not apply" option. The comments accompanying "does not apply" responses ranged from open statements of this lack of "need," to a browser's response of "I wouldn't have known this book existed had it not been on the shelf." In part, the problem can be ascribed to asking the respondents to set up a hypothetical situation, a difficult endeavor at best. This impression is reinforced by the 10 patrons who simply declared that they would not wait at all, but find a substitute book, or find the same book elsewhere.

One overall impression that emerges from these responses is that browsers seem to have more trouble with the questionnaire than those who come in search of a specific volume. From comments on the questionnaire, browsers do not see themselves as having a well-articulated purpose, and thus cannot articulate a need for the material. Reference volumes also caused a disproportionate number of

anomalous answers. They should not be included in any similar study, since they are not properly a part of the circulating collection.

SUMMARY

Measurement of Unrecorded Use

If technical problems related to spurious measurement (e.g., questionnaire displacement caused by stack shifts) or dubious measurement (e.g., ambiguities in determining whether a questionnaire has been displaced) can be either disregarded or solved, the method used in this study provides an adequate, simple and relatively inexpensive means to study the unrecorded use of library material on a sampling basis. The results of this study indicate that at least 23 percent of all library use, and 33 percent of unrecorded use, takes place at the shelf rather than at tables or carrels. The method used in this study has distinct advantages over techniques that rely only on data about materials left on tables. It must be remembered, though, that the findings of this technique cannot be generalized beyond the duration of the study.

The Questionnaire

The technique of placing questionnaires in books results in a low response rate and the possibility of response bias. Response rates can be improved and the sources of bias avoided, but there is probably an upper limit to the effectiveness of such improvements. Fussler and Simon, using the same technique, report an estimated response rate of about 33 percent, even when incentives to complete and return questionnaires were provided (1969, pp. 110- 111).

The need for a number of technical improvements in the questionnaire itself has been previously noted. More generally, it appears that the length and complexity of the questionnaire was the direct result of the attempt to address multiple objectives in the study. The best way to simplify the questionnaire is to limit the scope of study and clarify the research questions under investigation.

We must emphasize the particular limitation of the questionnaire technique in the assessment of immediacy of need: when the user is not seeking a specific book to satisfy a specific need, it is difficult for the user to assess the "immediacy of need" for the book selected, and for the analyst to interpret the user's response.

The Sample

The characteristics of the sample used for this study permit some conclusions regarding the sampling requirements for a similar study. In a random sample, such as that used for this study, the number of observations for dormancy periods in excess of 10 or 11 years becomes small relative to the size of the whole sample (see, for instance, Table 4), calling for either very large random samples or stratified sampling. Stratified sampling using variables like subject and form of material would also be desirable. The type of multivariate analysis which could show differences in use rates by subject for monographs and periodicals separately is not possible with the small cell sizes for certain subjects and forms in this sample (Tables 10 and 11).

Staffing for Data Collection

Experience with the data collection process shows that it is made more economical and reliable when turnover in the data collection staff is minimized, and

when the staff are already familiar with the local library and with the Library of Congress call number system. The training process can be improved through systematic checking of staff performance, but training improvement is only affordable if staff turnover is low.

APPENDIX A

QUESTIONNAIRE RESPONSE RATE EXPERIMENT

Introduction

The initial findings of the Study of the Use of General Collections indicated a very low rate of user cooperation in filling out the questionnaires inserted in the sample volumes. Of the items which showed indications of use in the first six weeks of the study, only ten to fifteen percent generated completed questionnaires. Before rejecting this methodology for future studies, we attempted to test possible ways of improving the response rate. In general, there are three methods which could encourage more users to complete the questionnaire:

1) Publicity: Apprise library users of the existence of the study in progress, and the benefits to them that may derive from the information they supply.

2) Incentives: Offer direct rewards to those who complete and return the questionnaire.

3) Simplification: Redesign the questionnaire itself to make it more attractive, more physically convenient to handle, and easier to complete.

Methodology

The Questionnaire Response Rate Experiment was designed to test the third alternative. The questionnaire was greatly simplified and shortened, with no open-ended questions (see Figure A-1).

FIGURE A-1

LIBRARY SURVEY

Dear Library User:

WE NEED YOUR HELP!!!! Your library wants to provide you with the best service possible. But to do that, they need to find out more about which books you are using and how you use them. PLEASE take a few minutes to fill out this questionnaire, and leave it in the box next to the exit as you leave. We need to hear from YOU.

A. PLEASE CHECK YOUR STATUS AND AFFILIATION FOR THIS LIBRARY VISIT.

STATUS (Check one only)

__1. Faculty
__2. Faculty proxy (acting for a faculty member)
__3. Doctoral student
__4. Masters or certificate student
__5. Undergraduate
__6. Library Staff (Your own use)
__7. Library Staff (Acting for a user)
__8. Other

AFFILIATION (Check one only)

__1. This UC campus
__2. Another UC campus
__3. Other college or university
__4. Other

B. DID YOU COME TO THIS SHELF FOR THIS SPECIFIC BOOK? (CIRCLE "YES" OR "NO")

YES
NO

C. DO YOU EXPECT TO TAKE THIS BOOK OUT OF THE LIBRARY? (CIRCLE "YES" OR "NO")

YES
NO

D. IF THIS BOOK HAD NOT BEEN ON THE SHELF AT THIS MOMENT, WOULD YOU HAVE ASKED THE LIBRARY STAFF TO LOCATE, RECALL OR HOLD IT FOR YOU? (CIRCLE "YES" OR "NO")

YES
NO

PLEASE RETURN THIS QUESTIONNAIRE TO THE BOX NEAR THE EXIT

Thank you for your cooperation,

University of California Systemwide Administration
Office of the Assistant Vice President—
Library Plans and Policies

In cooperation with the Graduate Social Sciences Library

To test whether this simplified format, by itself, would result in more returned questionnaires an experiment was conducted in the open stacks of the Graduate Social Science Library (GSSL) on the Berkeley campus. With the advice and assistance of the library staff, twelve single-faced sections (about 1,180 volumes) of relatively frequently used material (as defined by GSSL staff) were selected. The sections were selected in pairs, each pair having materials in the same subject area. In one section of each pair, every book had a copy of the original UC questionnaire (used at Davis and Santa Cruz) inserted in it. The other section received the revised questionnaire. The questionnaires were inserted so that the volume could not be consulted without disturbing the questionnaire, and thus recording a use, whether or not the questionnaire itself was completed and returned. The paired sections were close together but not contiguous, to minimize the chance that a single user on a single visit would encounter both forms of the questionnaire.

Each volume was also inconspicuously marked on the date due slip, to assure that in later phases of the study, treated books could be discriminated from those that were not on the shelf at the beginning of the study. Due to cost and time considerations, data were not collected for the individual volumes in the sample. Only aggregate use data for each section were tabulated during the course of the experiment.

Questionnaires were placed on Monday, May 22, 1978. Each morning thereafter through June 2, the volumes were checked, apparent uses noted, and questionnaires repositioned or replaced as necessary.

Findings

The primary objective of this experiment was to compare response rates for the two forms of the questionnaire to ascertain whether a simplified questionnaire would, by itself, result in a higher response. At the conclusion of the experiment, the results were as follows:

	Returned Questionnaires	Total Uses	Response Rate
Original Questionnaires	13	145	8.97%
Revised Questionnaires	36	143	25.17%

Completed questionnaires were counted only if they were returned to the box provided at the exit gate. Questionnaires found in the stacks are not included in these totals. The total uses are sums of the number of questionnaires disturbed plus the number of questionnaires missing plus the number of volumes not on the shelf at the final check. These last were presumed to be either charged out or in use somewhere in the library. In either case, they were counted as uses. The response rate is the number of returned questionnaires divided by the total uses. The result shows a significant difference in response rates between the two forms of the questionnaire. Using the t-test for the difference in sample proportions, the difference is significant at the 0.001 level.

Although of secondary importance, another aspect of the methodology could be evaluated through this experiment. Stack checks were conducted at three-week intervals at Davis and Santa Cruz, although multiple uses of a single volume in that time period could go unrecorded: if a use did not result in a returned questionnaire, the staff had no way of replacing it. In this experiment, however, daily monitoring

provided more comprehensive information on use (multiple uses in a single day, of course, could not be detected). Each volume was inconspicuously marked on the date due slip each time it showed use, providing a record of multiple uses. Had a check been done only once, at the end of the two-week study period, we would have detected only 118 uses for volumes with the original questionnaire and 109 uses for those with the revised questionnaire. This is 227/288, or 79 percent of total uses. Conversely, 21 percent of these uses would have been missed had the daily checking not been done.

Because the stack sections were chosen partly for their high use, the percentage of missing uses would not necessarily hold for a randomly-selected sample with much lower overall use. However, the finding can be a guide in planning the logistics for a future study. It is important to note that the missed uses are predominantly unrecorded uses, because in a general stack collection, loan periods of less than two weeks are rare. Thus, multiple uses of items in a two-week period will be composed primarily of items that were not charged out during that period.

Meaningful comparisons of the responses in the two forms of the questionnaire are difficult. The questions are asked differently on each, and the number of completed responses is very small. Overall, however, the two sets of responses are very similar. Seventy-two percent of the respondents to the revised questionnaire, and 69 percent of the respondents to the original questionnaire, were looking for a specific item when they came to the stacks (i.e., the volume in which they found the questionnaire). Forty-four percent of the respondents to the revised questionnaire intended to take the volume out of the library, and 50 percent of the respondents to the original questionnaire intended to check out the item. The immediacy-of-need questions are too dissimilar for any comparison.

APPENDIX B

REGRESSION ANALYSIS OF THE RELATIONSHIP BETWEEN CIRCULATED AND UNRECORDED USE IN THE LIBRARY AT NEWCASTLE-UPON-TYNE POLYTECHNIC

The Data

Data on in-house and circulated use of a collection of 8,483 volumes over a one-year period were collected by Harris (1977). These data were presented in a cross-tabular form which enabled us to reconstruct the raw data from which the cross-tabulation was made. The resulting data set consisted of 8,483 ordered pairs, the first value representing the number of circulated uses of the volume in the one-year period, and the second representing the number of in-house uses.

Harris had grouped numbers of uses (of both types) into the categories 0, 1, 2, 3-5, 6-10, and 11+. The categories 3-5 and 6-10 were represented by their median values (4 and 8 respectively) in the reconstruction, and cases in the 11+ category were given the value 11.

The Regression Model

The regression model tested was of the form:

$$I_i = a + bC_i, \quad i = 1 \text{ to } 8,483$$

where:

I_i is the number of in-house uses of volume i;

C_i is the number of circulated uses of volume i; and

a and b are parameters to be estimated.

Regression Results

The ordinary least-squares estimate of the foregoing model fitted to Harris' data resulted in the equation:

$$I_i = 0.145 + 0.115\ C_i$$

The t-value of the coefficient of C_i (b) was 28.6; the F-value for the fitted equation was 818.17 with 1 and 8,481 degrees of freedom. Both tests are statistically significant at the 0.001 level.

Goodness of Fit and Prediction Intervals

The value of the R-squared statistic for the fitted equation is 0.088.

The mean square error (MSE) is 0.549; the standard error of the equation (SE) is 0.741. Thus, the prediction interval for a single case of the independent variable is given by the equation:

$$(0.145 + 0.115\ C_i) \pm SE\ (z)$$

where z is the z-value for the desired confidence level (Neter and Wasserman, 1974, p. 73). When $C_i = 4$ and $z = 2.576$ (at the 99 percent level):

$$I_i = 0.61 \pm 1.909$$
$$= -1.3 \text{ to } 2.52$$

The value of C_i for which the 99 percent response interval of I_i did not include zero was determined by calculating the value of C_i for which the expected value of I_i would be greater than 1.909:

$$1.909 = 0.145 + 0.115\ C_i$$

$$C_i = 15.3391$$

Thus, when $C_i = 16$, the 99 percent prediction interval for I_i does not include zero.

APPENDIX C

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APPENDIX D

GLOSSARY

Circulating Volumes. Volumes eligible to circulate during the period of this study, i.e., all volumes not designated as "reference" or "library use only."

Critical Date. For items with any recorded circulation, the year of the most recent circulation. For volumes with no recorded circulation, the estimated year of acquisition.

Current Use(s). The total use which occurred during the time of the study, Spring Quarter 1978.

Dormancy Period. The number of years between the critical date and the date of this study (1978). A volume with a critical date of 1976 (i.e., last circulated in 1976, or acquired in 1976 and never circulated) has a dormancy period of two years.

Known Items. Items for which questionnaire respondents responded "Yes" to the question, "Were you looking for this specific book when you came to the shelf?"

Non-UC User(s). Patrons not affiliated with the University of California.

Questionnaire Method. An approach which relies on some form of user questionnaire to determine the rates at which patrons either use materials within the library or check them out.

Recorded Use(s). The number of circulation stamps appearing on the special circulation slip of a sample volume; the number of external circulations during the study period.

Sweep Method. An approach to measuring in-house use which collects data about books left on library tables, carrels, etc. (synonymous with "sweep counts").

Total Use(s). The sum of all uses of a volume as indicated by the number of questionnaires replaced (i.e., either definitely moved or missing due to circulation or in-house use) in the volume by the study crew or the local library staff.

UC Users. Patrons affiliated with the University of California (students, staff, etc.).

Unknown Items. Items for which questionnaire respondents responded "No" to the question, "Were you looking for this specific book when you came to the shelf?"; books "discovered at the shelf."

Unrecorded Use(s). Total use(s) minus recorded use(s).

Use(s). The word "use" is defined as any event which resulted in (1) the detectable displacement of a questionnaire, and/or (2) the posting of a charge stamp during the study period; used interchangeably with "total use(s)" (the "maybe moved" category is not counted as a use).