

Core journals in the health sciences : a study of interlibrary loans usage

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**CORE JOURNALS
IN THE HEALTH SCIENCES :
a study of interlibrary loans usage**

HUMBERT VICTOR PRIBAC

**A research project submitted in
partial fulfilment of the requirements
for the Award of
Degree of Master of Librarianship**

University of N.S.W.

1979

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LIBRARY

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Bert Pribac
Librarian, Commonwealth
Health Department

CONTENTS

	<u>Page</u>
Acknowledgements	ii - iii
Contents	iv - vi
List of Appendices	vii
List of Tables	viii - ix
Rank Lists of Journals	x
Figures and Graphs	x
 <u>CHAPTER 1 - INTRODUCTION</u>	
1.1 Summary of methodology and results	1
 <u>CHAPTER 2 - DEFINITIONS AND ABBREVIATIONS</u>	
2.1 Definition of terms	4
2.2 Abbreviations and their meaning	8
 <u>CHAPTER 3 - BACKGROUND TO THE PROJECT</u>	
3.1 Foreword	10
3.2 Rationale for this ILL usage survey	12
3.3 Significance and aims of this study	13
3.4 The hypotheses to be tested	14
 <u>CHAPTER 4 - THE METHODOLOGY OF THIS RESEARCH PROJECT</u>	
4.1 Basic considerations	17
4.2 Limits of the survey - Libraries and materials	19
4.3 Limits - Time span of survey and size of data	20
4.4 Sampling techniques - General considerations	21
4.5 Sample size	24
4.6 Why systematic sampling	25
4.7 Sampling errors	27
4.8 Sorting of the raw data	29
4.9 Handling of the raw data	30
4.10 Coding of data for the SPSS programme	33
4.11 Adaptation and use of the SPSS programme	36
4.12 Some further comments on the methodology	42

<u>CHAPTER 5 - LIMITATIONS OF THIS RESEARCH PROJECT</u>	
5.1 The basic frame	43
5.2 The sampling methodology	44
5.3 The variables	45
<u>CHAPTER 6 - PRESENTATION OF THE RESULTS - FREQUENCIES AND RANKS</u>	
6.1 Frequency distribution of titles and articles	47
6.2 Ranking lists of biomedical journals	51
6.3 Analysis of ranking lists	59
6.4 Comparison of rank/core lists	60
6.5 Australian biomedical periodicals in this survey	67
6.6 Comparison of Australian titles with overseas titles	70
6.7 Some analytical comments on Australian biomedical journal titles	71
<u>CHAPTER 7 - PRESENTATION OF THE RESULTS - OBSOLESCENCE OF BIOMEDICAL PERIODICALS</u>	
7.1 General considerations	74
7.2 The mean life and the half life	74
7.3 Tabulation of obsolescence data	80
7.4 Discussion on obsolescence patterns - Exponential and linear curves	87
7.5 The methodology of obsolescence	91
7.6 Implications of the half life patterns on collections management	94
7.7 Age patterns of scientific literature. A comparison.	97
7.8 Obsolescence patterns of Australasian biomedical journals	99
<u>CHAPTER 8 - PRESENTATION OF OTHER USEFUL RESULTS</u>	
8.1 General considerations	102
8.2 The three lending libraries. Breakdown by number of titles and articles	103
8.3 Location of borrowing libraries	104
8.4 Types of borrowing libraries	107
8.5 Region of publication of the biomedical journals	110
8.6 Effect of increase of sample size on frequencies	113
8.7 The Bradford's Law and its application in this project	115

CHAPTER 9 - INTERPRETATION OF RESULTS

9.1 Australian background and regional resources sharing	120
9.2 Interpreting the frequencies. A methodological approach.	130
9.3 Obsolescence patterns as a measure for relegation	133
Appendices	137-215

LIST OF APPENDICES

Appendix 1:	<u>A survey of the literature of usage surveys and core lists.</u>	
1.1	Introduction	137
1.2	Interlibrary loans usage surveys	139
1.3	Core lists of journals - techniques and types	144
1.4	Core lists in the USA and UK	146
1.5	Core lists in Canada	148
1.6	Core lists in Australia	150
1.7	Evaluation and comparison of core lists and ranking lists	151
1.8	Bradford's Law - a brief outline of the literature	155
1.9	Limitations of usage survey	161
Appendix 2:	Original general purpose coding sheets for the raw data and printout listing	165
Appendix 3:	The SPSS Procedure PL1 coding form	167
Appendix 4:	SPSS procedure for frequency tabulations and ranks	169
Appendix 5:	Bibliographic services for Medlars, 1967	170
Appendix 6:	T. Raymond: Medlars in Australia. Letter to NHMRC	172
Appendix 7:	Correspondence between Anne Harrison (Melbourne University) and Dr K.W. Edmondson (NHMRC)	174
Appendix 8:	Document backup for Medline. Medline and LSTLC meetings	178
Appendix 9:	National Medical Library Services. Report on Medical Librarians meeting in Sydney, 1967	181
Appendix 10:	Minutes of AACOBS Committee on Medical Library Services meeting of October 30, 1967	186
Appendix 11:	List of References	191-205
Appendix 12:	Bibliography	206-215

LIST OF TABLES

Table 1:	Number of requests according to the number of requested titles. First sample of 638.	48
Table 2:	Number of requests according to the number of requested titles. Second sample of 638.	48
Table 3:	Number of requests according to the number of requested titles. Composite sample of 1 276	49
Table 4:	Comparison of periodical usage rank lists	61
Table 5:	Comparison of core lists - only top titles	62
Table 6:	Frequency listing of journal titles in overseas lists	64
Table 7A:	Frequencies and ranks of Australian titles - First sample of 26	68
Table 7B:	- Second sample of 28	68
Table 7C:	- Composite sample of 54	69
Table 8:	Frequencies - Proportion of Australian titles compared to overseas titles	70
Table 9:	Frequencies - Proportion of Australian articles compared to overseas articles	71
Table 10:	Publication data broken down by frequency of loan. First sample of 638 articles.	78
Table 11:	Number of requests according to age of article - First sample of 638 articles	82
Table 12:	Number of requests according to age of requested article. Composite sample (1).	83
Table 13:	Number of requests according to age of requested article. Composite sample (2).	84
Table 14:	Relative and cumulative age of requests	91
Table 15:	Age patterns of scientific literature - comparison with overseas studies	97
Table 16:	Relation of publication data to place of publication. First sample of 637.	99
Table 17:	Relation of publication data to place of publication, ANZ versus other titles. Sample of 1 267	100

Table 18:	The three lending libraries - breakdown by number of titles and articles	103
Table 19:	Location of borrowing libraries	104
Table 20:	Types of borrowing libraries	107
Table 21:	Region of publication of the biomedical journals. Sample of 637 articles.	110
Table 22:	Effect of increase of sample size on frequencies	113
Table 23:	The Bradford distribution	117

RANK LIST OF JOURNALS

List 1:	The eleven most used titles as obtained from the composite sample	49
List 2:	Ranking list of journals - First sample of 638	52
List 3:	Ranking list of journals - Second sample of 638	54
List 4:	Ranking list of journals - Composite sample of 1 276	56
List 5:	Ranking of Australian journals	69

FIGURES AND GRAPHS

Figure 1:	Age of requested articles - First sample of 637	85
Figure 2:	Age of requested articles - Composite sample of 1 267	86
Figure 3:	Age of requested articles (linear fit) - Sample of 1 267	90
Figure 4:	The exponential curve and the derivation of the half life	93
Figure 5:	Location of borrowing libraries - Sample of 638	106
Figure 6:	Types of borrowing libraries	108
Figure 7:	Region of publication. Breakdown by titles and articles (Sample of 638).	111
Figure 8:	The Bradford distribution. Sample of 1 276 articles and 711 titles	118
Figure 9:	The Bradford bibliograph. The three zones.	119

CHAPTER 1 - INTRODUCTION

1.1 Summary of Methodology and Results

The purpose of this project is to develop and test a methodology for the analysis of the interlibrary provision of photocopied articles from biomedical journals between Australian health sciences libraries and to discover the core journals in biomedicine in such interlibrary traffic.

In order to test the methodology, an attempt has been made to examine from real interlibrary loan data which are the core journals in biomedicine and in the health sciences perceived from the survey of the provision of photocopied articles from three major biomedical libraries in Australia.

The aim of this study is to compare also whether such core journals are similar to core journals as found in overseas studies and whether a narrow range of better known biomedical journals can be identified as not becoming obsolete as fast as the bulk of biomedical serials.

Australian and New Zealand biomedical journal titles are singled out by the methodology to see their relevance in comparison to overseas titles and also in regard to aging patterns of the periodical literature.

In Chapter 4 and partly in Chapters 7 and 8 are described methodologies developed or adapted to test the assumptions underlying the project.

Thus two types of methodologies are described: one to analyse large amounts of data by computer and with the aid of the 'Statistical Package for the Social Sciences' and another methodology to analyse smaller amounts of data manually and mentally.

Sampling methods and sampling errors are also discussed as they affect the data in this project.

In Chapter 5 are delineated the limitations of the methodology and of the results, while in Chapters 6 and 7 the results as derived from the methodology and the actual data are presented in a series of tables, lists, graphs and analytical comments.

Results comparable to many results in American and British studies are obtained for productivity of core journals and for aging patterns of the biomedical literature.

There are indications from the results that Australian biomedical titles are no more prominent in rank in this study than in overseas studies, though indications are also presented which show that aging patterns of Australian biomedical periodicals tend to be more conservative than in overseas titles.

In Chapter 8 other useful results, a by-product of the methodology, are presented such as types of borrowing institutions, region of publication, etc. The effect of increase of sample size on frequencies is presented briefly in this Chapter also.

The frequencies are tabulated and presented graphically in Chapter 8 according to the Bradford's law of bibliographical scatter.

The results and the methodology are discussed and interpreted in Chapter 9 in regard to their implication for the management of periodical collections and interlibrary cooperation.

Several appendices are included as supportive evidence, of which Appendix No. 1 is devoted to a discussion and presentation of recent literature on usage surveys, core lists of journals and the Bradford law of bibliographical scatter.

It is maintained that the methodology as developed and tested for this research project is an adequate tool for the study and survey of interlibrary requests for biomedical periodical articles either in a local or in a regional and national framework.

CHAPTER 2 - DEFINITION OF TERMS AND ABBREVIATIONS

2.1 Definition of Terms

Some of the terms used throughout this study need to be defined.

Some concepts and terms are used synonymously, e.g. journal - serial - periodical; loan - article - request. A short list of the more relevant definitions and concepts follows in alphabetical order:

Biomedical*:

Biological and medical; pertaining to the application of the natural sciences to the study of medicine.

Biomedicine*:

Clinical medicine based on the principles of the natural sciences.

Biomedical libraries:

Though the above dictionary definition may have simplified things, the terms biomedical, biomedicine and biomedical libraries in the context of this report 'are related' to the functions and the literature of the three libraries that have contributed interlibrary loan request forms for the survey.

Note that a better proposition would have been perhaps to use throughout the phrase: biomedical and health sciences libraries, since this term would include also hospital, nursing and

* According to the Dorland's Illustrated Medical Dictionary, 25th Edition. Philadelphia, Saunders, 1974.

government health libraries. Requests for articles came in fact from all these types of libraries.

Core Journals, Core Lists, Core Collections

There is no agreed consensus in the literature perused and among librarians as to what constitutes a core journal, a core collection of periodicals or even a core list of periodicals. The terms are relative to a particular situation, to a particular study or to a particular managerial decision regarding a core collection of journals. There is some understanding nevertheless that those journals which produce the greatest number or the greatest proportion of the most relevant articles in a subject field or topic, would be considered core journals.

In the context of this study 'core journals' are the smallest nucleus of titles producing at least one-third of loans or articles on a given topic or in a given discipline. This term seems to satisfy to a great extent Bradford's law of bibliographical scatter as applied in this study.

Half life:

The time during which half of the articles requested on inter-library loan (during the survey period) have been published. Cho⁽¹⁾ has a slightly different definition which is applicable in a wider sense, but can be understood within the above definition as well. It states: 'The time by which half the total use of the literature has taken place'.

The short notation for the half life used in this project is $T_{\frac{1}{2}}$.

Interlibrary loan or loans

Within the framework of this project, the above term is probably a misnomer. Whenever possible, the terms as article, transaction or request have been used. Nowadays very few libraries lend periodicals to other libraries. Instead, specific articles from periodical issues are photocopied and supplied free or at a nominal cost.

It is hoped therefore, that when the terms loan, loans or interlibrary loan(s) are used, these will be understood as articles or requests for articles.

Mean age or mean life

This term is to be understood as the sum of the count of all the articles' years of publication divided by the sum of all the articles in the count or subgroup, i.e.

$$M = \frac{\sum T}{n}$$

where T stands for year of publication of individual articles.

Periodical

I have accepted the definition by Smith⁽²⁾ as the most suitable because it does cover the types of ILLs analysed in this study, but I do often use the term journal synonymously, since this seems to be the habit in this country. Therefore: 'Throughout the study the term "periodical" is understood to include serial publications which appear annually or less frequently as well as monthlies, weeklies, etc. Abstract journals and indexes are not within the scope of the study'. Regular conferences and symposiums are treated as periodicals.

Point of obsolescence

Cho⁽¹⁾ defines this point as 'The time by which 85% of the total use of the literature has occurred'.

For the purposes of this study, the point of obsolescence is defined in a similar manner as the point after which less than x% of all use of the literature occurs.

It is understood that this point is related or is a function of the period or time-span of the sample. In our case only three months in 1977. The value x is again related to the managerial or research decision as to what percentage constitutes the obsolescence point in a specific library or research situation.

Scatter or Title dispersion

Leimkuhler⁽³⁾ has defined scatter 'as the degree to which the useful literature of a given subject area is scattered through a number of different books and journals'.

When considering the aging of the literature, the definition could be reworded to indicate also 'the degree to which the useful literature in a given subject area is scattered through a period of time'.

Productivity of a journal

The number of times a journal title has been borrowed in proportion or relation to other titles with lower or higher frequency use.

2.2 Abbreviations used:

ANU	Australian National University
AARL	Australian Academic and Research Libraries
AACOBS	Australian Advisory Council on Bibliographical Services
ABC & S	Australian Bureau of Census and Statistics
ADH	Australian Department of Health
ADP	Automatic Data Processing
ALJ	Australian Library Journal
AMLG	Australian Medical Librarian's Group
ANSTEL	Australian National Scientific and Technological Library
ANZ	Australian and New Zealand biomedical periodical titles from which articles have been requested
BLLD	British Library Lending Division
BMJ	British Medical Journal
BPCL	Biomedical Periodicals in Canberra's Libraries
CMLO	Central Medical Libraries Organisation - Melbourne
ILL	Interlibrary loan
ILLs	Interlibrary loans
LSTLC	Life Sciences Technical Liaison Committee
JAMA	Journal of the American Medical Association
KOMRML	Kentucky, Ohio, Michigan Regional Medical Library
MJA	Medical Journal of Australia
MONASH	Monash University Biomedical Library
NEMRLS	New England Medical Regional Library Service
NH & MRC	National Health and Medical Research Council
NLA	National Library of Australia

9.

RML	Regional Medical Library
SINFDOC	Swedish Council for Scientific Information and Documentation
SSAL	Scientific Serials in Australian Libraries
3BML	Three Biomedical Libraries, i.e. Monash, UNSW, ADH
STISEC	Scientific and Technological Information Services Enquiry Committee
UNSW	University of New South Wales Biomedical Library

CHAPTER 3 - BACKGROUND TO THIS PROJECT

3.1 Foreword

Usage studies of biomedical periodicals in Australia are non-existent, or at least not published. Most libraries keep records of interlibrary loans transactions but, if these are ever used, it is for internal rationalization of subscriptions, or at times to ask their funding bodies for more money to support the burden of internal usage and unsolicited requests for interlibrary loans. It has been assumed until recently that this burden has fallen heavily on the biomedical libraries at the major Australian universities (Raymond⁴).

A search of the literature has revealed only one article on usage of an Australian biomedical collection. This is by Freeman⁽⁵⁾ who discusses National Library loans figures and delays in supplying requested items. Previous concern with interlibrary loans (ILLs) is focused principally on the logistic of participation in the loan network and on standardization of ILL forms. An article by Archer⁽⁶⁾ in 1953 which is in fact a plea for standardization of request forms and attitudes is a strong example of this type of concern regarding ILLs. I must say, that now twenty-five years later and having looked through a maze of close to 4 000 ILL slips from all over Australia, even the standardization of request forms seems to be still eluding us. In fact less than half of the request for ILLs in my sample were on the LAA suggested ILL forms.

The STISEC estimates regarding the volume of loans which were made in 1973 states that 177 000 items were transacted through the whole country between all types of scientific libraries and for all types of the literature.⁽⁷⁾ There is other evidence however to suggest that the STISEC estimate may have been very low, or at least that the volume of ILLs has since increased considerably.

A very recent survey by Franki⁽⁸⁾ of ILLs required by 12 Sydney teaching hospitals, estimates that 14 000 requests are made annually only by those 12 hospitals. It appears from Franki's study that 'teaching hospitals obtain most rapid service from fellow teaching hospitals'. The results of my study, if extrapolated to one year, show that only three major biomedical libraries in Australia (Monash, UNSW and Fed. Health) provide over 18 000 periodical articles annually to other libraries, half of that to hospitals - and this figure covers only photocopies of journal articles and not monographs. There are at least ten other tertiary institutions in Australia with biomedical libraries, several state health departments and there is also ANSTEL which are all involved in the provision and request of ILLs. We ought to mention also the many hospital and other health institutions libraries.

Thus we can assume, that the STISEC figure of 177 000 items would now be very conservative indeed and a new national survey of ILL transactions may well be appropriate. Franki's and my own extrapolations could possibly be questioned in that they were based on samples taken over three months of the year only and

that perhaps during the summer months ILL activities could be slower. Nevertheless the great volume of ILLs cannot be doubted, neither can we doubt the economic or logistic implications of managing such large figures of interlibrary loans activity among biomedical libraries.

3.2 The Rationale of Usage Surveys

Whilst the size of ILL activities requires a seemingly 'healthy' growth of biomedical information gathering and especially of its literature usage, Maguire and Lovelace⁽⁹⁾ have found evidence in their study on 'Information Needs, Usage and Attitude of Medical Researchers in Australia' that

- (ii) 'local library services are inadequate at both the community and hospital levels to serve the needs of medical practitioners;
- (iii) the inter-library loan network is inadequate, even as it functions in the medical libraries of the larger universities' (p.67)

and they further say that most of their respondents experienced some difficulty in obtaining apparently relevant items. In fact '30 respondents had not sought some relevant items because of delays experienced or expected in obtaining inter-library loans'.

It is now widely accepted and known that a small number of titles borrowed accounts for the largest proportion of usage. It is assumed that those are the relevant journals that researchers wanted and could not obtain readily. It stands to experience

that: 'Purchase of journals absorbs a large part of medical library expenditure. For those who are involved in medical library planning and who are responsible for decisions on expenditure, it may therefore be helpful to have an estimate of what readers of the library consider to be the currently important journals in biomedicine.' This is the line of reasoning adopted by Whittle⁽¹⁰⁾ in the Edinburgh survey, which I will be trying to adopt in a wider context in my study.

Some relevant arguments are voiced also by Graziano⁽¹¹⁾ who writes that: 'It is reasonable to expect the library of an organization to own the necessary source materials that are frequently used and to borrow items that are enormously expensive and seldom used.' But according to Stewart⁽¹²⁾ this is not always the case because: 'Many such libraries penalize readers by levying charges for photocopies from periodicals not in their own holdings. At the same time they spend substantial sums in acquiring and holding periodicals that are never read.'

It is interesting and hopefully useful too, to find out what is the situation in this country, which are the journals borrowed heavily and which are not and who are the main users.

Significance and aims of study

Brookes⁽¹³⁾ has formulated certain questions which may justify the significance of any study on usage. His questions go like this: How can a given collection be subdivided into collections of primary, secondary and tertiary relevance or into stores requiring frequent, occasional or only rare access?

In this case, the provision of photocopied articles by three major biomedical libraries has been examined in terms of which serials are really being used by other libraries, what are the aging patterns of those serials and which titles should be taken off the lending list as each borrowing library should have them. The findings suggest some rationalization of lending activities, but above all they suggest further in-depth studies.

An attempt has been made to examine which are the core journals in biomedicine and in the health sciences as indicated by the provision of photocopied articles by three major biomedical libraries in Australia.

Because of time and sample limitations this project is more a test on the methodology and whether the assumptions underlying this piece of research can be tested by the methodology. A full scale national investigation as suggested some years ago by Maguire and Lovelace⁽⁹⁾ is still outstanding.

It is hoped that the methodology as described and tested does provide a starting point for a major survey or investigation into either a hospital library network or a larger group of biomedical libraries. At least, it may provide a background for the methodology of a more ambitious survey.

3.4 The Hypotheses

It is hoped that this project's results indicate whether the hypotheses, as advanced here below, are compatible with the evidence gathered or suggested. Another aim of this study has

been to correlate frequency of usage to age of publication in order to see whether frequently used serials tend to retain a higher life, say after five, ten, fifteen or twenty years and whether it is worth investigating a larger sample or to develop a methodology to measure usage in terms of time-span of publication dates and also loans dates.

A principal hypothesis and two subsidiary hypotheses have been formulated, based on studies overseas and personal perceptions formed during several years of intensive library practice.

The main hypothesis being tested, states:

'That what is being lent on interlibrary loan by three major biomedical libraries are not so much the exotic journals but the core titles in biomedicine.'

This main hypothesis seems to be confirmed by my research project.

Two secondary hypotheses have been tested from the same data with varying results and these are stated as follows:

- (1) 'That several Australian and N.Z. biomedical journals are prominent in the ranking of core titles, compared to their lower ranking on overseas lists.'
- (2) 'That a narrow range of major (or better known) biomedical journals can be identified as having a longer half-life (or do not become obsolete as fast as the bulk of biomedical serials).'

In the light of the above hypotheses data has been collected, computed, summarized, compared and analysed. Results are analysed and interpreted to see whether there is evidence for interlibrary loan patterns similar to those found and discussed in overseas studies* either in terms of frequency of use or of age of usage. In this context then rationalization of holdings of the less frequently used periodicals or a ban on copying from the more used journals can be discussed or given an empirical basis. The results could be tentatively interpreted also in terms of core journals requested on loan in the Australian health sciences ambient and compared to some overseas core lists.

* Though many overseas studies are relevant to this project because of methodological arguments and interesting results and would have certainly enhanced the logics of this chapter, for reasons of size and integrity of the literature survey, it was decided to make the literature survey a separate entity as Appendix No. 1.

CHAPTER 4 - METHODOLOGY

4.1 General Consideration

The basic aim of this study or research project is to develop and test a system of methodology to enable librarians and their institutions to draw empirically based inferences and make sound managerial decisions regarding information services and periodical collections under their control.

This project seems to be an original piece of research in this country though at least four similar projects, but in other subject fields and different emphasis, are being undertaken at the same time within the School of Librarianship at the UNSW.

It could be considered that this project is unique in so far as its aim is to test in the Australian scene the methodology and findings of similar studies overseas.

If some of the inferences resulting from this particular piece of research are capable of generalisations, so much the better, but no claim is made for such results or generalisations except in a narrow sense for the limited data and time span. Basically, the methodology is supposed to analyse interlibrary requests in terms of productivity of journals (frequency of use and ranking) and it is supposed also to obtain a measure of the obsolescence for the biomedical literature and whether such obsolescence is a dependent function of frequency. In this context, Australian biomedical journals are considered as a subdivision of the discipline of biomedicine.

The methodology allows also for the analysis of other data as country or language of publication, types of borrowing institutions and their geographical location.

With minor modifications and additions to the format of coding raw data: the authoris of articles (when several requests are for the same article*), the date of the request, the specific subject, the source of reference and the particular requesting library could also be analysed.

Except for the region of publication, the type and location of borrowing institutions, analysis of the additional variables has not been attempted at this stage. The lending of biomedical books could be analysed also by this methodology, but then appropriate modification of identification labels as authors or classification numbers would be required.

A pilot test was not considered necessary, as there is enough evidence from similar studies overseas that this type of usage survey is quite feasible and amenable to useful bibliometric analysis. The methodologies used in overseas surveys have been helpful in organizing this piece of research. Due credit is given when such is the case.

* This variable has been suggested also by Frances Flynn, Chief Librarian, Harvard Center for Community Health and Medical Care, Harvard University, U.S.A., in a personal letter.

4.2 Limits of the survey - Libraries and Materials

The libraries that have supplied interlibrary loans data for this test are:

The Central Library of the Australian Department of Health in Canberra,

The Biomedical Library of the University of New South Wales, and

The Biomedical Library of the Monash University in Melbourne.

The Monash University Library was selected because in the words of Professor Andrew, then Dean of the Faculty of Medicine⁽¹⁴⁾ it was the first faculty in Australia 'to establish courses throughout all six years of the course to take in these aspects - behavioural sciences, medical psychology, medical sociology, community practice, epidemiology, general practice and of course, psychiatry'. The Library of the Commonwealth Department of Health was selected not only because the author of this project works there, but mainly because its collection has a strong bias in pharmacology, public health measures and the politics of health. It has also relevant collections in nutrition, infectious diseases and the planning of health services. The Biomedical Library of the University of New South Wales was selected on the other hand, because it was at hand for the gathering of data and its collection shows a bias towards clinical medicine.

In this project lending data for photocopied periodical articles only are considered, as in all three libraries the lending of bound volumes or single issues of serials is insignificant and not part of the lending policy of the three libraries. Borrowings of the three libraries (except from each other), and in house lending or usage are not being tested, though such data would make interesting comparison.

4.3 Time span of survey and size of data

Interlibrary requests for photocopies of articles from biomedical periodicals only, placed with the Health Department Library and University of New South Wales Library during the months of September, October and November of 1977 have been put aside for this project. In the case of the Monash University which does not keep ILL forms after the requests have been attended to, it was indicated to me that only requests received from the end of September onwards to the end of November 1977 have been saved for this research project.

There were collected

1 412 Interlibrary loan forms from Monash (two months and one week)

1 445 Interlibrary loan forms from the UNSW (three months)

976 Interlibrary loan forms from the ADH (three months)

Only biomedical titles have been included in the sample population (in accordance with the definition of biomedicine on p.4 of this report). Otherwise the sample for ADH would have been close to 1 300 loans. The ADH Library provides an information service to officers of the Department also in the literature of Automatic Data Processing and staff management and research, finance and population statistics, regional and urban studies, environmental pollution, etc. Periodicals in these subjects are borrowed often times by other government agencies and departments in the ACT, especially in the nearby Woden offices. These have been omitted from this study in order to keep the data homogenous with requests to the other two survey libraries.

The raw data consisted unfortunately of a maze of originals, carbon copies of all sizes and kinds, e.g. there were dozens and dozens of telephone and telex messages and letters. Except for a sizeable sample from the teaching hospitals in Sydney which use a standardized, clearly set-out form, and some libraries which do use the AACOBS prescribed ILL forms, most other borrowing institutions use designs of their own or just write a plain letter. This makes for very tedious sorting and analysing.

1.4 Sampling Techniques

General considerations

Beside some problems in the nature of sampling itself, as sampling errors, and the selection procedure, there are some

problems associated with the functions and policies of the lending libraries, with the 'filter' influence of serial union lists on the channelling of requests. Then again, the UNSW Biomedical Library for reasons of limited staff resources refuses to fill requests to libraries outside New South Wales if the same titles are listed to be held by ANSTEL⁽²⁹⁾. ANSTEL has undertaken to supply articles from its journal holding to anyone in Australia. Such policies, limitations and 'filters' would tend to bias the sample from the three libraries and naturally also the results to some extent.

The choice of libraries in Sydney, Melbourne and Canberra was made in order to dampen somewhat such bias.

If interlibrary request statistics and ranking lists of usage by title were available from previous years (before the establishment of ANSTEL and new policies in the survey libraries), comparative studies could have been possible. As it is that no such statistics or ranking lists are available, one had to start from scratch and make comparisons only with overseas studies, from which it must be admitted many methodological hints have been derived.

Thus our sample is basically composed of what Urquhart calls 'residual demand',⁽³¹⁾ and what I would rename 'filtered residual demand'. Any general inferences from the analysed results will be analysed and should be understood in this context.

The initial problems to solve were the size of the sample and the time-span of the survey and the types of libraries to contribute data for the survey.

As R. Kench⁽¹⁵⁾ has stated in her paper:

'In research in librarianship it is often neither practical nor possible to measure each member of the population. Then it is, necessary to use a sampling procedure, that is, to select a relatively small number of the total population for measurement and this group will be used as a basis for the estimations of values for the total population.'

A similar reasoning was adopted also by C. Freeman⁽¹⁶⁾ in his study of marine biology citations. He moreover says that 'If this is done correctly, then the results obtained should not differ greatly from more optimum procedures.'

The sample consisted initially of every sixth request from a population of 3 833 requests whether satisfied or not. This measure was taken to satisfy Brookes' requirement of a minimum sample of around 600 requests⁽¹⁷⁾. Another reason was also the fact that the BLLD/SINFDOC survey with which my data is compared has also been based on a sample of every sixth request⁽⁴⁵⁾.

The sample is large enough to enhance precision and also capable of some generalizations and comparison with similar studies overseas, especially when it is merged with a second sample taken - also of every sixth request.

4.5 Sample size

Sample size seems to be a major element if we aim at obtaining statistical accuracy.

Chen⁽¹⁸⁾ has preferred a count of total use over a period of three and a half months rather than random sampling, as he says: '... in order to obtain statistical accuracy, the recorded frequency of use of physics journals must be as large as possible'.

Yet Garfield⁽¹⁹⁾ considers 'a three months sample of journal issues ... certainly more than adequate for statistical purposes', especially if 'the sample has been matched against another sample of more than adequate size'.

Brookes⁽²⁰⁾ is adamant though that:

'As in other sampling techniques, the larger the sample taken, i.e. the longer the period of observation, the more confident we are about the data we collect and the inferences we draw.'

When obsolescence measures were considered in this project, Brookes reasoning was adopted. Therefore, once it was established that the samples taken from each of the three libraries were too small to yield meaningful results separately, there was not much point of analyzing data by each individual library. The samples were considered as one sample of 638 articles out of a total population of 3 833 loan forms, e.g. every sixth request.

Brookes seems to more than agree with Garfield on the value of matching samples because he states that 'Whether any special randomizing techniques are used, it is always informative to collect the total sample in four or more separate equal batches and to compare the results obtained from each batch',⁽²¹⁾.

In discussing the limits to precision imposed by sampling he states in the same article that 'a well randomized sample of at least 580 items is needed to give (and then with a confidence of only 95%) a direct estimate of the half life which is correct to within 10% of its true value. Therefore, if one librarian finds the half life of a certain set of periodicals to be 9.0 years and a second librarian finds the half life of the same set to be 11.0 years, these two measures cannot be regarded as necessarily incompatible if the samples on which they are based number under 600 items. Such a discrepancy would not be statistically significant at the 5% level. A sample is a sample and only a sample. All obsolescence measures are derived from samples.'

For these reasons I have drawn a second sample in order to test the validity of the ranking lists and mean lives of the literature.

4.5 Why systematic samplings?

Because it is easier and according to Foreman, Yates, Moser and Kalton and Ackoff^(22, 23, 24, 25) provided that 'the ordering is random, then systematic random sampling yields the same variability of estimates as does simple random sampling'.

Drott⁽²⁶⁾ says that 'the critical factor is the order in which the population is arranged'. Foreman, Moser and Kalton have stated (perhaps with different words) the same meaning as Yates namely that 'provided there are no periodic features in the list, the sample will not be biased'. As I have chosen this type of systematic sampling for my research project, in the words of Yates⁽²⁷⁾ I fully recognize 'that the responsibility for the judgement that the material is such that systematic sampling will give satisfactory results rests with the investigator'.

The procedure to follow in systematic sampling is rather simple, Foreman describes it thus:

'To select a sample giving equal probabilities of selection to each sample unit, the procedure (assuming an integral sample interval) is to select at random a number, k (called the "random start") between 1 and the sampling interval, $g = \frac{1}{f}$ where f is the sampling fraction.'⁽²²⁾

Every g^{th} record is then picked out. In our case the sampling interval was 6 and the random start number was 5 (as picked out of a hat) therefore the 5th, 11th, 17th, 23rd, 29th, etc. request forms were picked out of the total population of 3 833 loan requests. This sample has been merged later on with another sample of every sixth request, where the random start number $k = 3$ was chosen in the same manner as in the first sample. Therefore the 3rd, 9th, 15th, 21st, 27th, 33rd, etc. requests were picked up to make another sample of 638 inter-library loans.

I shall discuss the results of the two samples in Chapters 6-8. Suffice it to say that the two samples have been merged to form a sample of every third request, which is henceforth called the composite sample of 1 276 requests, which I am convinced produces a nearer approximation to the population mean. I am aware though, as Simpson⁽²⁸⁾ has warned 'that increasing the size of any sample would not necessarily have any effect on the bias shown by the sample' if there is any bias inherent.

In systematic sampling one is warned against such bias or periodic trends of a regular nature. In our case, periodicity would have to be a factor of six, e.g. if every sixth request was from the same source or for the same journal title, something most unlikely to happen.

In analysing the samples for such trends, it was apparent that there was no such periodicity of demand from the same source or for the same title.

4.7 Sampling errors

As only a sample of the transactions were processed the results obtained will differ from those that would be obtained if all transactions had been analysed. This difference is known as the sampling error.

Moser and Kalton⁽³⁰⁾ maintain that in systematic sampling 'When the sample is a random one, sampling errors can and should be calculated, and presented together with the survey estimates'.

The common measure of these errors is called the 'standard error of the estimate'. It is described by Yates⁽³²⁾ thus:

'The sampling standard error of an estimate is a measure of the average magnitude of the random sampling to be expected in that estimate ...'

When examining tabulations, it is useful to bear in mind that the standard error of a count is roughly the square root of the count.* A more accurate though still simple formula is provided by Yates:

$$\text{Standard error of } p = \sqrt{\frac{pq}{n}}$$

where p is the proportion of units of the given type in the whole population, and $q = 1-p$ is the proportion not of the given type. He says that 'the formula holds unchanged if the proportions are replaced by percentages'.

Roughly speaking, there are two chances in three that the 'true' value lies within one standard error of the estimate and there are nineteen chances in twenty that the 'true' value lies within 1.6 standard errors of the estimates. Therefore when Yates' formula is applied to the count of 26 ANZ journal articles in the first sample of 638 the percentage of ANZ transactions is estimated to be $4.1\% \pm 0.8\%$ with 66% confidence and $4.1\% \pm 1.6\%$ with 95% confidence. Corresponding estimates from the second sample of 638 articles in which 28 ANZ articles were detected are $4.4\% \pm 0.8\%$ and $4.4\% \pm 1.6\%$ which are in good agreement. Combining the two samples gives an estimate of $4.2\% \pm 1.1\%$ with 95% confidence.

* Ian Keppel, Principal Research Officer Statistics, Health Department in personal communication.

Now if this rule is extrapolated to the whole population sampled we can say with 95% confidence that the range $4.2\% \pm 1.1\%$ accounts for ANZ periodical articles requested, or translated into absolute numbers that between 123 and 199 requests are for articles from ANZ journal titles.

The same procedure can be, and indeed has been applied to other estimates from the samples.

4.8 Sorting of raw data

Copies or originals of the interlibrary request forms were sorted by date of placement of request of the borrowing libraries. This was done for two reasons:

- (i) because it ensures an original random order. It puts them in the order they were requested.
- (ii) because the date of filling the request was in many instances not marked on the forms in the lending libraries.

Consequently each slip was numbered with a consecutive identification number starting from the earliest date to the latest, e.g.

1-14 **12** for Monash

1-14 **45** for UNSW

1- 976 for ADH

which gives a total population of 3 833 requests for the three libraries and the three months of 1977.

Out of this population two systematic samples of 638 each were taken, coded and analysed for the purpose of this research.

4.9 Handling of raw data

Because the original ILL slips come in all kinds of size, form or order of elements, it was perceived that any meaningful sorting by categories like place and date of publication, frequency of loan, etc. would have been difficult and also subject to errors. It was decided therefore to copy the pertinent elements onto scrap catalogue cards. To speed up copying the following abbreviations or codes were devised:

For the Lending Libraries

M	Monash University Biomedical Library
H	Federal Health Department Library
N	University of NSW Biomedical Library

For Borrowing Institutions and Libraries

St.	State and Local Government
T	Tertiary Institutions including CAE
H	Hospitals
Fe	Federal Government (including statutory bodies)
F & A	Firms and Associations (including professional societies)
O	Others
S	The three survey libraries. Applicable only when requests came from one of the three lending libraries.

For the location of borrowing libraries and institutions a brief code was also devised, thus

V stands for Victoria
 N for NSW
 SA for South Australia
 WA for Western Australia
 C for Canberra
 T for Tasmania
 NT for Northern Territory
 O for overseas
 QLD for Queensland

As said, this system of abbreviations allows for fast transcription and coding of data, therefore the raw data on scrap catalogue cards would look like this:

J.A.M.A.	
M77	H/V

Which means that an article published by JAMA in 1977 was lent by Monash to a Hospital in Victoria. Because originally, the intention was to sort the data manually, the above type of coding is quite handy as it allows for various fast sorts, counts and analysis of data manually, either by title, region, lending library, year of publication or type of library.

The fact that T stands for tertiary institutions and also for Tasmania, does not confuse the coding because the first T before the stroke always stands for tertiary institutions and the T after the stroke stands for Tasmania, thus we may have:

Med. J. of Australia	
H36	T/T

which means that an article published in the MJA during 1936 was lent by the Federal Health Department Library to a tertiary institution in Tasmania. The same logic would apply to the use of H for the Health Department Library as lending library and also for Hospitals as borrowing institutions.

After this transcribing has been done, the cards were sorted in alphabetical order by title. All titles were then checked for place of publication in Ulrich's⁽³³⁾ and if not found there, also SSAL⁽³⁴⁾ and BPC⁽³⁵⁾. The correct form of entry was also verified in these directories when there was a clash between two or more loan slips. This is rather relevant, when one tries to sort titles by frequency into a ranking list, e.g. Journal of ... Journal for ... or for example J. of the Indian Medical Association against Indian Medical Association Journal.

This is unfortunately a tedious task because there is no unified form of entry between requesting libraries.* While it may seem trivial at first glance, it is rather confusing when one is dealing with dozens and dozens of American journals or just with so many titles starting with 'Journal of' or 'Journal for'.

* Smith⁽³⁶⁾ reports similar difficulties in establishing a regional union list for biomedical periodicals in the Kentucky Ohio Medical Regional Library (KOMRL).

An identical procedure was adopted also for the second sample of 638 except that this sample was not analysed in full by SPSS as the first but only frequencies and age were computed and analysed by hand.

4.10 The Coding for the SPSS system

Whilst the handling of 638 or even 1 300 loan slips does constitute a fair amount of tedious clerical work, it can be done nevertheless within reasonable time limits and manually. If one were to collect and use more data, say for a national survey, or to enhance sample precision, as suggested in the literature especially by Brookes⁽¹⁷⁾ then the size of the data and the boredom of sorting it and counting it (not to mention the cost in wages and time) may deter many a willing researcher to undertake a survey of similar nature. For this reason, computerized processing and analysing of the data was deemed worth investigating.

The suggestion of F. Flynn*, while she was in Australia on a WHO consulting mission, that I should try to use the SPSS programme for computer sorting and manipulation of the data, as she has done in her library, was readily accepted. The notes by Nancy Lane⁽³⁸⁾ gave an initial understanding of what the package does

* F. Flynn is Chief Librarian at the Harvard Center for Community Health and Medical Care at Harvard University.

and how it works, though the SPSS programme for this piece of research has been adopted directly from the work of NIE and others⁽³⁹⁾ and in this respect, Mr Ian Keppell's* assistance was invaluable.

Data from individual scrap cards was summarized on one master card for each title, which were then numbered consecutively, e.g. given identification tags.

All data had to be coded again on Health Department PL1 coding sheets. Whilst each title was given an identification number, for each transaction a line of coding was necessary. This coding resulted in 54 pages of coding sheets** plus the programme itself. The following codes were used as indicated in brackets on the next page:

* I. Keppell is a graduate of the ANU and Principal Research Officer Statistics with the Federal Health Department.

** See Appendix 2 for copy of original coding sheet.

<u>Variables</u>	<u>Columns</u>	<u>Variables labels</u>	<u>Value labels</u>
VAR 1	18-20	Journal title identifi- cation number	(1-445)
VAR 2	27-30	Date of publication	1877-1977
VAR 3	40	Place of publication	(1 to 7)
VAR 4	50	Frequency of loan	(1 to 7)
VAR 5	55	Mark for frequency*	(1 or 0)
VAR 6	60	Lending Library	(1 to 3)
VAR 7	65	Type of borrowing institution	(1 to 7)
VAR 8	70	Location of borrowing institution	(1-9)

Input of raw data from PL1 coding sheets has been done by the ADP Branch of the Health Department in Canberra.

The SPSS program itself has been input directly on a Plessey's VDU terminal by myself.**

Printouts were obtained for proofreading the raw data and the programme before executing the programme. Corrections of both were done by myself directly onto the VDU terminal.

* This instruction allows for a select command by title, thus at title No. 330 with a frequency of six requests one transaction only is marked 1, all others are marked zero 0.

** I must acknowledge here the generous supervision given by Miss Olga Fijalkowski of the User Services Section of the ADP Branch of the Commonwealth Health Department.

4.11 Adaptations and use of the SPSS Programme

Raw data which was collected and coded manually onto scrap catalogue cards, was recoded for ADP applications and all counts, frequencies and statistical cross-tabulations and breakdowns were done by the SPSS programme. Only the first sample of 638 requests was analysed this way. The second sample was sorted and analysed manually, but only for frequency of request for each title and for the age of publication of the articles. The SPSS programme, in its fullness, consisted of SPSS control cards or statements as presented on p. 37:

The SPSS Programme Control and Procedure Cards
for an Interlibrary Loan Survey

WL.BPSPSS4

NUMBERED	YES
EDIT	
RUN NAME	CDRE JOURNALS IN HEALTH SCIENCES & BIOMEDICINE
VARIABLE LIST	VAR001 TO VAR008
VAR LABELS	VAR001 TITLE OF JOURNAL/VAR002 PUBLICATION DATE/ VAR003 PLACE OF PUBLICATION/VAR004 FREQUENCY OF LOAN/ VAR005 MARK FOR FREQUENCY/VAR006 LENDING LIBRARY/ VAR007 BORROWING LIBRARY/VAR008 LOCATION OF BORROWER/
VALUE LABELS	VAR002 (1)1877-1952 (2)1953-62 (3)1963-67 (4)1968-1972 (5)1973-1977/ VAR003 (1)ANZ (2)USA AND CANADA (3)UK AND IRELAND (4)WEST.EUROPE (5)EAST. EUROPE (6)ASIA (7)OTHERS/ VAR006 (1)MONASH (2)UNSW (3)FED.HEALTH DEPT./ VAR007 (1)HOSPITALS (2)TERTIARY INSTITUTIONS (3)SURVEY LIBRARIES (4)FEDERAL AUTHORITIES (5)STATE AND LOCAL AUTHORITIES (6)FIRMS AND ASSOCIATIONS (7)OTHERS/ VAR008 (1)OVERSEAS (2)A.C.T. (3)NORTH.TERRITORY (4)VICTORIA (5)NEW SOUTH WALES (6)QUEENSLAND (7)SOUTH AUSTRALIA (8)WESTERN AUSTRALIA (9)TASMANIA/
INPUT MEDIUM	DISK
INPUT FORMAT	FREEFIELD
MISSING VALUES	VAR002 (99)
N OF CASES	638
SELECT IF	(VAR005 EQ 1)
RECODE	VAR002 (1973 THRU 1977=5) (1968 THRU 1972=4) (1963 THRU 1967=3) (1953 THRU 1962=2) (1877 THRU 1952=1)/
LIST CASES	CASES=638/VARIABLES ALL
FREQUENCIES	GENERAL=VAR002 VAR003 VAR004 VAR006 VAR007 VAR008
OPTIONS	4, 6, 8, 9,
STATISTICS	ALL
BREAKDOWN	VARIABLES=VAR002(1877,1977)/VAR003(1,7)/ VAR004(1,7)/ TABLES=VAR002 BY VAR003, VAR004/
READ INPUT DATA	
CROSSTABS	VARIABLES=VAR002(1,5)VAR003(1,7)VAR004(1,7) VAR006(1,3)VAR007(1,6)VAR008(1,9)/ TABLES=VAR002 BY VAR006/VAR002 BY VAR004/ VAR003 BY VAR004/VAR007 BY VAR002/VAR007 BY VAR003/ VAR006 BY VAR004/VAR002 BY VAR003/VAR003 BY VAR002/ VAR006 BY VAR004/VAR002 BY VAR003/VAR003 BY VAR002/
OPTIONS	9,
STATISTICS	1, 3, 5,
FINISH	

The raw data which was coded originally on a separate file was merged with the main SPSS instructions programme by the SPSS catalogued procedure JCL1*

```
//WLBSPSS JOB (WLB,T),BPRIBAC,CLASS=A
// EXEC SPSS,PROGRAM='WL.BSPSS1',RAWDATA='WL.BPDATA'
```

Naturally, not all the JOB and SPSS control cards were used or can be indeed used at the same time. For example the EDIT control statement and the LIST CASES control statement were deleted after all proper corrections have been made and no errors were detected in the programme anymore.

The SELECT IF statement was used only once, to obtain the number of titles, their frequency and place of publication. This statement is tied to VAR005 MARK FOR FREQUENCY, in which only one transaction per title is marked for title count and other related statistics, all other transactions are omitted.

Another useful procedure statement is the RECODE statement whose function is to recode variable values. In this instance it was used twice; to modify the many individual year of publication into groups of requests falling into the same five or ten years, thus all transactions with publishing dates between and including 1973 to 1977 were coded as = 10 or 5 and so on down to 1877 THRU 1932 or 1952 which = 1.

* JCL1 stands for Job Control Language to Run the Programme.

* The jobs were submitted through the TSO Plessey's terminal.

This type of sort is useful for cross-tabulations of publishing periods with frequencies, region of publication or with lending or borrowing institutions so that relationships between variables could be identified otherwise each year would be a variable and cross-tabulations would be almost meaningless. It was noticed also, that for cross-tabulations, it was more convenient to divide the age pattern into only five groups otherwise too many cells would have been left with zero data. When the RECODE control statement is inserted into the programme the corresponding VALUE LABELS also have to be added or changed as the circumstance demands.

The SPSS 'BREAKDOWN' procedure was used in this research to find out the mean ages of the sub-samples of biomedical periodicals. The justification for this procedure can be found in the literature of statistics, but it was stated concisely by D. Magin⁽⁴⁰⁾* who said that for large samples $\bar{x}$ (the mean) is an adequate measure of difference between values and that 'Tests of significance have a reduced role in research in librarianship where we are dealing with large samples.' This is particularly so if results are highly significant.

The BREAKDOWN procedure replaced the FREQUENCIES and the CROSSTABS control statements and it was the last job in a series of jobs that resulted in a number of ranking lists, cross-tabulations and counts.

* Doug Magin: Lecture on May 5, 1977 at UNSW School of Librarianship.

When the BREAKDOWN procedure is used, the RECODE procedure and its corresponding VALUE LABELS have to be omitted as well.

BREAKDOWN provides the sums of counts under each separate value label for the variables compared, also their means, standard deviations, variance and the N of the cases for the total sample and its various sub-groups. So, in the last SPSS job, the programme was set as follows:

The SPSS Breakdown Procedure for an ILL Survey

STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES

05/31/78

PAGE 1

SPSS FOR OS/360, VERSION H, RELEASE 7.1, JULY 11, 1977

DEFAULT SPACE ALLOCATION..	ALLOWS FOR..	83 TRANSFORMATIONS
WORKSPACE 58240 BYTES		332 RECODE VALUES + LAG VARIABLES
TRANSPACE 8320 BYTES		1334 IF/COMPUTE OPERATIONS

NUMBERED	YES	00000005
RUN NAME	CORE JOURNALS IN BIOMEDICINE ON ILL IN AUSTRALIA	00000020
VARIABLE LIST	VAR001 TO VAR008	00000030
VAR LABELS	VAR001 TITLE OF JOURNAL/VAR002 PUBLICATION DATE/	00000040
	VAR003 PLACE OF PUBLICATION/VAR004 FREQUENCY OF LOAN/	00000050
	VAR005 MARK FOR FREQUENCY/VAR006 LENDING LIBRARY/	00000060
	VAR007 BORROWING LIBRARY/VAR008 LOCATION OF BORROWER/	00000070
VALUE LABELS	VAR006 (1)MONASH (2)UNSW (3)FED.HEALTH/	00000080
	VAR007 (1)HOSPITALS (2) TERTIARY INSTITUTIONS	00000090
	(3)SURVEY LIBRARIES (4)FEDERAL AUTHORITIES	00000100
	(5)STATE AND LOCAL AUTHORITIES	00000110
	(6)FIRMS AND ASSOCIATIONS (7)OTHERS/	00000120
	VAR003 (1)ANZ (2)USA AND CANADA (3)UK AND IRELAND	00000130
	(4)WESTERN EUROPE (5)EASTERN EUROPE (6)ASIA	00000140
	(7) OTHERS/	00000150
	VAR008 (1)OVERSEAS (2)ACT (3)NORTH.TERRITORY	00000160
	(4)VICTORIA (5)N.S.W. (6)QUEENSLAND	00000170
	(7)S.AUSTRALIA (8)W.AUSTRALIA (9)TASMANIA/	00000180
INPUT MEDIUM	DISK	00000190
INPUT FORMAT	FREEFIELD	00000200
MISSING VALUES	VAR002 (99)	00000210
N OF CASES	638	00000220
BREAKDOWN	VARIABLES=VAR002(1877,1977)/VAR003(1,7)/	00000221
	VAR004(1,7)/	00000222
	TABLES=VAR002 BY VAR003,VAR004/	00000223

***** BREAKDOWN PROBLEM REQUIRES

280 BYTES WORKSPACE, NOT INCLUDING VALUE LABELS *****

4.12 Further comments on the methodology

Though the SPSS approach for tabulating and analyzing the data has been used only on the first sample of 638, it can be equally valid for the second sample or on any larger sample. On the second test sample of 638, all counts and sorts have been done by hand, but only for title and request frequencies and date of publication. Transactions from Australian titles have been also identified (including publication dates). The means, standard deviations and variance have been derived for the second sample with the help of an HP-25 calculator.* No cross-tabulation or other results have been attempted from the second sample or from the composite sample, which was derived manually by merging the two sets of cards and the two sets of data.

As the whole intention of the project was to develop a methodology** which would be adequate to analyse the frequency of periodical usage, the obsolescence of periodicals and the relevance of Australian biomedical periodicals the SPSS programme as adopted in this project is an adequate tool to give relevant and fairly precise results. It is hoped that this will be confirmed in the ensuing chapters.

* Hewlett-Packard HP-25 Applications Programs 00025-90011 Rev. C8/75.

** This methodology could be well applied (with minor modifications) to the analysis of internal periodical circulation.

CHAPTER 5 - THE LIMITATIONS OF THE RESEARCH PROJECT

5.1 The Basic Frame

In a research project of this type, when one is limited not only by a time span during which data has been collected, but one is limited also by a rather small sample and by a small number of participating libraries, any results obtained have to be taken with caution. The libraries represented and the time periods used may not be representative of all other health libraries and all periods. That is why any claim to generalize these results to all Australian health and biomedical libraries cannot be sustained statistically.

It must be stated therefore emphatically that the results apply to interlibrary loan data* or rather to the provision of photocopied articles during the survey period of September to November 1977 and then only to the three libraries that have supplied the data. Any extrapolations and wider generalizations are applicable therefore primarily to these three libraries and to the requests they received from a wide range of borrowing libraries and institutions.

In addition, as Lovelace says: 'The requests received are already "filtered", in the sense that location has generally been verified in Scientific Serials in Australian Libraries'⁽³⁴⁾ and in BPC⁽³⁵⁾ and CML⁽³⁷⁾. Thus the data and its results cannot be

* The term interlibrary loans is a misnomer in this instance and throughout the whole project, as we are in fact dealing not with returnable loans but with photocopied articles given free or sold for a minimal charge to the recipient libraries.

applied to the borrowing libraries except in a very tentative manner, because no doubt, the borrowing libraries have asked for photocopied articles from a range of other lending libraries and above all from each other as Franki's survey so clearly demonstrates⁽⁴²⁾. Morton suggests in fact that in order to avoid this source of error, the records of the requesting libraries, should be used instead⁽⁴³⁾. Such records would also show the level of use of non medical literature by health sciences libraries.

Because of the above arguments, it could be said only tentatively that the sample does reflect, but on a very limited scale, the Australian environment. Further studies and research, involving a wider segment of biomedical libraries, a larger sample and above all also borrowing data as a two-way interlibrary traffic, would in my opinion give more indicative and precise results.

What this project has achieved is a methodology to support and enable such further studies. All other claims, suggestions and speculations in this research project, will be seen, I hope, in the light of the above limitations.

5.2 The Methodology

Sampling

The sampling errors associated with a sample of 638 articles are rather large. For example, a count of 26 ANZ items could be in fact seen as 26 ± 5 at one standard deviation and 26 ± 10 at two standard deviations (95% confidence limits). The 375 articles

from the United States of America and Canada in the first sample may well be 375 ± 38 at the 95% confidence limits if other samples of the same size were taken*. Where applicable, the sampling errors have been stated or indicated. Where the standard errors have been not stated, I hope, these will be assumed.

5.3 The Variables

- Not satisfied requests were not excluded from the samples as these constitute a real demand for existing articles. The methodology permits the inclusion of this variable in the SPSS programme, which could be merged with some value labels to indicate whether the same requests were made beforehand to another library (e.g. switching library after failure at first or second attempt) or whether requests for specific periodical titles were for the same article. Especially this value label would indicate whether it is a journal itself, a particular author or particular topic which is responsible for the productivity of a journal title or subject field.
- Then, variable No. 7 in the SPSS programme could be identified better. Instead of indicating just the type of library with a code number, the postcode or preferably the SSAL code for each borrowing or lending institution should replace the 'value label'.

* Brookes contention that we can state 'correct only to 10%' is quite evidently so in many sample groups in this research project.

But I presume, with some experience from the handling of the raw data in this project, that this aspect would be rather difficult to establish because the request forms in many instances do not use the SSAL code and it would therefore require quite an effort establishing codes for each transaction separately.

An additional benefit of the SSAL or NUCOM code would be to identify local and/or regional inadequacies of collections.

- A subject variable?

Some measure of obsolescence patterns or differences might have been obtained if the articles were coded for their subject content. Though the methodology would allow for this extra variable with up to 999 value labels, many less or just a dozen or so value labels would be adequate. This approach was not attempted, because of the sheer volume of work required to code each article for its topic. Neither was this approach considered seriously in the research proposal in the first instance.

Instead, only a comparison of age means between high frequency and low frequency titles was done and the age mean of ANZ articles was also compared with the overseas articles age mean. A comparison of mean age between subject groups could have thrown some more light on obsolescence patterns of the biomedical literature, except that the newer biomedical journals would of necessity show a much shorter mean age. The problem then would be, how does one compare the classical journals with the newer journals? Just by their productivity or by some other criteria.

CHAPTER 6 - PRESENTATION OF RESULTS - FREQUENCIES AND RANKS

6.1 Frequency distribution of titles and loans

An analysis of the individual periodical titles in two separate samples and one composite sample reveals that a total of

638 articles from 444 titles were obtained in the
first random sample,

638 articles from 461 titles were obtained in the
second random sample,

and 1 276 articles from 711 titles were obtained in the
composite random sample.

In the first sample the range of requests was 328 titles with one request each and one title with seven requests. In the second sample, 347 titles accounted for one request each and the highest used journal accounted for seven articles. In the composite random sample of 1 276 requests the range was from 438 titles with one article each to two journal titles with thirteen requests each. More detailed results are presented in Tables 1 - 3.

TABLE 1

No. of requests according to the number of requested titles.

First Sample of 638

No. of requests per title	No. of titles	Cumula- tive No. of titles	Cumula- tive % of titles	No. of re- quests	Cumula- tive No. of requests	Cumula- tive % of requests
7	1	1	0.2	7	7	1.1
6	3	4	0.9	18	25	3.9
5	4	8	1.8	20	45	7.0
4	9	17	3.8	36	81	12.7
3	31	48	10.8	93	174	27.3
2	69	116	26.1	136	310	48.6
1	328	444	100.0	328	638	100.0

TABLE 2

No. of requests according to the number of requested titles.

Second Sample of 638

No. of requests per title	No. of titles	Cumula- tive No. of titles	Cumula- tive % of titles	No. of re- quests	Cumula- tive No. of requests	Cumula- tive % of requests
7	1	1	0.2	7	7	1.1
6	4	5	1.1	24	31	4.8
5	0	-	-	0	-	-
4	9	14	3.0	36	67	10.5
3	24	38	8.2	72	139	21.8
2	76	114	24.7	152	291	45.6
1	347	461	100.0	347	638	100.0

TABLE 3

No. of requests according to the number of requested titles.

Composite Sample of 1 276

Freq.	No. of titles	Cumulative No. of titles	Cumulative % of titles	No. of requests	Cumulative No. of requests	% of Cumulative No. of requests
13	2	2	0.28	13	26	2.03
12	2	4	0.56	24	50	3.91
10	1	5	0.70	10	60	4.70
8	2	7	0.98	16	76	5.95
7	4	11	1.55	28	104	8.15
6	10	21	2.95	60	164	12.85
5	20	41	5.76	100	264	20.68
4	24	65	9.14	96	360	28.21
3	62	127	17.86	186	546	42.78
2	146	273	38.39	292	838	65.67
1	438	711	100.0	438	1 276	100.0

LIST 1THE ELEVEN MOST USED TITLES - COMPOSITE SAMPLE

1. Medical Journal of Australia
2. New England Journal of Medicine
3. Journal of the American Medical Association
4. Clinica Chimica Acta
5. Dimensions in Health Services
6. Urology
7. Hospitals
8. Journal of Chromatography
9. Archives of Dermatology
10. Diabetes
11. Hospitals Practice

} equal.

It can be seen that the eleven most used titles, while they constitute only 1.5% of titles, have satisfied over 8% of inter-library requests for periodical articles. Eighty-seven titles, comprising the nucleus of the literature in biomedicine as surveyed in the three libraries, while accounting for less than 13% of the titles during the three months of the survey have contributed more than 33% of the articles requested. And 173 titles (less than 25% of 711 titles) have contributed exactly half of the requested articles.

In the above three samples we notice a large scatter of the usage of the biomedical literature over the whole population (in this case periodical titles). This fact has been noticed previously on a smaller scale also by Maguire and Lovelace⁽⁹⁾. This large scatter would be due in this instance only partly to the small sample. The actual population parameters seem to be influencing the scatter. This can be evidenced if we compare the first two samples with the merged composite sample, in which we find that to account for 50% of requests we need

- 28% of titles in the first sample
- 31% of titles in the second sample
- 24.3% of titles in the composite sample.

Sampling errors may account for the difference between the three percentages. In fact at the 99% and also at the 95% confidence limits the difference lies well within the sampling errors for the respective counts.

6.2 Ranking lists from the three samples

When journals are ranked in the order of the most productive titles, the following three lists are obtained, one for each sample, i.e. Lists No. 2 - 4, pp. 52 - 58:

LIST 2

Ranking list of journals

First Sample of 638

Titles in rank order (frequency 3 to 7 articles)

<u>Title</u>	<u>No. of Articles</u>	<u>Also found in second sample</u>
1. New England J. of Medicine	7	*
2. Clinica Chimica Acta	6	*
3. JAMA	6	*
4. Med. J. of Australia	6	*
5. Clin. Endocrinol. Suppl.	5	
6. Dimensions in Health Services	5	*
7. Hospitals	5	*
8. J. of Speech and Hearing Research	5	
9. Archives of General Psychiatry	4	
10. Am. J. of Obstetrics & Gynaecology	4	
11. Hospital Practice	4	*
12. J. of Chromatography	4	*
13. J. Of Paediatrics	4	
14. Lancet	4	
15. Paediatrics	4	
16. South African Med. Journal	4	
17. Urology	4	*
18. Water Pollution Control Feder. J.	4	
19. Annals of Internal Medicine	3	
20. Archives of Dermatology	3	*
21. American J. of Med. Sciences	3	
22. Behaviour Therapy	3	
23. British Medical Journal	3	*
24. Biochem. Biophys. Acta	3	
25. Cancer Research	3	
26. Diabetes	3	*
27. Hoppe - Seyler's Z. for Physiolog. Chemie	3	

28. Headache	3	
29. J. of Cell Biology	3	
30. J. of Counselling Psychology	3	
31. J. of Counselling & Clin. Psychology	3	
32. J. of Immunology	3	
33. J. of Pharmacology & Experim. Therap.	3	
34. J. of Experim. Psychology	3	
35. J. of Endocrinology	3	
36. J. of Medical Education	3	
37. Med. Aspects of Human Sexuality	3	*
38. Medical Care	3	
39. Metabolism	3	
40. Marine Biology	3	
41. Proc. Nat. Acad. Science	3	
42. Nature	3	
43. Psychological Bulletin	3	
44. Psychological Medicine	3	
45. Preventive Medicine	3	
46. Psychiatry	3	
47. Stroke	3	
48. Archiv. fur Orthopad. und Unfall-Chirurgie	3	

LIST 3

Ranking list of journals.

Second Sample of 638

(Frequency : 3 to 7 articles)

	<u>Titles in Rank Order</u>	<u>No. of Articles</u>	<u>Also found in first sample</u>
1	1. Med. J. of Australia	7	*
2	2. J. of the American Med. Assoc.	6	*
2	3. Age and Aging	6	
2	4. Clin. Chim. Acta	6	*
2	5. New England J. of Medicine	6	*
3	6. Brain Research	4	
3	7. Child Psych. and Human Development	4	
3	8. Dimensions in Health Services	4	*
3	9. Diabetes	4	*
3	10. Medical Instrumentation	4	
3	11. Israel J. of Medical Sciences	4	
3	12. Archives of Dermatology	4	*
3	13. Urology	4	*
4	14. British Medical Journal	3	*
4	15. British J. of Urology	3	
4	16. British J. of Nutrition	3	
4	17. Connecticut Medicine	3	
4	18. Clinical Pediatrics	3	
4	19. Canadian Medical Association Journal	3	
4	20. Cell and Tissue Research	3	
4	21. Federation Proceedings	3	
4	22. Developmental Med. and Child Psych.	3	
4	23. Laboratory Investigations	3	
4	24. Medical Aspects of Human Sexuality	3	*
4	25. J. of Studies on Alcohol	3	*

4	26. J. of Chromatography	3	*
4	27. Am. J. of Medicine	3	
4	28. Am. J. of Hospital Pharmacy	3	
4	29. Acta Neurologica Scandinavica	3	
4	30. Acta Dermato-Venereologica	3	
4	31. Australian Nurses Journal	3	
4	32. Archives of Pathology	3	
4	33. Archives of Phys. Med. and Rehabil.	3	
4	34. Hospital Practice	3	*
4	35. Hospitals	3	*
4	36. Science	3	

LIST 4

Ranking list of journals.

Composite Sample of 1 276 Loans

Titles in rank order (Frequency: 4 to 13 articles)

* Common with first sample, ** Common with second sample.

<u>Title</u>	<u>No. of Loans</u>	<u>Country of Publication</u>			
1. Medical J. of Australia	13	Aust.	*	**	
2. New England J. of Medicine	13	USA	*	**	
3. J. of the American Med. Assoc.	12	USA	*	**	
4. Clinica Chimica Acta	12	HOLLAND	*	**	
5. Dimensions in Health Services	10	CANADA	*	**	
6. Urology	8	USA	*	**	
7. Hospitals	8	USA	*	**	
8. J. of Chromatography	7	HOLLAND	*	**	
9. Archives of Dermatology	7	USA	*	**	
10. Diabetes	7	USA	*	**	
11. Hospital Practice	7	USA	*	**	
12. J. of Speech and Hearing Res.	6	USA	*		
13. Lancet	6	UK	*		
14. Med. Aspects of Human Sexuality	6	USA	*	**	
15. British Medical Journal	6	UK	*	**	
16. Archives of Gen. Psychiatry	6	USA	*		
17. Am. J. of Surgery	6	USA		**	
18. Age and Ageing	6	UK		**	
19. Pediatrics	6	USA	*		
20. Child Psych. & Human Development	6	USA		**	
21. J. of Medical Education	6	USA	*		
22. J. of Studies on Alcohol	5	USA		**	
23. Medical Instrumentation Journal	5	USA		**	
24. Medical Care	5	USA	*		
25. Canadian Medical Association J.	5	Canada		**	
26. British J. of Nutrition	5	UK		**	
27. Brain Research	5	HOLLAND		**	

28. Biochimica Biophysica Acta	5	HOLLAND	*	
29. Behaviour Therapy	5	USA	*	
30. Archives of Pathology	5	USA		**
31. Am. J. of Hospital Pharmacy	5	USA		**
32. Am. J. of Obstetrics & Gynaecology	5	USA	*	
33. Acta Dermato-Venereologica	5	SWEDEN	*	**
34. Preventive Medicine	5	USA	*	
35. South African Medical Journal	5	S. AFRICA	*	
36. Science	5	USA		**
37. Water Pollution Control Federation Journal	5	USA	*	
38. Clinical Pediatrics	5	USA		**
39. Clinical Endocrinology	5	UK	*	
40. J. of Physiology	4	UK		
41. J. of Pediatrics	4	USA	*	
42. J. of International Medical Research	4	UK		
43. J. of Immunology	4	USA	*	
44. J. of Endocrinology	4	UK	*	
45. Modern Health Care	4	USA		
46. International J. of Health Services	4	USA		
47. Israel J. of Medicine Sciences	4	Israel		**
48. Archiv fur Orthop. & Unfall-Chirurgie	4	W. Germany	*	
49. Annals of Internal Medicine	4	USA	*	
50. Am. J. of Medical Sciences	4	USA	*	
51. American Water Works Assoc. J.	4	USA		
52. Australasian Nurses Journal	4	Australia	* ²	** ²
53. NZ Medical Journal	4	New Zealand	* ²	** ²
54. Psychiatry	4	USA		
55. Pediatric Research	4	USA		

*² with a frequency of two loans only.

58.

56. Radiology	4	USA		
57. Stroke	4	USA		
58. National Academy of Sciences Proc.	4	USA		
59. Cancer Research	4	USA	*	
60. Cell and Tissue Research	4	USA		**
61. Connecticut Medicine	4	USA		**
62. Developmental Medicine and Child Neurology	4	UK		**
63. EEG and Clinical Neurophysiology	4	Ireland		

6.3 Analysis of Ranking Lists

It is evident from the ranking lists of sample No. 1 and sample No. 2 that except for the first ten titles in each list where we have five titles in common, though ranked in different order, there is little correlation between the other titles and the two lists. In fact, all in all only 13 titles are common to both samples out of 48 and 38 titles comprising the lists of most used journals. Just over 30% of titles appear to be common to both samples*.

The five titles that appear prominently in both samples are:

Medical Journal of Australia	(13 loans)
New England Journal of Medicine	(13 loans)
Journal of the American Med. Assoc.	(12 loans)
Clinica Chimica Acta	(12 loans)
Dimensions in Health Services (formerly Canadian Hospitals)	(10 loans)

It may be observed here that except for Canadian Hospitals, these are the titles that appear prominently also on overseas core lists (43, 45, 118, 114). Therefore it is self evident that

* This is perhaps an over-simplification, because journals with the frequency of two loans or even one loan have been omitted from these two lists, yet have quite an effect when merged together into a composite sample (compare List 4 and Table 3 in which this merging has been done). In fact, only 11 titles out of 64 titles in the composite sample have not appeared in either the first or second ranking lists, which indicates that over 80% of titles are common to both samples.

that except to derive an indication of a half dozen or so more relevant titles, a sample of around 600 loans is too small for any deductions about a core list or to derive ranks of most used journals.

To obtain any ranking of journals of some use, a much larger sample is needed, in fact a full three months usage population $N = 3\ 833$ in this case should give solid results. A composite sample of 1 276 articles, which is one-third of 3 833 articles requested goes only partly towards such a goal.

6.4 Comparison of core lists

The list of most frequently used titles obtained from the composite sample has been compared for similarity with seven overseas and one Australian list. The results are in terms of percentages, rather than comparing title by title.

In summary it can be said that 38 titles (or close to 60%) out of 63 most used titles can be found in some other ranking listing. A breakdown gives the following results:

26 titles appeared in no list

18 titles appeared in one or two lists only

20 titles appeared in more than three lists.

A further breakdown appears in the following table.

Expected page number is not in the original print copy. pages 61-63

The fact that nine of the eleven top journal titles with the frequency of seven articles and more are all to be found also in overseas lists is also quite indicative that the same titles that are well used overseas, are also well used by many Australian biomedical libraries. This aspect can be better observed in the following table.

TABLE 6

Frequency listing of biomedical journals in overseas lists

Total No. of titles	With frequency of	Titles listed in other lists	No. of times listed	Not listed
24	4	12	34	12
19	5	12	31	7
10	6	5	27	5
4	7	3	8	1
2	8	1	2	1
1	10	1	1	-
2	12	2	11	-
2	13	2	11	-
64	4-13	38	125	26

The average listing is 3.3 per title but the four top titles in the 3BML list are listed an average of 5.5 times:

Medical Journal of Australia	- 6 times
New England Journal of Medicine	- 5 times
J. of the American Medicine Association	- 7 times
Clinica Chimica Acta	- 4 times.

Expected page number is not in the original print copy(65,66).

6.5 Australian titles in the survey

In the research proposal, it was indicated that Australian and New Zealand titles would be lumped together as many indeed are published on behalf of or for the health professionals in both countries.

One assumption of the research project was that Australian titles, though not prominent on overseas core lists, would appear, at least in the case of some better known local biomedical journals, more prominent in this study. The underlying intuition being that local literature, being of more immediate need and also available at less cost and delay, would be more frequently used.

The results as tabulated here below, do not indicate that this is so.

But let the results speak for themselves.

In the first sample of 638 loans, only 26 transactions for Australian biomedical literature were found, which expressed in percentage is 4.1% of the sample.

In the second sample of 638 loans, 28 transactions were attributed to ANZ titles or 4.4% of the sample.

When the two samples were merged, we have 54 transactions or 4.22% of the sample. This result is naturally subject to sampling errors.*

* Sampling errors for articles from ANZ journal titles have already been calculated at page 28.

Expected page number is not in the original print copy.

TABLE 7CComposite sample of 54

<u>Frequency per title</u>	<u>No. of titles</u>	<u>No. of Articles</u>	<u>Cum. No. of Articles</u>	<u>% of Articles</u>
13	1	13	13	24%
4	2	8	21	15%
3	1	3	24	5%
2	5	10	34	18.5%
1	20	20	54	37%
Total	<u>29</u>	<u>54</u>		

LIST 5Ranking of the journals and
number of articles

Medical Journal of Australia	13
NZ Medical Journal	4
Australasian Nurses Journal	4
Hosp. and Health Services Adminis.	3
Ecological Soc. of Australia Proc.	2
Australian Bird Watcher	2
Modern Medicine of Australia	2
Australian Journal of Experimental Biology and Medicine	2
ANZ Journal of Psychiatry	2

Except for the M.J.A., the NZ Medical Journal or the Australasian Nurses Journal which appear both in sample number 1 and sample number 2 all other titles seem to have come into the ranking lists purely by chance.

6.6 Comparison of Australian titles with overseas titles

When the above results, especially from the composite frequencies and ranking list are compared with the frequencies and ranks of overseas titles, we find that except for the Medical Journal of Australia which shares rank number 1 with the New England Journal of Medicine, no other ANZ title is among the top 39 journals.

The Australasian Nurses Journal and the NZ Medical Journal share the fortieth place with some 22 other overseas journals with a frequency of four loans each.

And when overseas titles are compared with Australian titles in groups of frequencies as tabulated in Table 8 here below we seem to have just the opposite effect than prominence.

TABLE 8

Frequency proportion of Australian titles compared to overseas titles

Frequency of loan per title	No. of titles		% of titles	
	<u>Overseas</u>	<u>Australian</u>	<u>Overseas</u>	<u>Australian</u>
1	418	20	61.3%	69.0%
2	141	5	20.7%	18.2%
3 and more	123	4	18.0%	13.8%

If we compare in a similar way the transactions the following results are obtained:

TABLE 9

Proportion of requests per Australian item compared to overseas items

<u>Frequency of loan per title</u>	<u>No. of loans</u> <u>Overseas - Australian</u>		<u>% of loans</u> <u>Overseas - Australian</u>	
1	418	20	34.2%	37.0%
2	242	10	19.8%	18.5%
3	562	24	46.0%	44.5%

The little difference between the popularity of Australian and overseas titles could easily be attributed to sampling errors, therefore it must be stated that Australian titles are no more prominent than overseas titles. Therefore the assumption that Australian titles are more prominent on the ranking list derived in this project is not proven, except for the Medical Journal of Australia which ranks equal first on the 3BML list. Though the MJA is listed in many overseas lists, its best ranking on these lists is 10th on the BLL/SINFDOC list.

6.7 Some analytical comments on Australian biomedical journal titles

The proportion of Australian biomedical periodical literature in other usage surveys is difficult if not impossible to assess.

Studies on its role are rather scarce, surveys not undertaken.

The only two citations of any relevance that I could find, is the work of Bower⁽⁴⁵⁾ who reported on the SINFDOC survey and an interim report of Cummings⁽¹⁵⁹⁾ which took the form of a feasibility study done for the National Library of Australia.

The SINFDOK survey unfortunately lumped together Australian and Asian scientific titles. The literature from Asia and Australasia constituted only 7% of titles used by BLL customers.

The result of my first sample indicates that if we lump together the two regions we obtain a usage figure of 5.7% composed of 4.1% of Australasian biomedical literature and 1.6% of Asian biomedical literature, exclusively Indian, Japanese and Israeli*. Naturally, with such low percentages one is aware of considerable sampling errors. To relate this survey's results to the SINFDOK results would be unwise, especially in view that in this survey only biomedical literature was studied, whilst in the SINFDOK survey the whole universe of scientific periodicals was dealt with. Dr Cummings on the other hand, while on his consulting job at the NLA was more concerned with the Australian output of scientific literature, which he estimates tentatively to be less than one per cent of the world output. He disputes strongly the often bartered STISEC/RACI⁽⁴⁶⁾ statement that 'Australia produces about 2% of the total world output of information in science and technology'. Cummings bases his lower estimate on the then available data of Australia's expenditure on scientific and technological information.

Be as it may be, neither Bower's nor Cummings' estimates can be compared meaningfully with this project, because in Bower's case a different scope and method is evident, with a much much larger sample, and because in Cummings' study, the figure quoted is published production and not customers or usage.

Nevertheless, both studies are indicative of the minor role played by Australian scientific literature. This indication seems to be supported by the result of my study.

Any estimates of Australian literature usage, if based only on interlibrary loans records are likely to be biased very strongly towards a low estimate of its use. It is expected or assumed that most local biomedical and health libraries would stock and subscribe to most Australian biomedical and health titles.

Therefore, to derive meaningful results and comparisons internal library usage would have to be considered. This does not deny Urquhart's law⁽⁴⁷⁾ that 'interlibrary loan demand for a periodical is as a rule a measure of its total use'. Our case may well be one of those exceptions he admits to be possible to his law.

It is evident from the analysis of obsolescence of the biomedical literature in Chapter 7 that even the little interlibrary use that libraries have for Australian biomedical periodicals, is skewed towards older citations.

Biomedical libraries in this country, many of which have been established or took off only in the last decade, seem to be well provided with the newer holdings but are scarce on older sets. When the odd need arises, they have to borrow the required articles from well established libraries.

CHAPTER 7 - OBSOLESCENCE OF BIOMEDICAL PERIODICALS

7.1 General considerations

One of the assumptions of this research was 'That a narrow range of major (or better known) biomedical journals can be identified (as having a longer half life) as not becoming obsolete as fast as the bulk of biomedical serials'.

Since it is agreed that:

'A mean or proportion calculated from a simple random sample is an unbiased estimator of the corresponding population parameter'* therefore the mean age of interlibrary loans has been derived simply by summing the age of each article** requested and then dividing it by n where n = the number of requests in the sample or in the sub-group of the 'sample'

$$M = \frac{\sum T}{n}$$

and where T stands for the date of publication for each article.

The results are presented here below (and in more detail in Tables No. 10 - 14 and Figure No. 2).

7.2 The mean life and the half life

In the first sample of 638 articles the following values have been obtained:

N = 637 (1 article with no date)

Mean life M = 1969.64 (8.02 years)

Standard deviations = 10.0477

Half life $\sum T_{\frac{1}{2}} = 5.56$ years

* Moser and Kalton, Magin, Keppell, etc.

** It is assumed, for the computation of the mean life that August 1977 constitutes the end of the publication period.

One standard error* of sample mean ± 0.398

In the composite sample of 1 276 articles (ten articles with no date) the following values have been obtained

$$N = 1\ 267$$

$$\text{Mean life } M = 1970.14 \text{ (7.4 years)}$$

$$\text{Standard deviation - } S = 9.83$$

$$\text{Half life } \mathcal{E}T_{\frac{1}{2}} = 5.12 \text{ years}$$

$$\text{One standard error of sample mean} = \pm 0.275$$

Other obsolescence results

When the mean age of less productive titles is compared with the mean of the more productive titles, the following results can be seen:

For the first sample of 638 articles (one article with no publication date)

Frequency of 1 or 2 loans per title

$$N = 464$$

$$M = 1\ 969.49 \text{ (8.16 years)}$$

$$\mathcal{E}T_{\frac{1}{2}} = 5.65 \text{ years}$$

$$s = 10.51$$

$$\text{One S.E.M.} = \pm 0.488$$

* Standards, errors of sample means have been calculated according to this formula $S\bar{x} = \frac{s}{\sqrt{N}}$. The standard deviation of the sample, has defined by the following equation:

$$S = \left\{ \frac{(d_1^2 + d_2^2 + \dots + d_n^2)}{n} \right\}^{\frac{1}{2}}$$

where $d_1 \dots d_n$ is defined simply as the difference between the individual 'readings' and the mean⁴⁸).

76.

Frequency of 3 or more loans per title:

$$N = 173$$

$$M = 1\,970.18 \text{ (7.48 years)}$$

$$E T_{\frac{1}{2}} = 5.18 \text{ years}$$

$$s = 10.37$$

$$1 \text{ S.E. of } M = 0.788$$

For sample of 1 276 loans

Frequency of 1-2 loans per title

$$n = 740$$

$$\text{Mean life} = 1\,969.86 \text{ (7.83 years)}$$

$$\text{Half life} = 5.43 \text{ years}$$

$$s = 10.68$$

$$1 \text{ S.E. of } M = \pm 0.392$$

Frequency of 3 or more loans per title

$$n = 526$$

$$\text{Mean life} = 1\,970.53 \text{ (7.13 years)}$$

$$\text{Half life} = 4.94 \text{ years}$$

$$s = 8.47$$

$$1 \text{ S.E. of } M = \pm 0.369$$

And to make things more sure, when the mean age of the top eleven titles with a production frequency of between 7 articles and thirteen articles each, has been computed we derive also a mean age which is well within the sampling errors (at any confidence level), namely

$$n = 104$$

$$M = 1\,970.68 \text{ (7.06 years)}$$

$$ET_{\frac{1}{2}} = 4.89 \text{ years}$$

$$s = 9.922$$

$$1 \text{ S.E. of } M = 0.97$$

Deductions

It can be seen from the above results that the values and minor differences obtained are subject or can be attributed to sampling errors.

In fact, it is shown that whatever difference there is between the mean age of high frequency* and low frequency titles this can be well accounted by sampling errors at the 68% confidence limits and quite comfortably at the 95% confidence limits. The little difference could have arisen by chance and is not statistically significant as resulted from a two tailed test between the means.

The probability of a difference this size or larger being observed, when in fact no difference exists, is greater than 0.2.

* It was assumed that the more productive titles are those that are also better known titles.

Discussion on resultsTABLE 10

Publication date broken down by frequency of loan

(VAR002 by VAR004)

Sample of 638

<u>Frequency of loan</u>	<u>Sum</u>	<u>Mean</u>	<u>Std Dev</u>	<u>Variance</u>	<u>N</u>
1-7	1254662.0000	1969.6421	10.0477	100.9566	(637)
1	646038.0000	1969.6280	10.9193	119.2313	(328)
2	267782.0000	1968.9853	9.4610	89.5109	(136)
3	181264.0000	1970.2609	7.7910	60.7004	(92)
4	70982.0000	1971.7222	5.7600	33.1778	(36)
5	39485.0000	1974.2500	2.8074	7.8816	(20)
6	35305.0000	1961.3889	15.6210	244.0163	(18)
7	13806.0000	1972.2857	5.8228	33.9048	(7)

It seems from Table 10 that, except for the titles with a frequency of six articles each, the most frequently used titles are also those that are of most recent publication dates.

And even for the three titles with the frequency of six loans each (which includes the MJA, JAMA and Clinica Chimica Acta), we can see that sampling errors could account for the low mean age of 1961.389. In fact, at the 95% confidence levels, the mean age could be 1961.3889 ± 7.36 years.

In fact, in the second sample* of 638 articles the above three journals give a mean age of 1970.526.

As we are dealing here with a minor sub-sample, of 18 articles only, the errors could be significantly high at any confidence limit.

This difference is even more evident, if we take the Medical Journal of Australia alone, which in the first sample gives six articles and a mean age of 1949.166, but in the second sample its seven loans give a mean age of 1972.428, a difference of over 23 years in its mean age. The mean ages of JAMA and Clinica Chimica Acta are more stable: 1959.333 and 1963.166 for JAMA and 1975.50 and 1975.666 for Clinica Chimica Acta.

The large variance in frequency 6 (Table 10) and partly also its low mean age can be attributed thus to the Medical Journal of Australia.

Conclusion on obsolescence

From the above evidence, it can be concluded that the research assumption, 'that the better known biomedical journals have a longer half life' has not been proven in fact it was proved that

* In the second sample, which was sorted and computed manually, only the above 3 mentioned journals have been treated separately. The second sample has been merged with the first sample to make the composite sample of 1 276 loans, in which only frequencies 1 and 2 and 3 - 13 have been analysed separately.

there is no evidence for a difference between the mean age of low frequency journals and the mean age of high frequency journals.

7.3 Tabulation of obsolescence data

For purposes of comparison with other studies and in order to find out what is the active life of biomedical literature, the data has been tabulated in descending and ascending order of age as suggested by Donohue⁽⁴⁹⁾: 'Intervals of five years were used to remove the effects of fluctuations within smaller intervals, because these fluctuations were not considered significant in the overall time span' of 100 years.

For the first sample of 637, the tabulations were computed by the SPSS programme, whilst for the second sample, the tabulation was done manually, but for many less variables and with no cross-tabulations.

Results:

From Tables 10-12 and figures 1-3 it can be seen that about 75% of use is concentrated in the latest 15 years out of a time span of 100 years. Between 93% and 95% of use can be attributed to the latest 25 years of publishing.

It can be seen also, that there is no difference in percentages between the first sample of 638 and the composite sample of 1 276,

or rather that the little difference can be well accounted by sampling errors*.

* And though a sample of about 600 articles does not satisfy criteria for frequency and scatter analysis of journal titles, neither was in this case adequate to obtain a Bradford distribution for frequency analysis, the sample was nevertheless adequate to obtain indicative results of obsolescence patterns, a fact which agrees with Brookes' contention that a minimum sample of 580 articles is needed to obtain any meaningful results on aging of periodicals.

TABLE 11

First sample of 638

Number of requests according to age of
requested articles

<u>Publication</u> <u>date</u>	<u>Maximum age</u> <u>of articles</u>	<u>No. of</u> <u>requests</u>	<u>Bradford's</u> <u>constant</u> <u>B_m</u>	<u>% of</u> <u>requests</u>	<u>Cumulative</u> <u>% of</u> <u>requests</u>
1973 - 1977	5	351	2.85	55.10	55.10
1968 - 1972	10	123	2.12	19.31	74.41
1963 - 1967	15	58	1.81	9.10	83.51
1958 - 1962	20	32	0.94	5.02	88.53
1953 - 1957	25	34	2.12	5.34	93.87
1948 - 1952	30	16	1.60	2.51	96.38
1943 - 1947	35	10	2.50	1.57	97.95
1938 - 1942	40	4	-	0.63	98.58
Before 1938	41-100	9	-	1.41	99.99
Totals		637*	1.99**		

* One article with no date

** In Morton's study the B_m = 2.13. See also footnote on next page!

TABLE 12

Composite sample

<u>Number of requests according to age of</u>					
<u>requested articles (1)</u>					
<u>Publication</u> <u>date</u>	<u>Maximum age</u> <u>of articles</u>	<u>No. of</u> <u>request</u>	<u>Bradford's</u> <u>constant*</u>	<u>% of</u> <u>request</u>	<u>Cumulative</u> <u>% of</u> <u>requests</u>
1973 - 1977	5	724	2.95	57.14	57.14
1968 - 1972	10	275	2.01	19.34	76.48
1963 - 1967	15	122	2.03	9.63	86.11
1958 - 1962	20	60	1.30	4.74	90.85
1953 - 1957	25	46	1.59	3.63	94.48
1948 - 1952	30	29	1.81	2.29	96.77
1943 - 1947	35	16	2.00	1.26	98.03
1938 - 1942	40	8	-	0.63	98.66
Before 1938	41-100	17	-	1.34	100.00
Totals		1 267**	1.96 average	100.00	

** Nine articles without date

* The Bradford constant which describes the approximate geometric series characteristic of the Bradford's Law is expressed often symbolically: as bm by Goffman and Warren (p. 1206) and also by Donohue (p. 16), as k by Brookes (Ref. 13, p. 258) and by Drott and Griffiths (p. 238) and as n by Goffman and Morris (p. 923). I found the explanations of the constant given by Donohue (p. 16) and Drott and Griffiths (p. 238) as the most concise and simple.

TABLE 13

Composite sample of 1 267 articles*

<u>Numbers of requests according to age of</u> <u>requested articles (2)</u>						
<u>Publication</u> <u>date</u>	<u>Maximum</u> <u>age of</u> <u>articles</u> <u>(years)</u>	<u>No. of</u> <u>re-</u> <u>quests</u>	<u>% of</u> <u>requests</u>	<u>Cum. No.</u> <u>of</u> <u>requests</u>	<u>Cum. %</u> <u>of</u> <u>requests</u>	<u>Brad-</u> <u>ford</u> <u>con-</u> <u>stant*</u>
Before 1900	100	3	0.24	3	0.24	-
1901 - 1922	77	4	0.31	7	0.55	-
1923 - 1927	55	3	0.24	10	0.79	-
1928 - 1932	50	3	0.24	13	1.03	-
1933 - 1937	45	4	0.31	17	1.34	-
1938 - 1942	40	8	0.63	25	1.97	-
1943 - 1947	35	16	1.26	41	3.28	2.00
1948 - 1952	30	29	2.29	70	5.52	1.81
1953 - 1957	27	46	3.63	116	9.15	1.59
1958 - 1962	20	60	4.74	176	13.89	1.30
1963 - 1967	15	122	9.63	298	23.52	2.03
1968 - 1972	10	245	19.34	543	42.85	2.01
1973 - 1977	5	<u>724</u>	<u>57.14</u>	1 267	100.00	<u>2.95</u>
Totals		1 267	100.00		Average 1.96	

It could be noticed that in this table the publication dates starts from the earliest articles and that articles pertaining to the period previous to 1938 have not been summarized. The results obtained are still the same as in Table 12.

* The Bradford constant has been calculated only for periods having more than 1% of the relative number of requests.

Figure No.1

Age of Requested Articles
(Exponential Curve)

N = 637 - First Sample

According to data on Table 12, but in
ascending order.

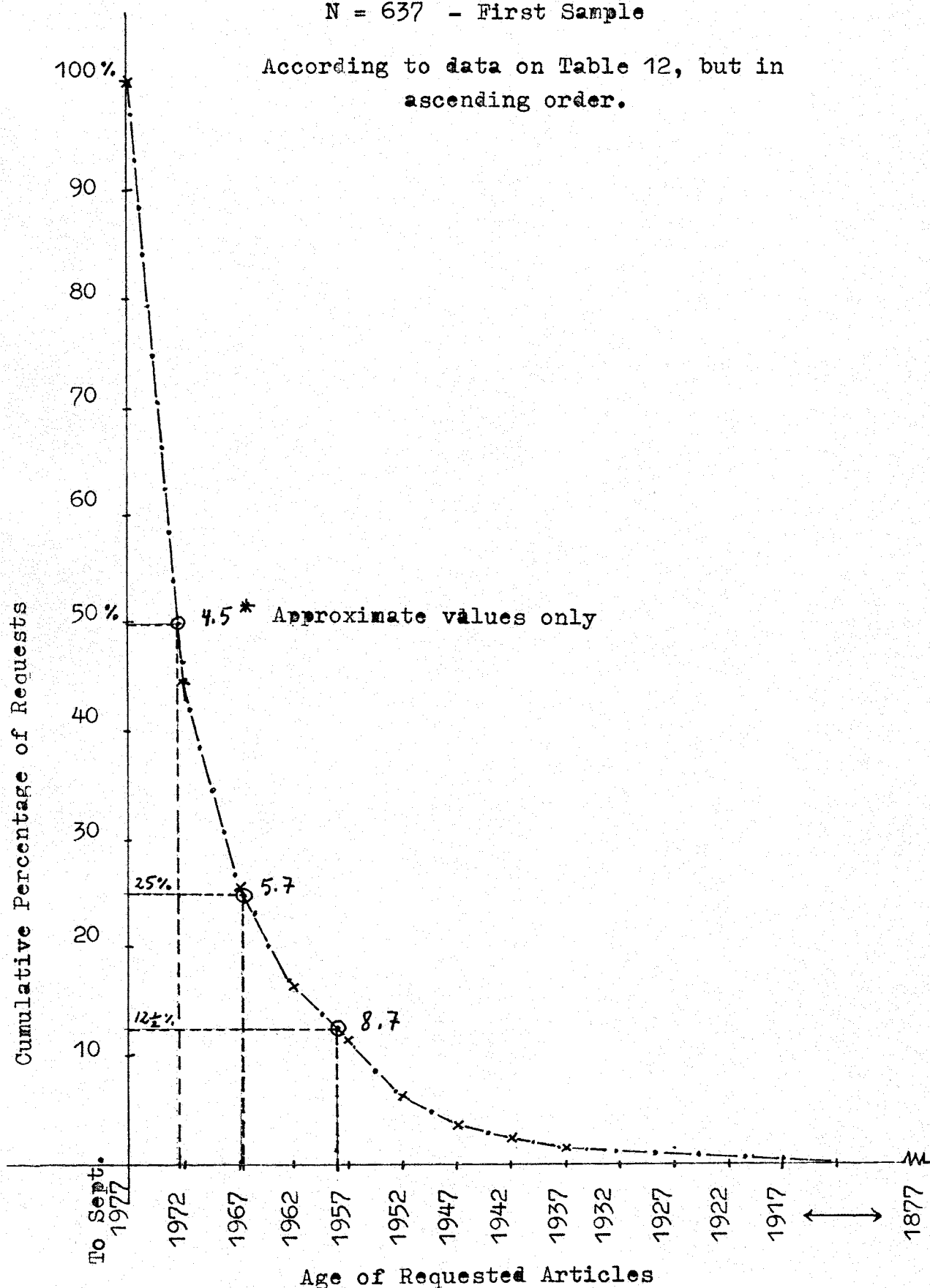
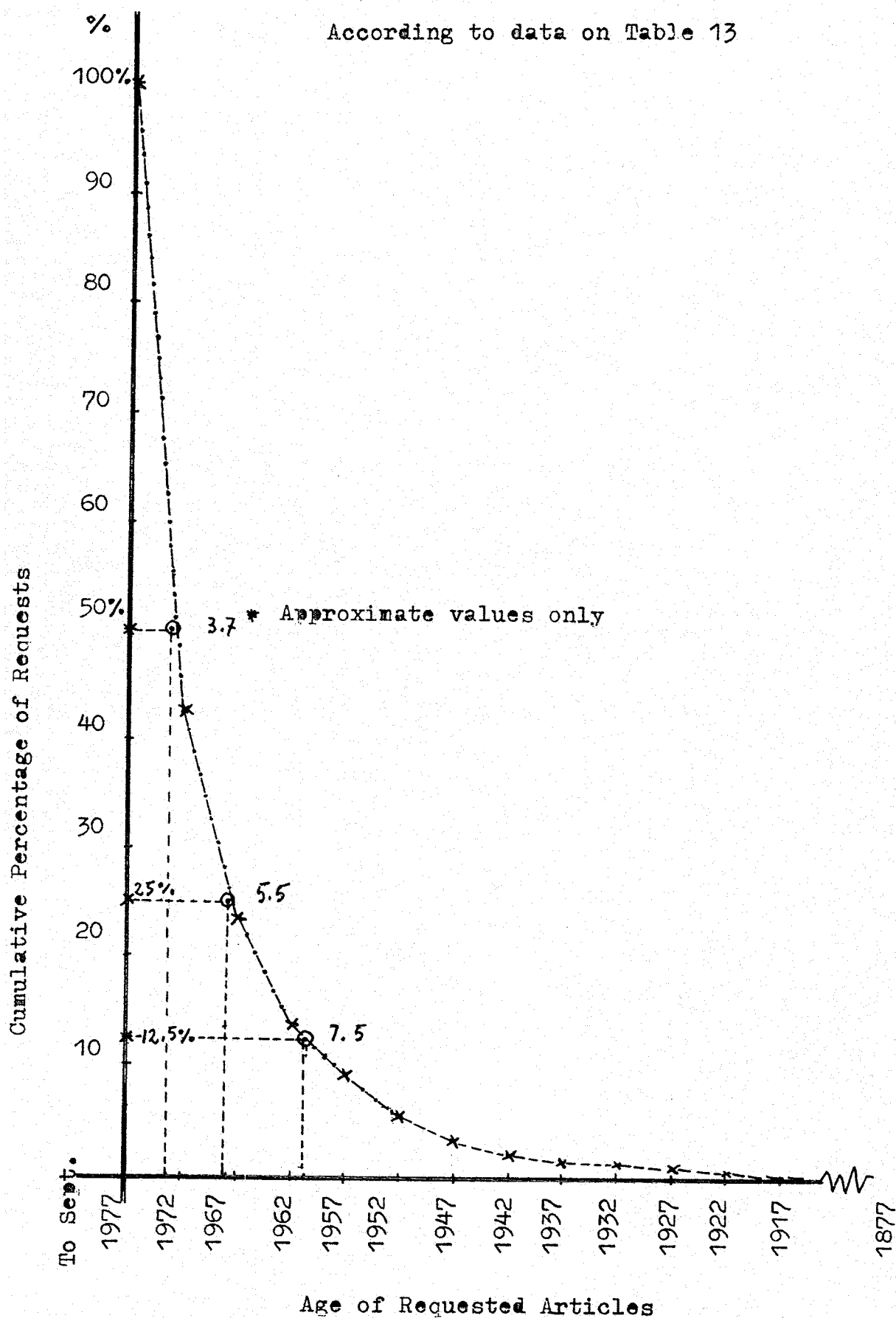


Figure No.2

Age of Requested Articles
(Exponential Curve)

N = 1267 - Composite Sample.

According to data on Table 13



7.4 Discussion on obsolescence patterns

The exponential and linear curves of obsolescence

The aging patterns of the biomedical literature in this survey seems to behave in a very regular manner. In fact linear or exponential curves can be derived graphically and half lives can be computed within half a year of accuracy. From the points on the curve (see Figures 1 and 2) it can be noticed that the half life differs considerably along the exponentive curve, an effect noticed already by Burton and Kebler⁽⁵⁰⁾ which they suggested may be due to different aging patterns of 'distinct types of literature' within a main literature. Presumably, they say, 'the classic literature has a relatively longer half life than the so-called ephemeral literature'. Cho⁽⁵¹⁾ also gives some evidence that 'literature in the older periodicals decays more slowly than does that in the newer periodicals, implying that literature in a well-established, reputable journal is cited more frequently and over a longer period than in a newer journal. Further, citation patterns of literature in the newer or more recent periodicals seem to be erratic'.

Brookes⁽⁵²⁾ suggests that in assessing obsolescence patterns, we should expect some deviation from the expected smooth 'decline'. He further says that 'whether such deviations are random sampling fluctuations or whether they represent true characteristics of the aging patterns of this periodical can be decided only by taking further samples of citations from the periodical to see whether they are always repeated' and that 'In view of the sampling variance and other difficulties arising in the measurement of

obsolescence, it would be unrealistic to rely on any measure being more precise than 'correct to 10%'. It is important to ensure that the sample is unbiased, that all work is under statistical control, and that the possible statistical sampling errors of any published empirical results are emphasised rather than ignored'.

I believe that Brookes' suggestions are valid not only for citation studies but also for usage surveys. In fact, Brookes himself states in the very same article that 'Only records of actual usage and direct reference could hope to give reliable estimates of what can be discarded and then only when relatively large samples of data have been assembled. Even the special library devoted to some area of fast-developing scientific research will have its own unique blend of immediate and historic interest'.

Convinced that the smooth exponential decline is evident from the graphical representation (Figures 1 and 2) no attempt to fit the exponential curve has been done. The linear progression as ascertained from the data has been fitted in Figure 3.

The linear fit suggests that the Bradford's law is applicable also to the obsolescence data in this survey. As can be noticed from the superimposed Morton's graph the linear fit is very similar to that of Morton's study. There is no evidence of an initial saturation effect nor of a significant tapering off, which may all indicate that the size of the sample, while vaguely

approaching adequate size, is still too small to bring in all titles in the population.

It is also evident in Figure 3 that the scatter pattern is wider in regard to age as compared to the Morton study. Morton analysed 4,368 requests and of these only less than 0.5% were for articles published before 1930 and none before 1901. In our case about 1% belong before 1930 of which 0.24% before 1901. As we are dealing in my case with a small sample really, even a 0.5% difference would be noticed evidently on an age scale.

Age of Requested articles
(linear fit)
From data on Table 14

DONALD J. MORTON

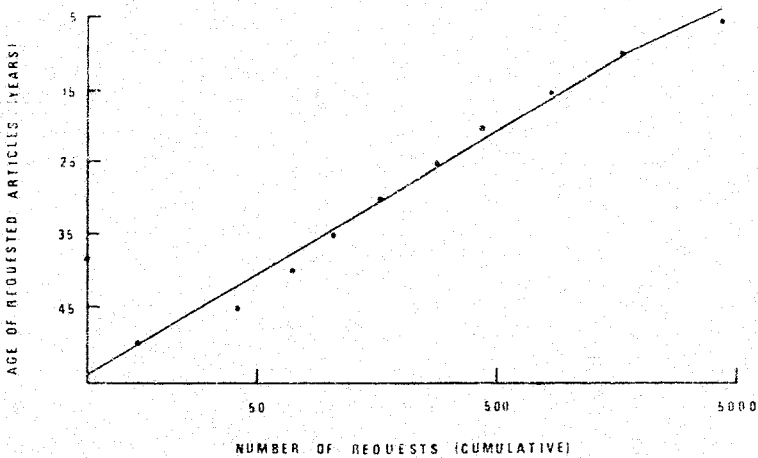
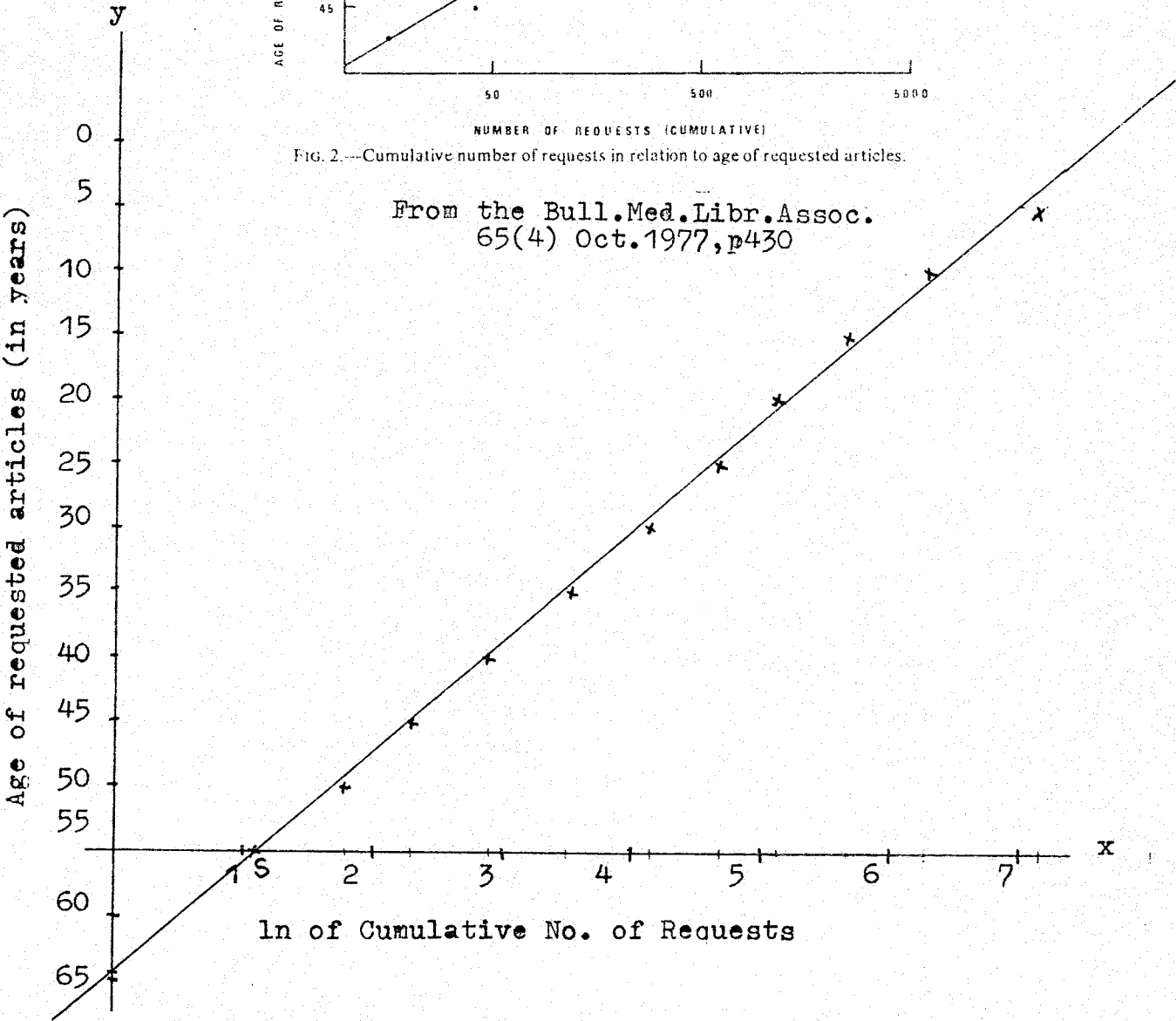


FIG. 2---Cumulative number of requests in relation to age of requested articles.

From the Bull.Med.Libr.Assoc.
65(4) Oct.1977,p430



7.5 The methodology of obsolescence

The linear fit

The linear fit was obtained and graphed from the following table:

TABLE 14

Relative and cumulative age of requests

<u>Years since publication</u>	<u>Relative No. of requests</u>	<u>Cumulative No. of requests</u>	<u>Cumulative % of requests</u>	<u>ln of Cumulative No. of requests</u>
Y		X		X
55	3	3	0.24	1.09
50	3	6	0.48	1.79
45	4	10	0.79	2.30
40	8	18	1.43	2.89
35	16	34	2.70	3.52
30	29	63	5.00	4.14
25	46	109	8.65	4.68
20	60	169	13.41	5.13
15	122	291	23.09	5.67
10	245	536	42.54	6.28
5	724	1 260*	100.00	7.14

* Publications older than 55 years were omitted in this table in order to compare my data with Morton's study. As it is only 7 articles or less than 1%, this omission has no effect on the results.

Using a linear regression, the line of best fit was determined by the least square method*!

with $y = 8.56x + 64.65$ years

and with a coefficient of determination $r^2 = 0.996$

We understand that the closer the value for r^2 is to 1, the better the fit. The high r^2 indicates that the fit is good and that the data does indeed follow an exponential pattern. However this does not constitute a formal test of the hypothesis.

The half life

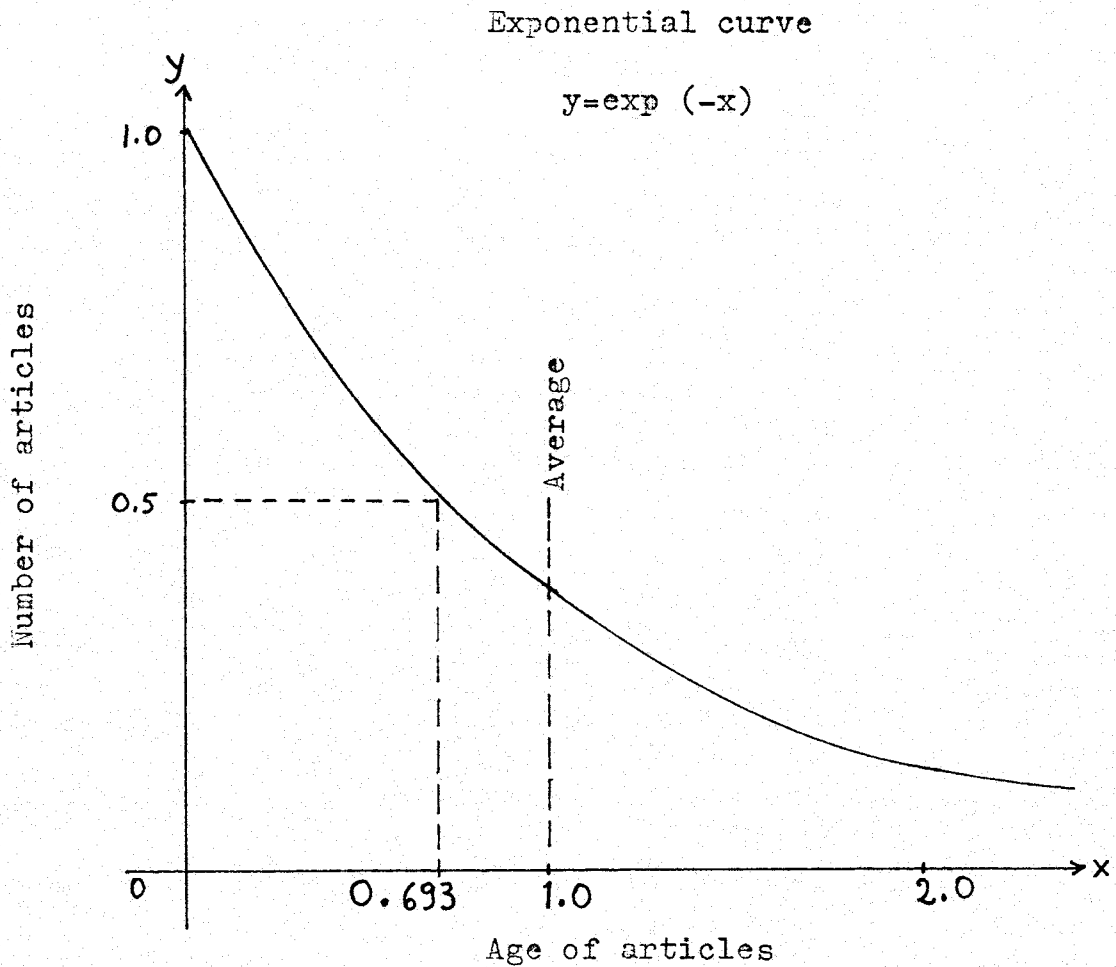
Half life in this survey is defined as the time during which half of the active articles (requested on interlibrary loan during the survey period) have been published.

It can be derived from the nature of the exponential curve where

$$y = \exp(-x)$$

as explained more concisely on the next page:

* I am indebted here to Fred Pribac, Applied Maths student at the A.N.U., who derived the fit with the use of HP-25 Applications Program (pp 87 - 89).

Figure 4

If the number of requests, y , was related to the age of the article, x , by

$$y = \exp(-x)$$

then the average age of articles requested would be 1.

We want the time during which half the active articles were published, i.e.

$$\int_0^t \exp(-x) = \exp(-t) = \frac{1}{2}$$

$$\therefore t = \ln 2 \approx .693$$

So if the average age is 1 the half life is .693, i.e. half life = .693 x average age.

The problem of estimating the half life is the problem of estimating the average. It is generally accepted that the sample average is the best estimate of the average for an exponential distribution.

This method of estimation of the half life is valid when the data follows an exponential distribution, which seems to be so in our case. A safer way of estimating would be counting back until one finds 50% of the productivity, starting naturally from an agreed starting point (compare Figures 1 and 2!).

7.6 Implications of the half life patterns on collections management

I am aware of Line's objection to librarians who base their decision, for keeping or discarding journals, on the half life of the body of the literature. Line⁽⁵³⁾ says that 'What librarians need to know is how long they need to keep individual journals. For this, item half life figures for each of the journals are ideally required. Any general statistical pattern discovered in the use of literature and libraries is of very limited use in practical situations; at best, such patterns can serve only as a background against which policies can be framed'.

Brookes⁽⁵⁴⁾ mirrors the same attitude when he states that 'it has hitherto been deemed sufficient to measure the half life of the literature of some particular subject and then to apply this measure equally to any periodical that contributes to that subject.

These periodicals are thus discarded when they reach the same critical age. This crude "straight-cut" method is wasteful'.

Nevertheless, librarians must have some understanding and awareness that literature, like everything in the life of mankind, does become old, obsolete, less used or even unusable. They must base their awareness on empirical proofs and methods. This research project contributes a few ideas or at least some tools towards such an understanding.

As Kraft and Polaczek⁽⁵⁵⁾ have said: 'obsolescence is a counter to the growth factor in that it is a damping force decreasing the size of a body of relevant literature over time'.

Because Australian biomedical libraries are becoming more and more receptacles and conservators of obsolescent literature, it is time that this 'damping force' be studied and applied in the management of library collections.

It is up to the individual librarian or manager of a library system to decide what to keep and what to get rid of. He or she may have to consider other influences beside the 'obsolescency point' or half life, before trimming off what is less used or unusable. Space, processing and deselection costs, the level of performance that they want to achieve for their collections and customers ought to be genuine considerations before sets of journals are disposed of.

Chen⁽⁵⁶⁾ suggests that the 'point of obsolescence is to be found as a point after which less than 15% of all use occurs'. Cho⁽⁵⁷⁾ advocates also a point at the 85% occurrence of use. If we were to accept their suggestion, then 20 years would be quite adequate for keeping the biomedical periodical literature in the three libraries in this survey (see Table 12). Naturally, assuming that internal requests would show the same aging pattern as interlibrary requests. One is tempted to suggest that the obsolescence point could be as well set at the 90% or 95% level of occurrence of use, as this would add only another 5 or 10 years of keeping the sets, but then it would all depend on how pressed we are for shelving space and how quickly and cheaply we can obtain from other libraries a photocopy of an article we discarded previously.

7.7 Aging pattern of the scientific literatureTABLE 15

<u>Age patterns of scientific literature</u>				
<u>Comparison with other obsolescence studies</u>				
<u>Author and year of study</u>	<u>Other studies</u>		<u>This study</u>	
	<u>Age of articles</u>	<u>% of requests</u>	<u>% of request</u>	<u>Difference between %</u>
Bower, 1976 ⁽⁴⁵⁾	5 years	57	55	- 2
Chen, 1972 ⁽¹⁸⁾	10 years	74	74	0
Smiths, 1970 ⁽³⁶⁾	{ 5 years	75	55	-20
	{ 15 years	95	83	-12
Blaxter and Blaxter, 1973 ⁽¹³⁹⁾	25 years	95	94	- 1
Stangl and Kilgour, 1967 ⁽¹¹⁶⁾	22 years	90	92	+ 2
Wender-Instit, 1975 ⁽¹¹⁸⁾	5 years	85	55	-30
Wender-Proffes, 1975 ⁽¹¹⁸⁾	5 years	69	55	-14
Morton, 1977 ⁽⁴³⁾	{ 5 years	62	55	- 7
	{ 25 years	96	94	- 2

This comparison is interesting because the difference in percentages between this study and the overseas studies indicates that there is a time lag in the use of biomedical literature by the Australian borrowers who borrow from the JBM libraries.

Many reasons could be advanced for this behaviour, the foremost of which would be that the three months sample is too small to arrive at any specific conclusions. This lag or wider age scatter of use

would provide material for a deeper investigation (compare also Table 13 and Figure 3 - the linear fit!). Among the things to be looked for in such a study would be questions like these:

Are Australian biomedical researchers more conservative and dubious of the newer journals and latest articles, or are they slower in keeping up to date, because SDI services are poor, and biomedical libraries are oriented toward the classical journals and are also starved of funds, so they cannot buy or experiment with newer journals and current awareness services.

Although the tyranny of distance may have had marked effects 10 to 20 years ago, it has for all purposes disappeared as regarding the provision of journals. Delays can be counted in terms of months and not years anymore. Some journals arrive into Australia in a couple of weeks after publications if ordered airmail, very few after more than half a year after publication. In fact the trend is for libraries to place airmail subscriptions for what they consider to be key journals. This is the impression one makes when talking to librarians.

It would also be interesting to compare in a few years time whether the recent advent of Medlars services, the Lockheed/Dialog and Ausinet services would be an incentive towards the use of newer journals and up-to-date articles in the classical journals.

And lastly, the overseas studies would have to be looked at more carefully to find out the time span covered, the period during which data was collected and the methodology used.

7.8 Obsolescence patterns of Australasian journals

Because the difference between the age means of low frequency and high frequency titles was found not to be significant, a further breakdown procedure was done on the data in which the publication date was broken down by the place of publication. It was hoped that such a breakdown would provide another alternative to test obsolescence patterns.

The results are presented here below:

TABLE 16

Relation of publication date to place of publication

<u>Region</u>	<u>N</u>	<u>Sum</u>	<u>Mean age</u>	<u>Std. Dev.</u>
Entire population	637*	1254662.0000	1969.6421	10.0477
ANZ	26	51032.0000	1962.7692	14.8951
USA and Canada	375	738578.0000	1969.5413	9.4251
UK and Ireland	88	173356.0000	1969.9545	9.7426
Western Europe	112	220692.0000	1970.4643	11.4340
Eastern Europe	20	39455.0000	1972.7500	3.9984
Asia	10	19719.0000	1971.9000	7.7237
Others	6	11830.0000	1971.6667	6.9761

There was one missing case.

* See footnote next page.

TABLE 17

<u>Relation of publication date</u> <u>to place of publication</u>				
<u>Region</u>	<u>N</u>	<u>Sum</u>	<u>Mean</u>	<u>Std. Dev.</u>
ANZ	53	104171	1965.49	16.13
Others	1 214	2391996	1970.34	9.83 approx.

We may see from the two preceding tables (Tables 16 and 17) that Australian and New Zealand periodicals seem to have a longer mean life than overseas titles. Therefore sampling errors have to be ascertained, to see whether the difference is due to chance. At the 95% confidence level the composite sample of 53 ANZ articles gave a mean age of 1965.49 ± 4.4 years and the first sample of 26 loans gave a mean age of 1962.74 ± 5.84 years. It appears that the differences between the means of the Australian items and overseas items are not as great as apparent on first sight, because sampling errors could overlap the results.

* The first sample of 638 was done using the SPSS programme and seven basic regions have been coded and identified only. In the second sample, which was sorted manually, only transactions of ANZ title versus all other regions have been analysed and compared as there was already evidence from the first sample that there is a difference between the mean ages of these two groups.

Therefore it was decided to test the significance of the results. If the mean age of Australian articles borrowed on ILL was in fact identical or younger to the age of articles from the rest of the world, then the probability that the observed difference of ANZ materials being five years and seven years older on average having occurred by chance is less than 0.02 in the first instance and less than 0.01 in the second instance as determined by a one tailed T test.

How does one explain this difference? Is Australian biomedical literature more valued by library customers because it contains relevant data from our immediate and long past? Or is the difference due to the poorness of the collections in the newer biomedical libraries? Or does the reason lie somewhere in-between the two alternatives just indicated? And how reliable is a sample of 26 articles or even 53 articles? This again is an area where this research project has uncovered more questions than findings.

CHAPTER 8 - OTHER USEFUL RESULTS

8.1 General considerations

As mentioned on page 18 the methodology of this project is designed in a manner that allows for a wide number of variables to be analysed and compared, besides researching the main assumptions as defined on page 15.

This seems to be sensible, because when one embarks on a study of interlibrary loans, it is as well that the whole relationship of the lending and borrowing processes and agents is compared.

While this project does not presume to research all of these variables and relationships, but only those assumptions as were set in the original plan, it is nevertheless useful to present the other results with a minimum of comment or analysis.

And when one does just that, there is always the danger of being carried away, of presenting too much, of suggesting hasty though tentative conclusions and perhaps of seeing relationship, where possibly none exist.

But if, on the other hand, these secondary results will instigate some further research or at least record certain relationships, without exploring them fully, I think a useful exercise has been attempted and recorded.

These subsidiary or secondary results are presented in graphic and tabular form on the next few pages:

- 8.2 The three biomedical lending libraries, breakdown by number of articles and titles.
- 8.3 Location of borrowing libraries and relationship to the lending libraries.
- 8.4 Type of borrowing institutions.
- 8.5 Region of publication of the biomedical titles in the survey, breakdown by number of titles and articles.
- 8.6 Effect of increase of sample size on frequencies.
- 8.7 Bradford's Law and its application in this project.

8.2

TABLE 18The three lending librariesBreakdown by number of titles and articlesFirst sample of 638

<u>Library</u>	<u>No. of articles</u>	<u>No. of titles</u>	<u>% articles</u>	<u>% titles</u>	<u>Average article per title</u>
Monash	234	163	36.7	36.6	1.43
UNSW	241	184	37.8	40.9	1.32
Federal Health	<u>163</u>	<u>100</u>	<u>25.5</u>	<u>22.5</u>	<u>1.63</u>
Total	638	445	100.00	100.00	1.43

Comments: In this table one can notice especially the low average number of articles per title in requests to the University of New South Wales Medical Library. It could be due on one hand to their policy of not lending out of N.S.W. those titles held by ANSTEL, the core titles, on the other hand their journal collection is rather large and the above title scatter may reflect the width of their journal collection.

8.3

TABLE 19Location of borrowing librariesFirst sample of 638 articles

<u>State or region</u>	<u>No. of articles</u>	<u>Percentage of articles</u>
Overseas	17	2.7
ACT	92	14.4
Northern Territory	18	2.8
Victoria	174	27.3
New South Wales	248	38.9
Queensland	37	5.8
South Australia	15	2.4
Western Australia	15	2.4
Tasmania	22	3.4
Total	638	100.0

Comments: Table 19 does indicate that libraries within a region tend to borrow in that region.

It can be noticed, again this time if Table 18 and Table 19 are compared, that the UNSW biomedical library lending percentage of 37.8 is very close to the borrowing percentage for that State - 38.9% - while in the case of both the Monash University Biomedical Library and the Federal Health Department Library, approximately one-third of requests come from other States.

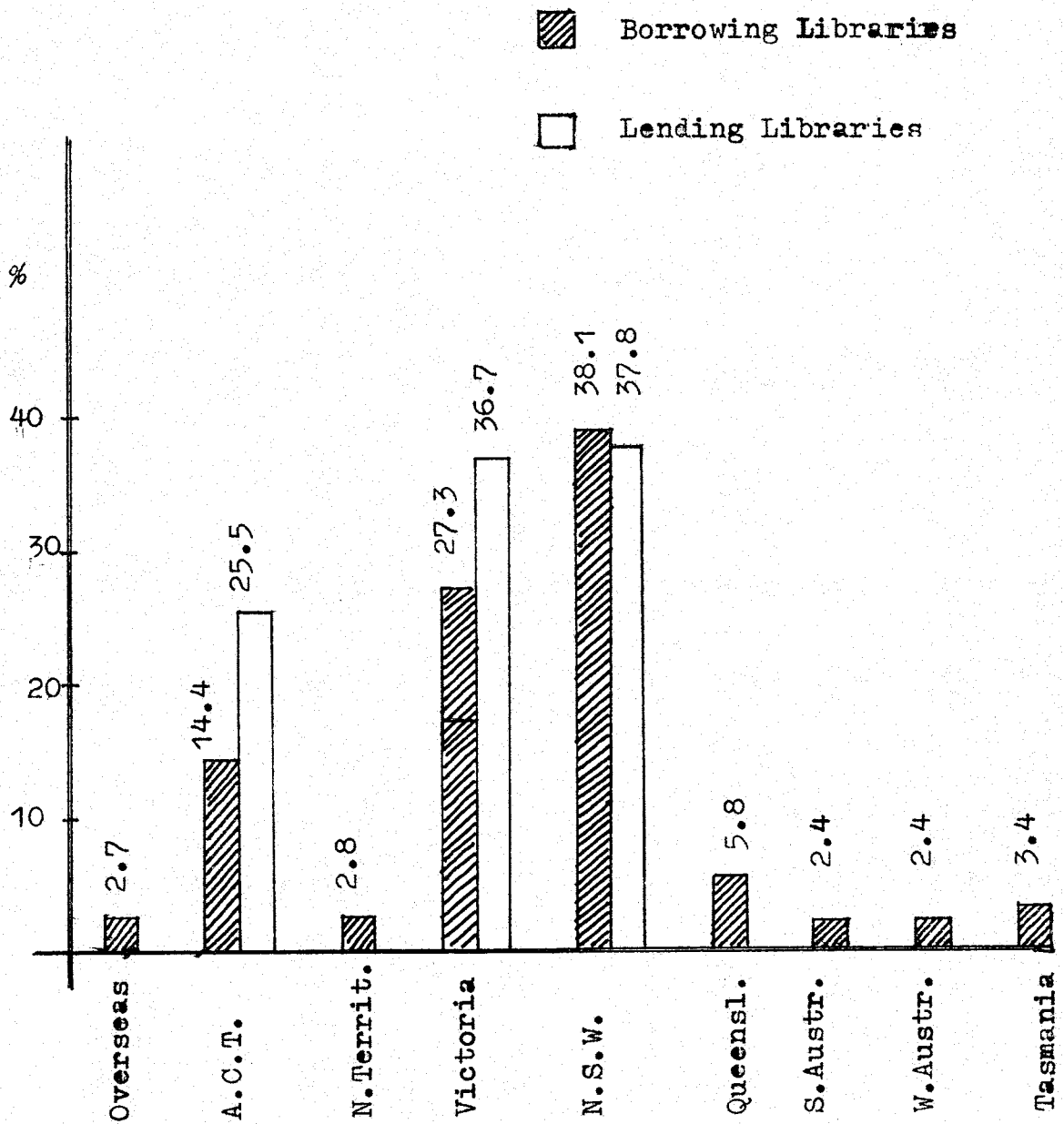
But considering the overall small percentage of requests from the other States, one can assume that local libraries tend to borrow from each

other as Franki has discovered⁽⁸⁾ or from major biomedical libraries in their region. It seems that only 'residual filtered demand' (see p,22) is then forwarded interstate or overseas.

The 2.7% of overseas requests were mainly from three areas, namely New Zealand, Papua and New Guinea and Malaysia.

Figure 5

Location of borrowing and lending
libraries
(Sample of 638)



8.4

TABLE 20

Type of borrowing library and
titles preference

First sample of 638

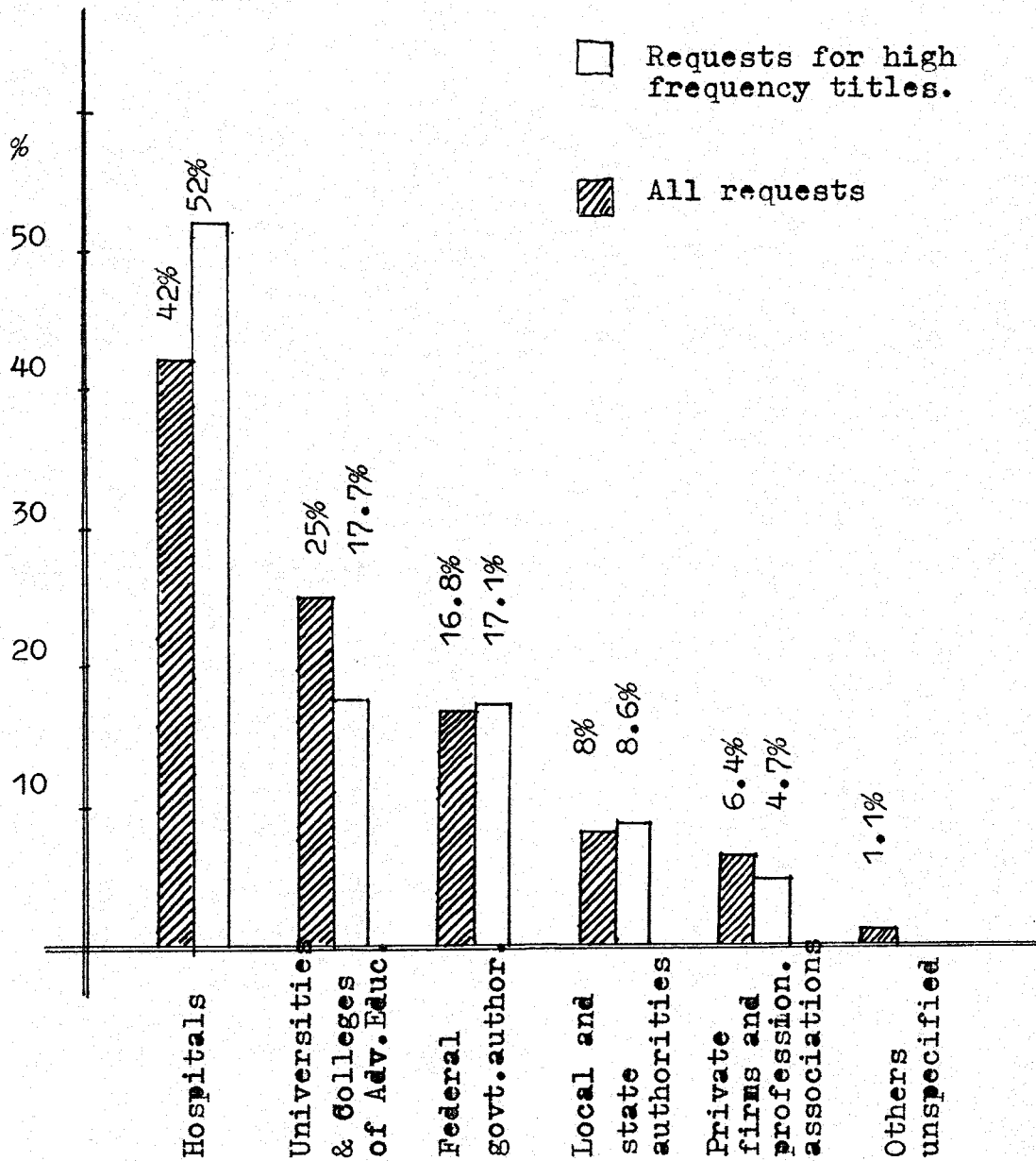
<u>Type of library</u>	<u>All titles</u>		<u>High frequency titles**</u>	
	<u>No. of articles</u>	<u>% of articles</u>	<u>No. of articles</u>	<u>% of articles</u>
Hospitals	268	42.0	91	52.0
Tertiary Institutions	163	25.5	31	17.7
Federal Authorities	107	16.8	30	17.1
State and Local				
Authorities	51	8.0	15	8.6
Firms and Societies	41	6.4	8	4.7
Survey* Libraries	7	1.1	-	-
Other Users	1	0.2	-	-
Total	638	100.0	175	100.0

* Very little exchange goes on between the three lending libraries
(Monash, UNSW and Federal Health).

** Frequency of three articles or more.

Figure No.6

Types of Borrowing Institutions & Requests
(Sample of 638)



Comments: In viewing critically Table 20 one could speculate that hospitals are the heaviest borrowers from the JBM libraries and that while there is no overall difference in the preference for high or low productivity journals between the types of libraries, there seems to be a case for further study on the predilection of hospital libraries for the more productive journals. Further sampling may indicate whether the 10% difference is due to sampling errors or to their poor collections.

Similarly, there seems to be a preference for borrowing low productivity journals on the part of tertiary institutions, either because they usually subscribe to the core journals or because they may need to borrow the more exotic or less used titles, e.g. they may need the occasional odd article from journals they don't hold.

8.5

TABLE 21

Region of publication of
the biomedical journals

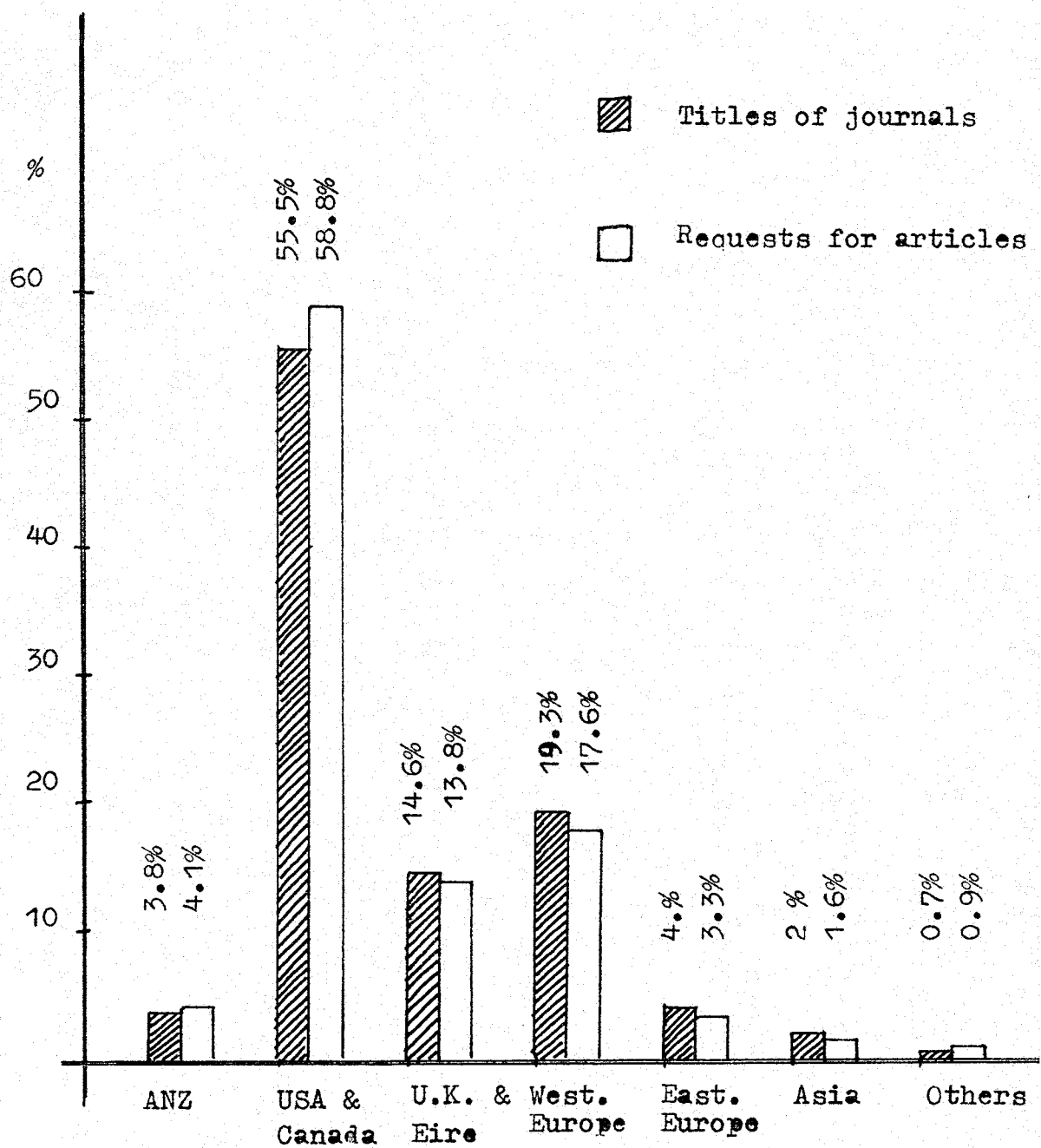
First sample of 638

<u>Region</u>	<u>No. of titles</u>	<u>% of titles</u>	<u>No. of articles</u>	<u>% of articles</u>	<u>Average no. of articles per title</u>
Australasia	17	3.8	26	4.1	1.53
USA and Canada	247	55.5	375	58.8	1.52
British Isles	65	14.6	88	13.8	1.35
W. Europe	86	19.3	112	17.6	1.30
E. Europe	18	4.0	21	3.3	1.17
Asia	9	2.0	10	1.6	1.11
Other regions	<u>3</u>	<u>0.7</u>	<u>6*</u>	<u>0.9</u>	<u>2.00*</u>
Totals	445	100.0	638	100.0	1.43

* The South African Medical Journal with four articles accounts for this high average.

Figure No.7

Country of publication
Breakdown by title and requests
(Sample of 638)



Comments: It is interesting to note in the above table the high percentage of U.S. and Canadian publications and the slight preference for Western European biomedical journals instead of British journals*. It could be that this sample reflects the size of biomedical publishing in the different regions. But it may also reflect the Australian preference for journals published in the English language, a phenomenon now well accepted in Western European countries.

In this context, one may also consider Chen's statement that 'English journals which are heavily and frequently abstracted and cited, are usually also heavily used'. Thus, frequency of use is a function of available abstracts and citations and also of linguistic expertise and the availability of adequate and fast translation facilities. Could this preference for English written biomedical journals be also a function of access to those journals, their immediate availability? A case for further study might also be the seemingly higher average of use per title of USA, Canadian and Australian journals.

Naturally, sampling errors at the 95% or 68% confidence levels could well account for the seeming differences and preferences.

* This argument can be seen also in conjunction with another assumption (stated more clearly on p. 65) that most Australian biomedical libraries seem to subscribe to the major British titles and therefore do not need to borrow them.

8.6

TABLE 22Effects of increase of sample size on frequencies

<u>Frequency per title</u>	<u>First sample of 638</u>				<u>Composite sample of 1 276</u>			
	<u>Titles</u>		<u>Articles</u>		<u>Titles</u>		<u>Articles</u>	
	<u>Number</u>	<u>%</u>	<u>Number</u>	<u>%</u>	<u>Number</u>	<u>%</u>	<u>Number</u>	<u>%</u>
1	328	73.9	328	51.4	438	61.6	428	34.3
2	68	15.3	136	21.3	146	20.5	292	22.9
3	31	7.0	93	14.6	62	8.7	186	14.6
4	9	2.0	36	5.6	24	3.4	96	7.5
5	4	0.9	20	3.1	20	2.8	100	7.8
6	3	0.7	18	2.8	10	1.4	60	4.7
7	1	0.2	7	1.1	4	0.6	28	2.2
8					2	0.28	16	1.2
9					-	-	-	-
10					1	0.14	10	0.9
11					-	-	-	-
12					2	0.28	24	1.9
13					2	0.28	26	2.0
Totals	444	100.0	638	100.0	711	100.0	1 276	100.0
Increase					+ 267		+ 638	

Average loans per title:

Sample of 638

1.4

Sample of 1 276

1.8

When a check random sample of about 300 loans has been taken, tabulated and compared with the two samples in the above table, we observe an interesting bibliometric phenomenon. The samples seem to follow a geometric progression pattern in regard to the average number of loans per title with increase in sample size, i.e. 1.2; 1.4; 1.8; and a geometric regression pattern in regard to the increase of new titles with the increase of the sample, i.e. 1.8; 1.6; etc. A geometric regression pattern can be observed also in the increase of titles with frequency one, e.g. 1.5; 1.3. This is only an interesting curiosity and more research would be needed to clarify this phenomenon. One could also speculate about the effect that saturation of titles would produce. Only further studies and a good understanding of mathematical patterns in frequency distribution may explain this bibliometric curiosity. It may well be the same case as for the Bradford's Law, for which Drott and Griffiths have deduced a 'basic probabilistic mechanism explaining the mathematical regularities',⁽¹⁶¹⁾.

Williams⁽⁵⁸⁾ has observed (if I understand him well) a similar pattern in the field of statistical biology and in the study of frequency distribution of words.

He maintains that: 'Where this is so, from the single formula one can deduce the frequency distribution of units in groups, the rate of increase of groups with increase in sample size (units); the number of groups with one unit; the approximate size of the most

abundant group; and also a measure of diversity which is independent of the size of the sample, provided it is taken from the same population'.

But I must admit that my statistical knowledge is too scarce to explain this curiosity in the pattern of sampling interlibrary loans.

One thing seems clear though, namely that by doubling the population's sample, we are not doubling the number of new titles as Brookes⁽⁹⁹⁾ seems to suggest, but it seems that the increase of new titles is a geometrical regression well below the 100% increase, more likely an increase of about 50-60% only.

8.7 Bradford's Law and its application in this project

Some years ago Maguire and Lovelace⁽⁵⁹⁾ have noticed in their Australian study of Information Needs of Australian Health Researchers that 'The use of all the literature by all users is characterised by an extended scatter pattern which on a large sample could lend itself to interesting bibliometric analysis as well as to possibilities of rationalization among competing services'.

This project goes some way towards achieving such bibliometric analysis.

According to Leimkuhler⁽⁶⁰⁾ 'The most important measure of scatter used in empirical studies is "title dispersions" which is defined as the degree to which the useful literature of a given subject area is scattered through a number of different books and journals'

A Bradford's distribution, and a corresponding bibliography, when computed and designed from adequate raw data do offer a measure of titles dispersion from which managerial decisions can be contemplated.

In applying Bradford's analysis to the data collected in this project, the procedure outlined by Donohue⁽⁶¹⁾ was followed.

Donohue's procedure for the Bradford analysis is as follows:

- '1. Tally the articles appearing in each journal.
2. Arrange the journals in order of decreasing productivity.
3. Divide the list into zones, such that they contain the smallest equal number of articles that will effect the Bradford partition of the list.
4. Establish the ratio between the number of periodicals in the nucleus and the number in each succeeding zone. This is the Bradford multiplier b_m for journals in the main corpus.'

Because the initial sample of 638 loans did not fit the criteria for minimal size to obtain a Bradford distribution as set by Goffman and Morris and also by Morton, because the number of titles with frequency of one request is in both cases more than half of the count, another systematic sample of 638 loans was obtained and merged with the original sample. Thus we have a new sample of every third request, giving us a composite sample of 1 276 articles. This method does not detract from the randomness and validity of the data. Thus, when data from Table 3 which

have been already tallied are arranged in order of decreasing productivity and fitted into zones of near equal productivity, the following Bradford distribution is obtained:

TABLE 23

<u>Bradford Distribution</u>					
<u>Zones</u>	<u>Articles</u>	<u>Titles</u>	<u>bm</u>	<u>% of articles</u>	<u>% of titles</u>
1	426	87	-	33.4	12.2
2	425	199	2.28	33.3	28.0
3	425	425	2.13	33.3	59.8

Graphically the three zones are superimposed and represented in graph Figures 8 and 9 by the bold line and the three circled dots, where s on the x axis represent the measure of scatter.

Otherwise, to obtain this graph, the procedure as described by Brennen⁽⁶³⁾ was followed. Accordingly: 'if the logarithm of the cumulative number of periodical titles is arranged by decreasing productivity and plotted against the corresponding cumulative number of articles produced, a curve with a linear portion is obtained (Figure 8). Bradford⁽⁶⁴⁾ determined that the slope of the straight portion of the line (Figure 8) is a measure of the extent of bibliographs scattering in a subject field'.

Composite sample of 1276 requests
and 711 titles
(According to data on Table 3)

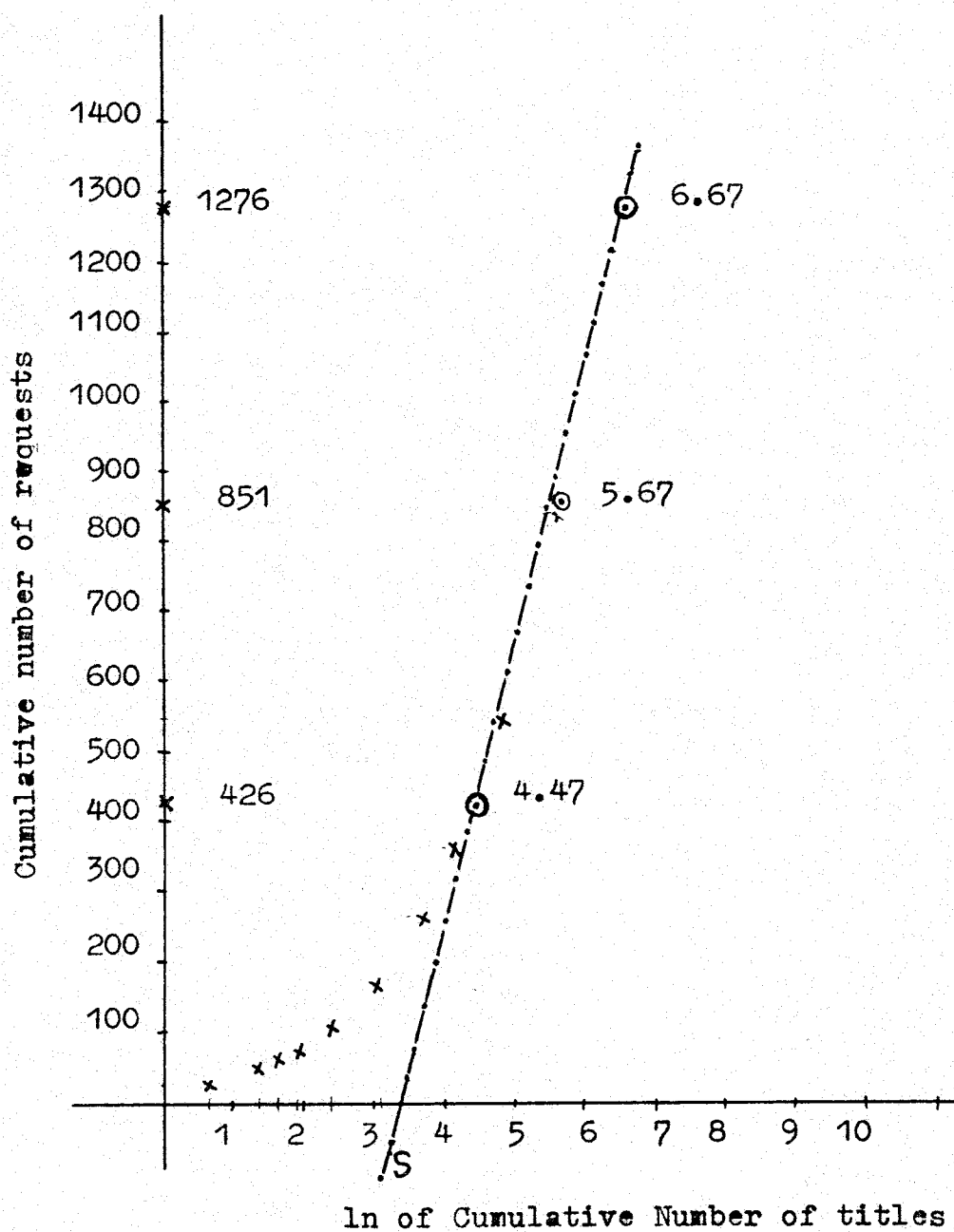
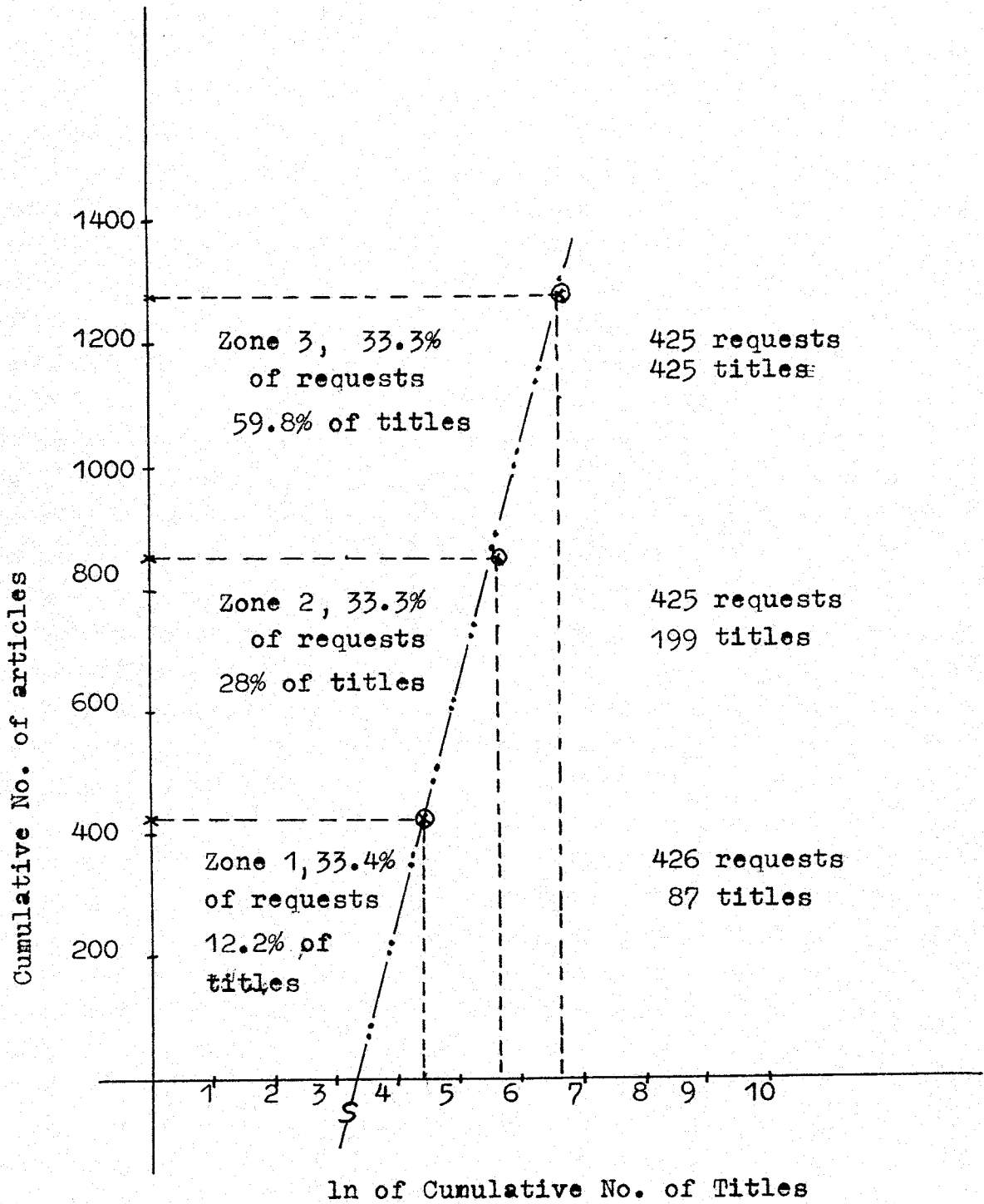


Figure 9

Bradford Bibliograph of Interlibrary Requests
 Composite sample of 1276 requests
 and 711 titles



CHAPTER 9 - INTERPRETATION OF RESULTS

9.1 Background

Though misgivings have been voiced about the value of core lists (Moll⁽¹³⁰⁾, Sandison⁽¹⁴⁸⁾, Swinscow⁽¹³⁴⁾) for collection management, these are now widely accepted in United States of America, Canada and the United Kingdom. Australia has only recently and reluctantly accepted that there could be some value in a core list of biomedical journals. At a meeting of the Medline Network Liaison Committee in May 1976⁽⁶²⁾, the participants (prodded by the National Library) discussed whether 'Medline centres may like to consider what action, if any, should be taken to ensure more effective document backup to the MEDLARS service. Such action could include:

- (i) identification of a core list of serials, each of which should be held at each centre ...
- (ii) the preparation of a union list showing locations for all Medline serials. This would not only be a working tool, but it would also reveal deficiencies in the current holdings, and could lead to
- (iii) arrangements for cooperative acquisition and/or storage,
- (iv) arrangements to monitor and notify changes in the journals covered.'

These issues were raised again at a meeting of the 'Life Sciences Technical Liaison Committee⁽⁶⁵⁾ in April of 1978 at which the feasibility of a survey of interlibrary loan transactions between biomedical libraries was briefly discussed. The underlying reason for such a discussion being that a survey of interlibrary

loans would indicate weaknesses and strengths of collections, besides establishing a core list of journals.

Therefore, the results of the JBL sample, with its SPSS and manual methodology, will be seen, I hope, as a pilot project to the more ambitious survey as suggested by the LSTLC. At the least, it ought to forewarn its protagonists, of the pitfalls and limitations of usage surveys and make them aware of the many overseas surveys of a similar nature.

One would wish to be able to say in the Australian context what Whittle⁽⁶⁶⁾ said for the United Kingdom Libraries, namely

'At the present time, decisions on acquisition of journals have to be based on the knowledge that can be obtained empirically of overall usage and reader requirements, and the nature of available library facilities (national as well as local) for meeting these needs. Both inevitably change over the years.'

Though we all agree that access to basic journals is essential for the health professional, we are forced to agree also with Brandon's outline of the United States of America biomedical library situation⁽⁶⁷⁾.

'Because of budgetary constraints, changes in the pattern of federal support for libraries, and massive flows of information from all sources, attempts at autonomous self-sufficiency by any library, regardless of size, are futile in today's changing environment. Cooperative resource

sharing offers the only viable cost-effective alternative for libraries to cope with these problems and at the same time to provide prompt access to health science information.'

A very similar mixture of gloom and hope pervades also the Australian biomedical library scene. But could it be, as Brookes⁽⁶⁹⁾ says that 'special libraries ... buy more periodicals than their scientific users could ever hope to read or even to scan, that scientific creativity can be inhibited by overfeeling scientists with information and that, in general, sharper focussing on the relatively few periodicals which are highly informative on the special subject would be helpful'. If Brookes is right, and I believe he is, then the concept of core journals is practical from the point of view of the manager of a library collection as well as from that of a user of the literature. The problem of core journals in Australia has to be considered in two or even three distinct frameworks: at the local hospital or special library level and at the regional or national level. As Urquhart⁽⁷⁰⁾ says, when discussing the British situation:

'The problem of providing a loan service for periodicals really becomes one of catering for the rarely used periodical by ensuring that it is available somewhere in the country, and that there are sufficient copies of the more frequently used periodicals. There is a general agreement that the responsibility of ensuring that the rarely used periodicals are available for loan rests with the National Lending Library. There is no general agreement,

however, about the responsibility for catering for the more frequently used periodicals.'

A similar reasoning was adopted by Truelson⁽⁷¹⁾ when discussing the United States of America scene:

'The assumption that it is important to keep a little used title somewhere in the consortium or region is the weak link in the theory of shared acquisitions. In view of the technology and functioning arrangements for shared access to collections, at least among health sciences libraries, it often is likely that one or a very few copies are enough in the entire country, and for this purpose the comprehensive collecting activities of a National Library of Medicine or a Center for Research Libraries offer a reasonable degree of security.'

Well, in Australia there is no general agreement neither for the frequently used periodicals, nor for the rarely used ones, though there is an implicit trend towards regional responsibility for the general provision of biomedical periodicals.

Eleven years ago, at a meeting of the AACOBS Committee on Medical Libraries⁽⁷²⁾ agreement was reached 'that regional medical library centres should be considered by AACOBS and the Book Resources Committee'. Only a few months earlier, at a meeting of Sydney Metropolitan Librarians⁽⁷³⁾ it was realised that:

'Both Sydney and Melbourne have institutions already providing an informal regional service and which would be willing to provide formal regional services in the future.'

Dr K.W. Edmondson, then a senior medical officer with the NH and MRC and now its Secretary, reporting to his superior Dr Wells on this same medical librarians meeting in Sydney had this to say:

'Librarians might be prepared to exchange or give substantial sections of libraries to improve distribution ... It looks as if cooperation might be surprisingly easy'.

But he also added that librarians were talking about 'concentration of journals' rather than a physical central medical library.

Anne Harrison⁽⁷⁵⁾ in a letter to the National Health and Medical Research Council (dated 13 July 1967) states that:

'It is terribly difficult to build a large number of small disparate libraries into a national structure - we really require a sub-structure at state level, and a national centre capable of serving as a base for the state systems.'

It looks as if 1967 was a good year for creating the awareness that biomedical libraries must cooperate and share their resources on a regional basis. And the main resource they were talking about seems to be journals.

It is only disappointing that in 1978, that is almost twelve years later these issues are only being debated by an informal Life Sciences Technical Liaison Committee, while in the United States of America a substantial and efficient Regional Medical Libraries Network has developed with resource libraries as main nodes. Many elements of their regional medical library network could be applicable in our geographical and political set-up.

But, as Lovelace⁽⁷⁴⁾ indicates quite strongly: 'For example, in the United States of America ... a resource library is recognized as such and special funds are allocated so that it can properly fulfill its function. In Australia there is no such provision and yet these libraries carry a heavy burden.' Australian biomedical libraries are not part of any special funding arrangement or under strong political sponsorship like the USA libraries. Another factor in the United States success, was the fact (as Maguire and Lovelace have pointed out⁽⁷⁶⁾) 'that they insisted on the use of ALA interlibrary loan forms; only accepted requests outside of the Region if they were accompanied by a declaration that the resources of the requestor's Region and the National Library of Medicine had already been tried; and refused to handle requests with inadequate citations from "libraries of substance". However, from small librarians they would accept such requests.' They quote from a report of the New England Regional Medical Library (NERML) that 'the heart of the Regional Medical Library program consists of the strengthening of library resources and services at the local level'.

Smith⁽⁷⁷⁾ reports that the Kentucky Ohio Michigan Regional Medical Library (KOMRML) has adapted a slightly different approach, which puts even more reliance on the strengthening of local and regional resources and allows for recovering the cost of the ILL programme. It consists of these criteria:

- '(1) A membership fee could be charged in institutions that participate in the interlibrary loan programme.

- (2) Certain kinds of material, e.g. commonly held journal titles, could be declared ineligible for lending by the resource library.
- (3) Quota of free loans to each borrowing institution.
A charge for each loan over the quota.'

This project is relevant in this context in so far as it produces not only the methodology of assessing national regional or local weaknesses and needs, but its results give already some indications that the situation in Australia could be improved by resource sharing and by a regional concentration of more frequently used journals. Such a solution would benefit most the hospital libraries, which seem to be the heaviest users of the resource libraries.

It could be noted in Tables 19 and 20 and Figures 5 and 6 that not only the requests of biomedical libraries in the Australian Capital Territory and Victoria are put with the Federal Health Department Library and Monash University Biomedical Library, but that these two libraries are satisfying also requests from other Australian States to the level of about 17% of their ILL output. It is indicated in the same tables that the UNSW Biomedical Library sample percentage (37.8%) is almost identical with the requests percentage from that State (38.9%). I dare say that the policy of the UNSW Biomedical Library not to copy articles held at the ANSTEL Biomedical Component in Canberra is having a marked effect on the ILL traffic between the Biomedical Library of the UNSW and biomedical libraries in the other States of Australia.

In the present economic stringency and staff ceilings affecting especially federal libraries and tertiary institution libraries, I dare say that the policy of the Biomedical Library of the UNSW may spread and have some serious effect on interlibrary loan traffic. To suffer from it would be, as it seems, outlying States such as Tasmania and Queensland. Such a trend may, on the other hand, produce the incentive and empirical arguments towards resources sharing on a regional and national scale.

Whilst a usage survey may give definite parameters of weaknesses and strength of a collection or collections in a region or a State, the percentages found and the core journals identified are not in themselves a measure of weakness of optimum performance of a collection or of a particular library.

I cannot but repeat that which Freeman⁽⁷⁸⁾ said about his own research on journal citations in marine biology:

'Life would indeed be easy if this was the only work required to identify key titles. Unfortunately the results must be taken a step further although this will not negate the general technique. Because the entire method is based on quantity rather than quality of articles there will be a constant situation where a high quality periodical with low frequency of papers will not appear in the core or nuclear areas. Subjective decisions will therefore be required but they are subjective decisions based on an objectively determined framework which is certainly better than any method currently employed.'

Houghton and Prosser⁽⁸⁰⁾ are even more specific on these matters. They say that 'Journals which are marginal to the library's main speciality are valued by users as they provide useful background to research projects. It is impossible at present to place a meaningful value on this information for background research, but some provision of this type of information gathering is essential. Another problem is seen in the provision of one or more journals specifically intended for one section of the users or for one person. If an organization requires the services of a specialist in a field marginal to its main activities it is reasonable to argue that at least one journal should be supplied by the library to satisfy the individual's requirements.'

They further add that 'any ... usage model with its resulting cut-off point can never be rigidly applied without examining the modes of use of the journals which are considered to be expendable by the model'.

The true measures of relevancy for journal usage are not so much the ILL titles, but the planned or intended level of performance by individual libraries or groups of libraries. This performance level can be measured in terms of the percentage of requests satisfied from own collection, own region or own State and also in terms of the time it takes to satisfy such requests.

Data from usage surveys must be viewed against performance levels set by the region or local library. The Kentucky Ohio Michigan Regional Medical Library Network set themselves for example, an objective of document delivery programme at the 90% level⁽¹⁶⁰⁾.

Some networks, as in Canada and the United States of America have decided to have all the Medlars journals in their region. Australia, being a region still dictated somewhat by distance, should not really be satisfied with anything much less than the complete coverage of the Medlars, Biosis and Excerpta Medica journals.

In 1967⁽⁷⁹⁾, the NH and MRC sought the opinion of the several dozen medical professionals and librarians in Australia whether it was worth taking all the Medlars journals, especially the Western and Eastern European ones. They concluded from the responses received that 'The opinion to date has been that almost none of these journals are worth taking'.

No wonder then, that in 1977 more than 250 titles of periodicals indexed by Medlars were not yet available in Australia.* These titles have not been found in the ANSTEL listing, in SSAL and the listing of Biomedical Periodicals in Canberra's libraries. It would be interesting to see how many of those titles are being borrowed from overseas and how often and at what cost.

Yet results from this limited survey indicate that more than 20% of all requests for periodical articles or titles is for European journals other than journals from the British Isles (see Table 21). Even Asia and Africa contribute close to 3%. Thus we see that the demand for journals outside the traditional anglo-american sphere is close to a quarter of all requests for periodical articles.

* It is likely though that at least some of these titles are subscribed to by smaller and specialized health libraries, which may not contribute to union lists which are known to be out of date.

9.2 Interpreting the frequencies

The question arises: how do we interpret the data and results of this research project?

We are dealing with three libraries, which are informally at least each a resource centre for their own region or functional sphere of interest.

We have seen (Table 23) that when data are ranked into three Bradfordian nuclei*, 40% of titles supply 67% of articles requested by their libraries which indicates that a good journal collection need not be too large because one can satisfy the largest proportion of needs with a minimal or moderate proportion of titles.

What measure of use (or at what cut-off point) should these three libraries consider to be an appropriate point to say to the borrowing libraries? We will not provide you any photocopying from these journals, because they are core journals and you ought to have them yourselves!

I think Donohue's⁽⁸¹⁾ methodology, as he adapted it from Goffman is an adequate tool to reach such a decision, providing that we distinguish between poor libraries and rich libraries and we

* The number of nuclei depends, as already discussed, on the number of titles with one frequency each. Thus a core collection is a relative concept if the Bradford's nuclei are taken as delimiters of core journals, as it depends on the number of nuclei that can be established from the data and on subjective decisions of library managers as to what constitutes an optimum collection.

consider peripheral interests of small special libraries. Donohue arrives at his conclusions through the following discussion which is worth repeating.

'We may say that, given a librarian's desire to provide journals of most likely interest to users in a given subject area, the library should stock those journals that fall into the first zone or minimal nucleus. If the library's budget permits, it may be desirable to extend the purchase list to include journals in succeeding zones. But how can the librarian determine the optimal point at which to stop adding journals?

Although the technique developed by Bradford provides a means for establishing a lower limit, it does not provide for an upper limit in periodicals acquisition. The lower limit could be used in a small library to determine which journals are most needed. But what of the problem of the large library, where the choice might be made to purchase all relevant journals, or, alternatively, to buy only those of a certain degree of likely usefulness? How can a cut-off point be determined between those of high and those of low potential value?'

Donohue gives them a brief summary (p. 20 - 22) on how Goffman derived his formula for a cut-off point between journals of a 'high potential and those of a low potential value' by applying Zipf's first law for common words and Booth's law for rare words.

According to Donohue, 'Goffman has suggested that this value can be predicted as the value of T given by

$$T = \frac{-1 + \sqrt{1 + 8l_1}}{2}$$

where T is a point of Transition between high and low frequency words' or in our case periodical titles:

and l_1 = the proportion of words (periodicals) occurring only once. Now, if we were to apply this method to our data from the sample of 638 loans with 328 titles occurring only once according to the above formula, we obtain a cut-off point at the top 63% of titles or 280 titles.

When we increased our sample to 1 276 transactions and 438 titles with a frequency of one request, the result would be the top 47% of titles, or 334 titles. (Since this type of sample is only a rough measure and the time span covered needs to be larger than three months, the results are only tentative and more than anything else a test of the methodology used.).

According to Donohue:

'This suggests that T, as applied to the journal dispersion, might be used to partition the distribution into high and low frequency journals. Just as the minimal nucleus provides a lower limit of periodicals, then T provides the upper limit. This point of transition can be taken by the library as a reasonable cut-off point in acquiring periodicals relating to a given subject.'

Should this point then be taken by the lending libraries as a delimiter for their lending policy or would the minimal Bradfordian nucleus be a more reasonable approach? These are decisions to be left to library managers.

9.3 Obsolescence as a relegation measure

Should we have accepted Goffman/Donohue's cut-off point at say 47% of the requested titles, we are left with the problem of how long should we keep a journal or journal titles? For ever, for fifteen or twenty years? Or should we dispose of the rarely used titles or holdings of a title when it has been already kept beyond a certain period of say twenty years? There is no set rule, no consensus of opinion.

As Urquhart⁽⁸²⁾ says:

'Relegation of periodicals can be based on borrowing data, in-library loan data or national interlibrary loan data. No method is 100% effective ...'. He further says that 'Care must be exercised when dealing with a "centre of excellence" subject'.

Lovisa Kamenoff⁽⁸³⁾ warns against any arbitrary culling of periodicals after five or ten years only. She suggests that any relegation for storage or disposal should be done on a title basis. J.M. Garvey⁽⁸⁴⁾ taking issue with Kamenoff's sampling methodology (only twelve months of usage records) has this to say on the retention of journals in hospitals libraries.

'Obviously, the back issues of all journal titles are not of equal value, and retaining all titles for any arbitrary number of years makes no more sense than basing your decision for disposal on the colour of the binding. One wonders, however, how accurate only twelve months record of usage will be in determining future demand. Past studies of the topic have found that when identifying

the 85% of the collection most likely to be in demand, many volumes were unused for between 24 and 120 months, depending on the study (1,3). I suspect that relying on statistics collected in the manner described by Kamenoff would result in selecting too large a part of the collection for weeding, resulting in inconvenience, lost time, and possible expense for future patrons.'

Whilst accepting his argument against a sample of only one year, and whilst not claiming that my results are indicative of all biomedical libraries in Australia, not even of those surveyed, I believe that the results from a one year sample, or even a three months sample are indicative of the literature of biomedicine in its totality, but cannot be used to interpret the usage of individual titles! In the instance of this research project, the results show two things:

- (i) no saturation of data has been reached even with a sample of almost 1 300 transactions as evidenced by the linear fit in the frequency graph (Figures 8 and 9) or in the obsolescence graph (Figure 3),
- (ii) the sample is indicative of only a small proportion of requests from the borrowing libraries and it mirrors the holdings of the three lending libraries only, and not of the totality of demand.

Nevertheless, it can be argued from a purely economic point of view that if many volumes are unused for 24 or even 124 months, and if space is scarce and photocopies can be obtained cheaply and promptly from a regional or national centre, it is very poor

economy for every library to keep such titles unused for so many months or years!

Williams and Pings⁽⁸⁵⁾ maintain that 'the cost of borrowing journals eleven to fifteen years old does not compare to the cost of maintaining storage space'.

They also say that:

'Resource libraries which are to provide documents through interlibrary loans to hospitals which maintain ten-year files of core journals should expect that a maximum of 25% of their interlibrary loans will be for articles in core journals that are more than ten years old.'

Which seems to agree with the results of this project.

They conclude that:

'Because of the purchase and storage costs and because of the relative little use per volume, a hospitals library should own no more than a twenty-year file.'

Taylor⁽⁸⁶⁾ as quoted by Urquhart⁽⁸⁷⁾ has formulated during 1974 the 15/5 rule for university libraries periodical holdings.

It states:

'If all volumes of a title published during the last 15 years have not been borrowed during the past 5 years then that title is a candidate for relegation unless it is a recently started subscription. He also considered as candidates for relegation titles dead for more than 15 years and all those titles which the library had ceased to subscribe to after 1920.'

Conclusions

The results of this research project indicate that 55% of the requests was for literature produced in the last five years, 75% for literature produced in the last ten years and 95% for literature produced in the last twenty-five years.

These figures do not mean much unless they are compared with performance levels of the 3BM libraries. The results would be more meaningful if these three libraries were designated as regional resource centres or centres of excellence.

All that can be said about the results, or their practical meaning is that a methodology has been described and partially tested against factual interlibrary loan data and that this methodology, if applied to a larger or more specific population, will produce results than can be compared with overseas studies or that can serve as a tool for managerial decisions on periodical collections maintenance.

The methodology is applicable, with minor modifications for survey and analysis of interlibrary usage patterns in a group of libraries, a major resource library or in a small specialised library, or on a national or regional level. Managerial decisions could be then derived empirically considering many variables, as performance levels, storage facilities, availability of alternative sources, and if the relevant functional requirements of the customers, a group of libraries, a regional system or of a single library have been subjectively assessed as well.

Appendix No. 1

The Literature of Usage
Surveys and Core Lists
of Periodicals

H.V. Pribac

September, 1978

APPENDIX 1 - THE LITERATURE OF USAGE SURVEYS AND CORE LISTS

1.1 Introduction

The validity of literature usage surveys and studies and the utility of core lists of periodicals are topics of continuing interest in library management. This literature survey is therefore devoted entirely to a review of the literature on these topics in the light of insights gained in this research project.

Studies on periodical usage not dealing principally with biomedical periodicals have been included only when the methodology expounded was relevant to this project or when general principles of serials management have been at the core of such studies. Otherwise it will be noticed, mostly studies in the health sciences serials management have been included.

It is a different matter with topics as the Bradford's Law and core lists, where it seems that principles valid across the whole range of scientific periodicals apply. I endeavoured to select the most relevant articles and reports in these topics and the ones that cover the subject most comprehensively.

As already mentioned on page 10 (Chapter 3), no published article or report dealing exclusively with the provision of photocopied articles from biomedical journals between Australian health sciences libraries and the relationship of such traffic to individual journal titles and their subsequent ranking has been discovered in the literature, though such articles abound in library and information science journals in the United Kingdom

and the United States of America. The already mentioned Franki's and Freeman's surveys are not concerned with the periodical titles and their attributes but with the overall volume of loans and loans delay^(88, 89).

Over one hundred and ten articles and books have been read in the preparation of this project, most of them are cited in this report. Unless specified otherwise, I have read all the articles, books and reports listed in the attached bibliography.

There is an abundance of references dealing with the economics of interlibrary loans and usage of library materials, while many more reports and articles are considering the more practical application of ILLS analysis for selection and acquisition purposes. Most of these are derived from statistics of loans. But it seems that even many more articles are devoted to the problem of publishing and citation analysis. Unless these articles have a bearing on the understanding of usage studies, they have been left out*.

Articles and references to core lists have also been included in this survey, because core lists are usually the result of citation analysis, specialist opinion and usage surveys. These are all related in some way to this study.

* Brookes, Fairthorne, Donohue, Houghton and Prosser and here in Australia Freeman, present in their articles succinct lists on the existing literature on citation analysis.

1.2 Interlibrary loans usage surveys*

The whole relevance of most surveys of interlibrary loan traffic is best summed by Williams⁽⁹⁰⁾ who states that

'Interlibrary borrowing or photocopying is not free, even for the borrowing library. Aside from the cost of the photocopy that the borrowing library pays for, it costs the borrowing library real money in staff time to make each request.

Clearly there is some point at which it is cheaper for the library to have its own subscription than to borrow or photocopy. This point is determined by the frequency of use and the cost of subscribing and maintaining a file as compared with the cost of borrowing or photocopying an article when needed ... this crossover point is the frequency with which the journal is used in that library.'

Williams has suggested in the same paper that the crossover point could be found to be a frequency of use of about six times per year. According to Williams, 'no library has enough money, or can even hope to have enough, to subscribe to, and keep and house in perpetuity, all of the journals its readers from time to time need to consult. Its immediate problem, therefore is how to select those that it can afford to subscribe to and how to provide access to those that: (1) it cannot afford to subscribe to at all, and: (2) the back files of those that it has subscribed to, but cannot afford the additional space to continue to keep for 20, 30, 50, 100 years, or more, when they are rarely used.'

* Vern M. Pings has reviewed the literature of interlibrary loans in the U.S.A. from 1876 to 1965⁽¹³⁵⁾.

The article by Stevens⁽⁹¹⁾ who in 1974 completed 'A study of interlibrary loans' produces 29 references and deals mainly with the costing problems of ILLS and who borrows what and for what purpose. He considered the time delays in obtaining ILLS and also surveyed articles dealing with the 'age of publication' of items lent or borrowed.

Erlam⁽⁹²⁾ has treated the problem of aging in biomedical literature in a major New Zealand library. New and Ott⁽⁹³⁾ have looked at interlibrary loans as a collection development tool, but recently Kraft and others⁽⁹⁴⁾ have developed a journal selection model for use in biomedical libraries in which ILLS are but one of the many aspects in deciding the worth of a journal. Their study attempts to develop criteria for a model encompassing growth, obsolescence, scattering, citation analysis and usage studies. He and his associates have been very critical of Brookes', Williams' and other models, because those studies do not consider users costs for delays and users preferences. They also produce a useful tabular summary of models and studies into usage surveys. Regarding core lists, they highlight the fact that a core collection in medical libraries for each discipline of biomedicine should be established.

The model developed by Kraft and associates requires elaborate statistics, which could be easily obtained only if the whole lending and circulating process has been computerised. Their title by title decision model (until the budget is exhausted) does not mention or specify whether a portion of the budget is set aside for previously undertaken subscription commitments,

neither does it consider the time-span value, e.g. a title may not have much use this year, but only next year or year after. In a hospital library or a library like our Federal Health Department, it is important to keep books and periodicals on infectious diseases and mass emergencies as an insurance against outbreaks and emergencies. Neither, does their model take into consideration the reality of the library environment, where decision for selection and purchasing are often a matter of prestige and pressure group mentality.

Palmour⁽⁹⁷⁾ also looks at costs of ILLS and proposes an American alternative for increasing access to scientific journals and compares the advantages and disadvantages of National Lending Centres against regional centres.

A special report⁽⁹⁸⁾ on the 1975 IEEE Conference on Scientific journals is devoted to citational analysis aspect, publishing aspect and library and copyright angles. It makes interesting reading and may offer new insight into interpretations of core lists.

The article on Derivation of the Bradford - Zipf Distribution by Brookes⁽⁹⁹⁾ considers also the 'time-span' of search when analysing ILLS. By doubling the time-span of the sample or total population, we are most likely to double the number of journals in any ranking list at the 'thin long tail', with an expected average of only one reference per journal*. He

* It seems from the results of this project, that this is not likely to be so, but that the increase is much less (see pp.113 to 115).

suggested that there is a need for agreement for a time-span of about three years. We would be able to apply the Bradford's Law in similar or comparable circumstances and generalisations would be more acceptable.

Houghton and Prosser⁽¹⁰⁰⁾ maintain and Graziano⁽¹⁰¹⁾ agrees that the 'best assessment of a journal collection is to count how many times the journals have been used ...' Houghton and Prosser consider parts of the Brookes' model with its elaborate costing mechanism as too complicated for small libraries. They have also analysed close to forty references on usage surveys and core lists. They say that 'special libraries require a workable and practical library, not a collection of hypothetically relevant papers but a journal collection which will be used by their clientele. The best assessment of a journal is to count how many times the journals have been used, assuming that each time a journal is borrowed, photocopies or referred to by a user he is looking for something relevant to his interests'.

Montgomery and Stewart⁽¹⁰²⁾ are adamant that decisions regarding selection and acquisition of periodicals should be made solely on the basis of the 'amount of use made', relating use to cost and also to delays in obtaining photocopies instead.

Brookes⁽¹⁰³⁾, in an article on citation analysis, admits that 'In a library, however, user demands would be preferable if they could be collected to provide large enough samples'.

Freeman⁽¹⁰⁴⁾ also says that 'It may be argued that use reflects quality and only a small percentage of the literature is of sufficient quality'. Hafner⁽¹⁰⁵⁾ admits that citation analysis can be 'marked in terms of quantity and not quality of papers published'.

But the strongest advocate of the relevance of usage studies especially interlibrary loans studies is Urquhart⁽¹⁰⁶⁾ who in a letter to the Journal of Documentation states that 'the inter-library loan demand for a periodical is as a rule a measure of its total use ... A deduction from the law is that the heaviest interlibrary loan demand is for the commonest items and these are the ones that the holding libraries have no wish to lend as they are heavily used locally.' And though external demand is in general only a residual demand, it is in Urquhart's words also a 'rough indication of total demand'.

The apparent exceptions to the law (which Urquhart claims to be his law) are few in number and 'may be statistical curiosities', claims Urquhart in the same letter.

In a recent study by J.A. and N.C. Urquhart⁽¹⁰⁷⁾ they quote a survey by the Cambridge Library Management Research Unit in which it is indicated that 'total in-library use of periodicals could be at least five times heavier than borrowings'⁽¹⁰⁸⁾.

This seems to be well confirmed by internal and external usage statistics collected over the last few years in the ADH Library.

The relevance of interlibrary loans usage studies and total periodicals usage studies seems to be well confirmed by many authors and it seems also that we are dealing here with the same set of phenomena and that conclusions from one sort of studies are applicable to the other set, or at least can be compared when we are ranking frequently used titles. The above conclusions seem to conflict though with the statements by Wilson⁽¹¹⁰⁾ and Graziano⁽¹¹¹⁾ that the

- (1) Interlibrary loans record is of limited value in choosing periodicals for backfile purchase;
- (2) The chance that any particular title will be requested more than once seems to be largely accidental;
- (3) Purchase of abstracts, bibliographies and union lists makes the best use of money; and
- (4) Current subscriptions are likely to be of greater value than backfiles.

While not denying their points (3) and (4), there is evidence from this survey and other surveys that their contentions under paragraphs (1) and (2) are not well founded.

And it must be stressed that they were analysing very small data, just over 500 loans! This is a limitation that is considered by Brookes⁽¹¹²⁾ to be rather relevant in any interpretation of bibliometric analysis of usage records.

1.3 Core lists of journals, techniques and types

The concept of a core collection or core list, or nucleus of heavily used periodicals is most probably the result of the information explosion and the economic stringency befalling

libraries everywhere. It is a concept similar to the super-market behaviour in which a large store may be displaying and selling 3 000 or more different items or types of goods, yet the bulk of its sales and profits can be attributed to a few dozen or at most a few hundred of the more popular sales items.

Librarians, publishers and analysers of the biomedical periodical literature have tried and are still trying to identify for themselves and their clientele a core number of titles which are either the most heavily cited, borrowed or which is in the opinion of the compilers the most pertinent to the discipline. It is implied also that such a core collection is economical in terms of acquisitions and also in terms of time needed to consult it.

Fortunately, the recent literature of core lists shows this awareness that any such 'nucleus' or 'core' can only be relative to the level of satisfaction that one wishes to achieve, either to satisfy customers or to work within a limited budget.

Types of core lists

Core lists can be divided into three categories according to the criteria used for their compilation, e.g. usage surveys, citation analysis and specialist opinion. There is no consensus yet on which are the best, in fact one can discern substantial criticism and doubts regarding the value of many core lists, especially those based on personal experience of compiler, those compiled from opinions or consensus of professional health workers or the questionnaire type methodology to identify

journals for core lists. Most notable examples for the three types of lists are:

- BLL/SINFODK (Bower): Usage survey⁽¹¹³⁾
- Garfield's: Citation analysis⁽¹¹⁴⁾
- Brandon's List⁽⁹⁵⁾ and the Library Association List⁽⁹⁶⁾:
Opinion of compiler.

1.4 Core lists in the USA and U.K.

The survey of Medical Literature borrowed from the NLLST⁽¹⁰⁹⁾ and done by Wood and Bower in 1969 is now out-of-date. Bower has published two years ago his new survey⁽¹¹³⁾ which was done during 1975 on a file of over 61 000 loans. He shows that among the top fifty serials, about 30 are biomedical. Bower has analysed also the type of borrowers and the obsolescence of the periodical literature. This core list which, as already mentioned, has strong affinities with the 1976 survey at Austel, has been compared with the results of this research project.

The Journal Citation Reviews produced by ISI and published by Garfield in Nature⁽¹¹⁴⁾ has been found useful for comparison as well.

The Garfield's list is not a list of interlibrary usage, but rather a list of top ranking citations analysed by computer in a file of over 5 million articles. It tells us how many times a journal has been cited and gives us also the measure of relationship between citations and articles published, though as Garfield admits, there are problems of age and discipline with this measure. The list comprises 206 top ranking journals of science and biomedical journals are prominent in the listing. There is

a remarkable stability of significant journals between this list and an earlier one produced by ISI in 1969, a fact noticed also by Bower when comparing the BLL lists. Garfield's words are strong: 'Time has shown beyond doubt that the important literature of science is encompassed by fewer than 1 000 journals. And even fewer account for the truly significant.'

The Brandon's list⁽¹¹⁵⁾, now in its 1977 edition, is basically his own work, but he says that he has 'heeded the recommendations of both biomedical librarians and subject specialists and in many cases have been guided by their suggestions when deciding what publications to include. The LA list has also been compiled basically by an individual, Mrs Lilian Sergeant, 'but many people in different types of medical libraries were consulted and contributed their advice and help'.

Ranking lists of more recent origin and basically derived from usage studies are those of Stangl and Kilgour⁽¹¹⁶⁾, Morton⁽¹¹⁷⁾ and Wender⁽¹¹⁸⁾. (See Tables 4 and 5 for comparison of lists.)

The ranking list derived by Dobroski and Kendricks⁽¹¹⁹⁾ from requests for duplicates in a RML program is most interesting too, as it correlates quite well with ranking lists done in the other loans usage and citations analysis studies. The two authors state that: 'The similarities between published studies, our circulation record analysis and the results reported in Appendix 1 (of their study*) corroborate the fact that a small clutch of journals satisfies a large percentage of the demand. It is also

* In bracket mine!

remarkable that the most commonly available journals are the ones requested most frequently. The journals listed are readily available in doctors' offices and lounges. Even the smallest medical library will have them, yet they seem to be the journals required most in formal library services.'

Another two widely known core lists are the one by Stearns and Ratcliffe⁽¹²¹⁾ and also the one by Wender, West and May⁽¹²⁰⁾.

A usage study done at Yale and Columbia biomedical libraries in the early sixties by Fleming and Kilgour⁽¹²²⁾ resulted in a core list of 262 biomedical serials producing 80% of usage at those two major libraries and only 67 titles were responsible for just above 50% of the usage over a period of more than three years. This is perhaps one of the best known earlier lists. Naturally the list of periodicals in Index Medicus and in the Abridged Index Medicus have also served as core lists for biomedical libraries and indeed have been widely used as such in the USA, Canada and even in this country.

A fairly comprehensive bibliography of recommended or core lists has been published recently by Onsager⁽¹⁶²⁾. The bibliography is usefully annotated with scope, source and number of titles in each list.

1.5 Core lists in Canada

One would think that Canada, being a close neighbour of the USA would have accepted without any qualms their many biomedical core lists without going into the trouble of creating and compiling their own lists. This was not the case except in a few instances.

A 'basic list' of heavily used health science serials compiled by the Canadian Library Association - Committee on Medical Science Libraries is mentioned as a useful tool in the Firstbrook report⁽¹²³⁾. This report which established the rationale for the Canadian Health Sciences Resource Center has identified excessive borrowing as being due to slow acquisitions, binding operations and to the failure to subscribe and back-file heavily used materials. It calls for local remedies and a central repository of relatively rarely used materials (besides the very heavily used) and it calls for coordination especially between university biomedical libraries regarding their retention policies (coordinated reservoir).

Another Canadian study by Brown⁽¹²⁴⁾ considers that the core list of Wender, West and May (in Postgrad. Medic. Dec. 1974) is an excellent list even for very large hospitals.

A third Canadian Study⁽⁶⁸⁾ on Medical Information Network for Ontario considers the Brandon⁽⁶⁷⁾ list of core journals as relevant for the small medical library. A by-product of the study was also a union list of periodical holdings in 14 hospital libraries in Ontario which they suggest as a core list.

Huntley⁽¹²⁵⁾ has done perhaps the best study of core lists in Canada and he noted with satisfaction that:

'Canadian hospital librarians recognize the importance of regional requirements in acquisitions and have, with considerable independence sought to meet their own special needs by very specialized lists.'

And further 'Core lists in Canada are characterized by regional differences.'

He believes that perhaps a 'small core' of about 15 titles is necessary, but for reasons of not lending, because every medical library ought to have those titles. Huntley's study is indeed a good survey of all such lists in Canada.

Brandon⁽¹²⁶⁾ voices a similar development in the USA Regional Medical Library Network, in which 'each RML is being requested by the National Library of Medicine to formulate restrictive lists of journals that are not eligible for RML interlibrary loan funding. Included in these lists will undoubtedly be some journals titles that small hospitals do not own. If hospital libraries cannot afford to purchase the restricted journal titles, their access to this material will rely on the innovative efforts on the part of their librarians to set up programmes for resource sharing, consortia, and liaison arrangements with larger medical institutions.'

1.6 Core lists in Australia

A similar pattern seems to be developing in Australia. Medical librarians outside N.S.W. are already aware that the biomedical library of the UNSW is refusing to lend to libraries outside N.S.W. those titles held at ANSTEL.

Maguire and Lovelace⁽¹²⁷⁾ also recommend on the basis of their research into the 'Information need of health researchers' that: 'an investigation be made of the adequacy of hospital collections and that a minimum core collection of titles be compiled which could well be adopted as a standard by the Australian Council on Hospital Standards'.

Whether the periodicals core list announced by the Victorian AML Group is a result of their prodding is hard to know*. The ANSTEL component of the NLA has also produced a list of the most heavily borrowed titles from its stacks⁽⁴¹⁾. And the ADH has also compiled a list of core titles (which have now been ordered by airmail) that have shown a very notable use internally and externally.

1.7 Evaluation and comparison of core and ranking lists

Brandon⁽¹²⁸⁾, whose core list seems to be well accepted among USA biomedical libraries, was well aware of limitations that are inherent in core lists and he states that: 'The selected list of books and journals is intended to serve as an acquisitions aid and is not set forth as the one and only definitive collection for the small medical library. No such list could meet that criterion, for each library is individual and has its unique needs.'

Timour⁽¹²⁹⁾ who made a good survey of USA core lists and discusses in the same article a certain methodology to identify journals for core lists, is also aware of limitations of many core lists, and so is Moll⁽¹³⁰⁾ who can be criticised on the other part for his reluctance to include 10 well known medical journals (among

* In a letter I received from the Victorian AML Group it is stated that the Victorian AMLG journals list has been through a number of editions already. It has been prepared by an AMLG Sub-Committee with feedback from Group members and hospital staff in general. The latest edition is 'on the production line', according to Anne McLean, one of its editors.

them the Medical Journals of Australia in any core lists, though it has been evident in the last few years, that the MJA has appeared prominently in many overseas lists as a relevant journal of medicine).

Trueswell⁽¹³¹⁾ evaluates core collections from another angle. He discusses: 'The desirability of having a partially automated and possibly computer-controlled, readily retrievable inter-library collection of lesser-used material coupled with smaller conventional core collections at those libraries belonging to the system. This would permit users to utilize their own institutions' core collection in the conventional manner and still retain the ability to readily retrieve any of the lesser-used material coupled with smaller conventional core collections at those libraries belonging to the system. Such a regional system would also have the built-in procedure that any item requested from the lesser-used area will, by definition, enter the core collection (and would also) reflect user-circulation requirements regardless of the source of the items. It appears that it might be possible to employ such a system to help reduce the currently expanding requirements for larger and larger libraries to hold larger and larger collections.'

On a similar vein is the article by Truelson⁽¹³²⁾ who maintains that: 'It is necessary to spread the load which usually is concentrated on a wellknown body of common titles, rather than on a wide range of little used titles. The natural needs of network members tend to insure that within any region the heavily requested titles are sufficiently available so as not to require their provision from the major back-up collection.'

Perhaps the best evaluation of core lists has been done by J.A. Bell⁽¹³³⁾ who has looked at and compared different core and ranking lists in the USA.

Firstly she considers the fact that even defining serials (and including them as such into a collection) is a widespread problem. She says that: 'It is not accurate to assume that the compilation of a list of serial titles by analysis of any one factor can result in a core collection. However, by considering the results of several studies and the needs of a given institution and its users, one can compile a list for a given library.'

J.A. Bell then maintains that there is little use comparing rank of biomedical periodicals from usage and citation analysis lists because the lists are the result of differently designed sampling techniques: 'Therefore direct comparison between rank in one list and rank in another list would not be accurate and indeed there is little direct rank similarity. However, a general comparison to determine similarity in titles identified, i.e. what percentage of the titles appeared on all lists can be made.' In comparing the list resulting from this project with other lists her suggestion has been followed.

Swinscow⁽¹³⁴⁾, one of the editors of the BMJ, sees 'core lists as notably making for a general uniformity' and is most critical of so many USA core lists. Swinscow calls into question much of the philosophy of core lists suggesting strongly that the medical librarian should not be offered only a core from the Tree of

Knowledge, but a whole apple. By this he means: '... a list of 300 to 400 journals which includes all the important ones plus a number of minor ones'. He then says that: 'From the "apple list" the librarian can select his journals in accordance with the following criteria:

- (1) The preference of the doctors who use the library;
- (2) The availability of journals in neighbouring libraries;
- (3) His budget.

In this context a core list does make sense and saves the individual manager the worry to compile a list of his own, when he has neither the resources nor the inclination to do so, not to mention the understanding and goodwill of those above him or her.

1.8 Bradford's Law - A brief outline of the literatureGeneral considerations

It is now widely known and accepted that a small number of titles borrowed account for the largest proportion of usage. This assumption has been formulated by several writers* from an assumption by S.C. Bradford formed in 1934 and defined more clearly by him in 1948⁽¹³⁶⁾. It states 'If scientific journals are arranged in order of decreasing productivity of articles on a given subject, they may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups or zones containing the same number of articles as the nucleus and succeeding zones will be as $1:n:n^2$.'

According to Fairthorne⁽¹³⁷⁾ 'Bradford found the number of periodicals in each zone to increase geometrically. He used this finding to estimate the number of periodicals that contained articles on a specified subject and concluded that unless many pertinent articles were to be lost periodical literature must be abstracted by source and not by subject.'

* For a detailed understanding of the Bradford's Law and its applications and also as a source of further references on Bradford studies and bibliometric analysis the articles by Brookes⁽¹³⁸⁾, Freeman^(16, 78), Fairthorne⁽¹³⁷⁾, Vickery⁽¹⁴¹⁾, Goffman and Morris^(149, 150) and Leimkuhler⁽³⁾ are most informative, but some of them require sound knowledge of algebra. I found Donohue's book⁽⁴⁹⁾ most simple and informative in this respect and quite adequate for the librarian with poor knowledge of mathematics. In Australia, bibliometric analysis, using either the Bradford or Poisson distribution is unknown or at least unpublished, except for two articles by Freeman^(16, 78) and one by Brown⁽¹⁴⁰⁾. The three Australian references are concerned with the application of the Bradford bibliographs to citation analysis and none to usage patterns.

Fairthorne wrote in 1969 that this type of bibliographic behaviour, as was noted some time ago without much effect, has been rediscovered and applied with fair vigour in the late 1960's. We shall not go into the reasons why, but suffice it to say in his words that 'Given enough carefully collected and presented data, both the pattern and its persistence can be estimated usefully in numerical terms.'

Brookes⁽¹³⁸⁾ who has done several bibliometric studies^(13, 20) on the Bradford Law states that:

'The Bradford Law is not reliable in predicting the productivity of individual journals: it is a statistical law which relates only to large collections of journals or to major subsets of such collections.'

And he further says that the 'Bradford's Law applies only to the occurrence of relevant papers, not to their informative value of frequency of reference' (p. 258). Also, 'Bradford's Law is unlikely to hold for large collections because, as N increases, strict conformity with the Bradford Law requires the contributions of references from the most productive journals, those ranked 1, 2, 3 ... to increase proportionally. The number of contributions from any one journal, however, even if it is devoted wholly to the given topic, is necessarily limited. So, in such cases, a kind of "saturation effect" may be observed. The cumulative sum of references ($R(n)$), plotted against $\log n$, then initially rises relatively slowly before $R(n)$ attains the linearity that follows when only "non-saturated" journals are contributing.'

This effect can be evidenced on my composite sample in Figure 8 where the straight portion of the line is not attained until there are approximately 350 articles on the y axis and 64 titles on the x axis.

But the sharp end at the top of the axis seems to be evidence to the contrary: in this case ^{it} is not so much a matter of saturation, but of uncompleteness of data.

Drott and Griffith⁽¹⁶¹⁾ have recently published an interesting and controversial study in which they contend strongly against the application of any 'relationship between Bradford's Law and the nature of the literature such as breadth of subject area, topic, time period or search technique to management decisions in libraries. They maintain tentatively that

such applications should be reconsidered in view that these relationships are 'the reflection of some underlying process not related to the characteristic of the search mechanism or the nature of the literature'. Drott and Griffith conclude that there is instead a basic probabilistic mechanism explaining the mathematical regularities which are at the core of the Bradford's Law.

Number of articles/titles needed for a Bradford bibliograph

Goffman and Morris⁽¹⁴⁹⁾ and Goffman and Waren⁽¹⁵⁰⁾ have found that 'In general, the number of items affecting the finest Bradford subdivision must exceed one half the number of items of frequency one in the distribution.'

In our case, the minimum sample required would be approximately 1 100 - 1 300 articles.

This formula has been restated in a different manner by Morton⁽¹⁵¹⁾ who says that 'the finest subdivision to be used as a zone must exceed one-half of the number of items found in the category of usage having the most items'. Fairthorne⁽¹⁵²⁾ also maintains that the last zone (usually one article per periodical) 'determines the greatest number of zones into which a particular collection can be subdivided'.

And AIYEPEKU⁽¹⁵³⁾ demonstrates that 'Conformity of a given set of data on a specified subject with the graphical formulation of Bradford's distribution theory appears to be partly a function of size. In other words, there is a minimum threshold value as well as a maximum "saturation point" for the law to apply in its present graphical formulation.'

Though this conformity of a given set of data with the graphical formulation of Bradford's distribution appears to be a function of size, first Vickery⁽¹⁴¹⁾ then Fairthorne⁽¹³⁷⁾ have clarified the mathematical side of Bradford's original article and they have demonstrated that 'if the relation held generally, it must hold for any subdivision into groups of equal yield, not just for high medium, and low yielding quantiles'.

Or as Goffmann and Warren⁽⁵⁵⁾ say 'The factors governing the dispersion among journals of entire literatures also appear to be relevant to the distribution of the individual bibliographies of a representative set of medical researchers' or in brief as summarized by Goffmann and Morris: Bradford's Law applies to a

portion of a literature as well as its totality. A rough approximation of this fact has been obtained in my composite sample for the Australian component of the biomedical literature (Table 7C).

Time-span of search

Brookes⁽¹⁵⁶⁾ has some relevant things to say on this matter and I believe that the incompleteness of my data is due almost entirely to the fact that only a small sample from a three months span only has been used to derive the results. Brookes quotes Susan Wright's data on the documentation of vitamins, which covered a three year span. 'Within that span she found that of the 146 journals cited, no less than 80 of them contributed only one relevant paper each. Had the search span been extended to six years, many further journals containing one single reference within the six year span would have been found. In fact, the doubling of the search span would be expected also to double the number of journals found.* So we need to specify the time span ... because 'the completeness of the search depends' on the time-span assigned'. It is therefore not only relevant to define the topic of the search and the level of productivity but also to standardize the time-span of the search to 'ensure comparability of estimates'. Brookes' suggestion is 'that the time-span of the search be fixed at one year on the basis of a three-year search span and that the minimum qualifying productivity for any journal be one relevant paper per annum.

* I have my doubts on this matter, because it seems from this research that by doubling the sample, we do not double the number of titles (see Table 22 for this phenomenon).

If it is more convenient or desirable to work with other search spans or with other levels of productivity, it is still possible to do so and yet to express the results in standard form for purposes of comparison.'

Applications of the Bradford's Law

It is possible to a certain extent, by using the relevance of Bradford's zones, to compute a minimal or maximal core of journals needed in a library or in a region. Work done by Donohue⁽¹⁵⁷⁾ in this respect is most pertinent to assess such cores, and more about it will have been said in Section 9. But most relevant in this regard is, I believe, the work done by Goffmann and Morris⁽¹⁵⁸⁾. Accepting their conclusions for such core lists, either on a local, regional or national basis, one can only repeat what they say in a more restricted vision perhaps, namely that 'The core should consist of the minimal nucleus of periodicals circulating in the Library plus the minimal nuclei of journals devoted to the subjects of most interest to the Library's nucleus of users. As the budget allows, successive zones of periodicals corresponding to circulation and user interest can be added.' This method could be easily adopted within the standards and parameters as suggested beforehand in Brookes' articles. Goffmann and Morris say in fact that 'Some libraries may compute the nucleus each month, others every three months and so forth. This is necessary because the nucleus may vary with time as a result of a change in users or users' interests.'

The two authors give us an indication that such a method would enable a library manager to predict his demand and therefore plan his budgetary and workload steps accordingly. They say that 'Expected minimal (Bradford) nuclei of users as well as the expected minimal nuclei of the subject areas of their interest at some appropriate future date can be established by extrapolation and in this way the library can be in a position to anticipate future demand.'

1.9 Limitations encountered by other authors

The literature of usage and citation surveys is abundant with warnings about the pitfalls of claiming too much relevance for generalizations derived from the study of single topics or a particular bibliometric measure. Some other limitations, with which I cannot but agree, have also been put forward by several authors. I will try to present them in a short summary.

Kraft and Polaczek⁽¹⁴²⁾ claimed that 'An overall model of literature dynamics has not been constructed before, most likely due to the fact that it would be very complex and require much mathematical sophistication. Most of the models built previously have concentrated on only one of the basic factors at a time, with a few considering the possibility of two at a time.'

Subramanyan⁽¹⁴⁷⁾ has expressed these limitations most succinctly by stating that 'Library patrons normally use only those journals that are made available to them (plus a few journals obtained on personal subscription), and authors cite only those journals whose contents become known and accessible to them.'

And a little further on he adds that 'No one criterion used in isolation can give a realistic indication of the relative importance of journals. Development of "core lists" of journals based on one measure, howsoever sophisticated, is of little value. It is also important to remember that the relative importance of journals in a given library situation can vary with time. Such variations may be caused not only by changes in the scope and quality of the journals themselves, but also by other factors such as changes in organizational objectives and shifting interests of library patrons.'

Morton⁽¹⁴³⁾ suggests that 'Because libraries tend to hold those titles most used by their clientele, their interlibrary loans do not reflect such needs', i.e. the use of such titles from other libraries. Houghton and Prosser⁽¹⁴⁴⁾ also maintain that 'A large percentage of the use made of special libraries is ... unrecorded, thus the data required to implement the model (Brookes') successfully is unobtainable.'

Also, articles that scientists obtain elsewhere, from colleagues or from other libraries directly, are not recorded by Inter-library Loans Officers.

Urquhart⁽¹⁴⁵⁾ would not agree entirely with them, but then Urquhart is perhaps looking at the situation on a library macrocosmic scale, at least in a regional or national framework, which implies that a core list based on national or regional loans statistics, while it may contain most of the titles used in specialized libraries, does not contain all of them, neither are they in the rank order they are used in each specific library.

Another limitation, which became evident early in my research project was the fact that some biomedical libraries do stock journal titles other than in biomedicine. In fact I have omitted from this project, journal articles on management, computers, economics and politics requested from the Federal Health Library, because the other two biomedical libraries in the survey (Monash and UNSW) do not keep these. The inclusion of such journals from only one library would have skewed the results against the biomedical titles, but yet with partial data only. Borrowing institutions usually ask from a lending library only those titles listed as kept in the lending library. Only total borrowing records would indicate the diversity of demand.

Wender⁽¹⁴⁶⁾ is quite adamant in this respect that, 'basic management especially', is a topic (she) found of interest to the majority of physicians. 'They want to know about it for the benefit of their professional practice.' She found that 'many hospital libraries maintained within the library a special section on management'.

An even more relevant problem in studying the productivity of journals, is the exponential growth of the literature of biomedicine or any literature for that matter. This growth may be noticed in the increasing number of new journals and also in the increasing bulkiness of the classical ones.

Sandison, Line, Cho and Brookes^(148, 53, 1, 17) (to name just a few authors) highlight the problem of the growth of the literature and its effect on sampling results. They look at it

from different angles and they also offer ways of incorporating this effect into the results. Sandison is especially clear and he insists that:

'Sampling techniques must always allow for any lack of uniformity in the population sampled. Library stocks are never uniform: there are always far more volumes of recent than of early data and of some titles than of others. The recent years and the bulky titles are therefore more likely to appear in a random sample than are the others.'

And he particularly stresses the need to realize that '... exponential curves' could be reflecting not so much usage, but rather the growth of library stocks.

It can be stated therefore in regard to the above limitations, that this research project is unambitious and that while one is aware of such limitations, much more study would have to be done into the arguments presented by those authors.

Meanwhile, the results obtained in this study are interesting, indicative of the population studied and the methodology of handling and analysing the data is perhaps one of the first attempts to analyse the interlibrary lending patterns of biomedical journals in Australia. This study is therefore just a step in the right direction, not an achievement as yet.

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PAGE OF

[illegible]

CORE JOURNALS IN BIOMEDICINE ON ILL IN AUSTRALIA

FILE: NONAME (CREATION DATE = 05/19/78)

Num.Code for
serial title.

Publication
date after
recode

Place of
Publication

Frequency of
Request

Mark for
Frequency

Lending
Libraries

Borrowing
Libraries

Location of
Borrowing
Libraries

CASE-N	SEQNUM	SUBFILE	CASWGT	VARC01	VARC02	VARC03	VARC04	VARC05	VARC06	VARC07	VARC08
1	1.	NONA	1.0000	1.	10.	1.	2.	0.	0.	4.	3.
2	2.	NONA	1.0000	1.	10.	1.	2.	1.	0.	4.	3.
3	3.	NONA	1.0000	2.	10.	1.	1.	1.	0.	1.	2.
4	4.	NONA	1.0000	3.	8.	4.	1.	1.	2.	2.	4.
5	5.	NONA	1.0000	4.	9.	1.	2.	1.	0.	4.	2.
6	6.	NONA	1.0000	4.	10.	1.	2.	0.	0.	1.	5.
7	7.	NONA	1.0000	5.	10.	3.	1.	1.	2.	2.	5.
8	8.	NONA	1.0000	6.	9.	2.	1.	1.	2.	5.	4.
9	9.	NONA	1.0000	7.	10.	2.	1.	1.	1.	1.	5.
10	10.	NONA	1.0000	8.	10.	2.	1.	1.	1.	1.	5.
11	11.	NONA	1.0000	9.	10.	4.	1.	1.	1.	2.	5.
12	12.	NONA	1.0000	10.	5.	2.	1.	1.	1.	4.	1.
13	13.	NONA	1.0000	11.	9.	4.	1.	1.	1.	2.	5.
14	14.	NONA	1.0000	12.	10.	4.	1.	1.	1.	2.	6.
15	15.	NONA	1.0000	13.	10.	1.	2.	1.	3.	4.	3.
16	16.	NONA	1.0000	14.	9.	5.	1.	1.	2.	1.	5.
17	17.	NONA	1.0000	15.	10.	4.	1.	1.	2.	2.	4.
18	18.	NONA	1.0000	16.	10.	3.	1.	1.	3.	1.	5.
19	19.	NONA	1.0000	17.	10.	2.	1.	1.	3.	1.	5.
20	20.	NONA	1.0000	18.	7.	3.	2.	0.	1.	1.	5.
21	21.	NONA	1.0000	18.	10.	3.	2.	1.	1.	1.	5.
22	22.	NONA	1.0000	19.	8.	2.	3.	1.	2.	1.	4.
23	23.	NONA	1.0000	19.	9.	2.	3.	0.	2.	1.	3.
24	24.	NONA	1.0000	19.	10.	2.	3.	0.	2.	1.	3.
25	25.	NONA	1.0000	20.	10.	4.	1.	1.	2.	1.	4.
26	26.	NONA	1.0000	21.	7.	4.	1.	1.	1.	5.	5.
27	27.	NONA	1.0000	22.	9.	5.	1.	1.	1.	1.	8.
28	28.	NONA	1.0000	23.	10.	4.	1.	1.	1.	1.	9.
29	29.	NONA	1.0000	24.	8.	5.	1.	1.	2.	2.	5.
30	30.	NONA	1.0000	25.	10.	4.	1.	1.	3.	4.	3.
31	31.	NONA	1.0000	26.	10.	4.	1.	1.	3.	1.	5.
32	32.	NONA	1.0000	27.	10.	4.	1.	1.	1.	4.	5.
33	33.	NONA	1.0000	28.	5.	4.	1.	1.	1.	1.	5.
				29.	7.	4.	2.	0.	1.	1.	5.

PROGRAMMER'S NAME

B. PRIBAC

JOB NAME

'W/L.BPSPSSI'

DATE _____

VARIOUS

2 PAGE

FIELD IDENTIFICATION

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
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SELECT IF

(VAR005 EQ 1)

$$R \subseteq C \subseteq D \subseteq E$$

VAR002 (1973 THRU 1977=5) (1968 THRU 1972=4)

(1963 THRU 1967=3) (1953 THRU 1962=2) (1877 THRU 1952=1)/

LIST CASES

CASES=638 / VARIABLES=ALL

FREQUENCIES

GENERAL = VAR002 VAR003 VAR004 VAR006 VAR007 VAR008

$\emptyset P T I \emptyset N S$

4, 6, 8, 9,

STATISTICS

ALL

BREAKDOWN

$$VARIABLES = VAR002(1877, 1977) / VAR003(1, 7) /$$

VAR004(1,7)1

TABLES=VAR002 BY VAR003,VAR004/

READ INPUT DATA

CROSS TABS

VARIABLES = VAR002(1, 5) VAR003(1, 7) VAR004(1, 7)

VAR006(1,3)VAR007(1,6)VAR008(1,9)/

TABLES = VAR002 BY VAR006 / VAR002 BY VAR004 /

$$VAR003 \text{ BY } VAR004 / VAR007 \text{ BY } VAR002 / VAR007 \text{ BY } VAR003 /$$
$$\text{VAR006 BY VAR004/VAR002 BY VAR003/VAR003 BY VAR002/}$$

ϕ_{PT}, ϕ_{NS}

9.

STATISTICS

1, 3, 5,

FINISH

PROGRAMMER'S NAME

B. PRIBAC

JOB NAME

'WL.BPSPSS2'

DATE

VARIOUS

PAGE

OF

FIELD IDENTIFICATION

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	
NUMBERED																YES																																																									
EDIT																																																																									
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VALUE LABELS																VAR006 (1) MONASH (2) UNSW (3) FED. HEALTH/ VAR002 (1) 1877-1952 (2) 1953-62 (3) 1963-67 (4) 1968-72 (5) 1973-1977/ VAR007 (1) HOSPITALS (2) TERTIARY INSTITUTIONS (3) SURVEY LIBRARIES (4) FEDERAL AUTHORITIES (5) STATE AND LOCAL AUTHORITIES (6) FIRMS AND ASSOCIATIONS (7) OTHERS/ VAR003 (1) ANZ (2) USA AND CANADA (3) UK AND IRELAND (4) WESTERN EUROPE (5) EASTERN EUROPE (6) ASIA (7) OTHERS/ VAR008 (1) OVERSEAS (2) ACT (3) NORTH TERRITORY (4) VICTORIA (5) NSW (6) QUEENSLAND (7) S. AUSTRALIA (8) W. AUSTRALIA (9) TASMANIA/																																																									
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MISSING VALUES																VAR002 (99)																																																									
NO OF CASES																638																																																									

The SPSS Procedure for the Analysis of Frequencies

WL.BPSPSS1

NUMBERED	YES	00000025
RUN NAME	CODE JOURNALS IN BIOMEDICINE ON ILL IN AUSTRALIA	00000022
VARIABLE LIST	VAR001 TO VAR008	00000030
VAR LABELS	VAR001 TITLE OF JOURNAL/VAR002 PUBLICATION DATE/ VAR003 PLACE OF PUBLICATION/VAR004 FREQUENCY OF LOAN/ VAR005 MARK FOR FREQUENCY/VAR006 LENDING LIBRARY/ VAR007 BORROWING LIBRARY/VAR008 LOCATION OF BORROWER/	00000040 00000050 00000060 00000070
VALUE LABELS	VAR006 (1)MONASH (2)UNSW (3)FED.HEALTH/ VAR007 (1)HOSPITALS (2) TERTIARY INSTITUTIONS (3)SURVEY LIBRARIES (4)FEDERAL AUTHORITIES (5)STATE AND LOCAL AUTHORITIES (6)FIRMS AND ASSOCIATIONS (7)OTHERS/ VAR003 (1)ANZ (2)USA AND CANADA (3)UK AND IRELAND (4)WESTERN EUROPE (5)EASTERN EUROPE (6)ASIA (7) OTHERS/ VAR008 (1)OVERSEAS (2)ACT (3)NORTH.TERRITORY (4)VICTORIA (5)N.S.W. (6)QUEENSLAND (7)S.AUSTRALIA (8)W.AUSTRALIA (9)TASMANIA/	00000080 00000090 00000100 00000110 00000120 00000130 00000140 00000150 00000160 00000170 00000180 00000190 00000200 00000210 00000220 00000221 00000222 00000223 00000300 00000370 00000380
INPUT MEDIUM	DISK	
INPUT FORMAT	FREEFIELD	
MISSING VALUES	VAR002 (99)	
N OF CASES	638	
FREQUENCIES	GENERAL=VAR002 VAR003 VAR004	
OPTIONS	6, 8, 9,	
STATISTICS	ALL	
READ INPUT DATA		
FINISH		
SAVE IT FOR NEXT TIME		

Edmondson



FILE COPY

NATIONAL HEALTH
AND
MEDICAL RESEARCH COUNCIL

TELEPHONE: 619111

TELEGRAMS: "HEALTH, CANBERRA"

BOX 93 P.O.

CANBERRA, A.C.T.

IN YOUR REPLY
PLEASE QUOTE

66/2361

COPY TO ALL MEMBERS OF THE M.R.A.C. AND THE M.A.C.

File

Dear

Bibliographic Services for MEDLARS

The enclosed list of journals includes all of those which are indexed by the U.S. National Library of Medicine but are not as far as is known held by any medical library in Australia.

A sub-committee of the Australian Advisory Council for Bibliographic Services is endeavouring to obtain an assessment of the value of these journals with a view to ordering the more important ones by medical libraries.

It would be of great assistance, if you have knowledge of the value of any of them, to indicate either that certain journals are worth taking or that certain others are definitely not worth taking. I would appreciate your help.

Perhaps you could return the list suitably marked or with comments as soon as is convenient.

Yours sincerely,

K.W. Edmondson
(Medical Officer)

127

KWE:AL

EDM

66/2361

2600

15/11/67

Dr. P.S. Woodruff,
 Director-General of Public Health,
 Department of Public Health,
 Government Offices,
 169 Rundle Street,
ADELAIDE. S.A. 5000

Dear Dr. Woodruff,

Many thanks for your letter of 13th November concerning the list of Journals not currently received by Australian libraries.

I understand that the Australian National Library has sent the list to the Medical Library of Adelaide University so that all the University staff should be already covered.

I think the consensus of opinion to date has been that almost none of these journals are worth taking! If however you feel that there are any doctors in Adelaide whose opinions should be obtained I would be pleased if you could spare the time to do so. I doubt however that it is necessary to take too much trouble over this exercise.

I have just heard from Mrs. Barbara Dahl of Flinders University that she has completed all the smoking data survey work in South Australia. I hope to get this on to computer tape shortly and will let you know what sort of results we get.

Kind regards.

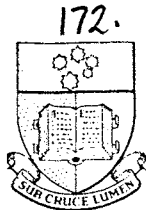
Yours sincerely,

K.W. Edmondson
 (Medical Officer)



172. 1472 66/2361 44pp.

THE UNIVERSITY OF ADELAIDE



ADELAIDE, SOUTH AUSTRALIA

BARR SMITH LIBRARY

Please address
correspondence to
The Librarian and quote

Our Reference IR/cmf

8th September, 1967.

Your Reference

Dr. K.W. Edmondson,
Medical Officer,
National Health and Medical Research Council,
Box 93 Post Office,
CANBERRA. A.C.T. 2600.

Dear Dr. Edmondson,

NEDLARS IN AUSTRALIA

As a member of the Australian Advisory Council on Bibliographical Services I recently received from the National Library a copy of Health, v. 17 no. 2, June 1967, and an undated circular letter which I understand you have sent to medical librarians.

Although neither the Medical Librarian (Miss J.A. Lloyd) nor I can trace receipt of a copy of the letter directly from you I am taking advantage of the opportunity to comment.

There is no doubt that the arrangement with the United States National Library of Medicine for the supply of MEDLARS magnetic tapes to Australia is a commendably progressive move on the part of the National Health and Medical Research Council. I certainly wish the project every success.

However, I have serious fears of the consequences of successful production of bibliographies unless certain precautions are taken. It is likely that bibliographies selected from the MEDLARS tapes will create a demand for many medical periodicals which are not held in Australian libraries but should be. Many librarians are acutely conscious of the need for additional funds to strengthen collections to meet present demands. A suddenly increased demand would add greatly to the present problems. A few libraries are already carrying a large part of the burden of inter-library lending. The Barr Smith Library, for example, in 1966 met more inter-library loan requests (13,042) than any other university library in Australia,

173.

-2-

and statistics indicate much heavier lending in 1967 than in 1966. The Medical Library, which is comparatively rich in holdings of periodicals and takes many out-of-the-way titles, is at present catering to almost half of the inter-library loan requests handled by the Barr Smith Library. I am afraid that if comprehensive bibliographies are produced in any number from the MEDLARS tapes the Medical Library, which by comparison with others in this country is fairly strong, will find, like a number of other libraries, that its collection is quite inadequate in the face of local and inter-state demands, and that the call for such material as it does hold creates a very heavy burden for the inter-library loan staff. The Medical Library reports its holdings to the national union catalogue and union lists of serials, and is taking other steps to ensure that its resources are known. Inevitably, the result is greater pressure on its service. Co-operation in listing and granting access to resources is certainly of fundamental importance, but, unless the resources are adequate, demands result which cannot satisfactorily be met.

I would respectfully ask that the National Health and Medical Research Council, unless it has already done so, consider or draw attention to the need of greater financial support to enable medical libraries to build up stronger collections, with due attention to some scheme which would ensure a greater degree of local self-sufficiency and a more even distribution of the burden of inter-library loans.

Yours sincerely,

I. RAYMOND
Librarian.

TELEPHONE
34 0484

TILB RAMS
UNI MELB PARKVILLE



84 60/2361 Apr

University of Melbourne

BROWNLESS MEDICAL LIBRARY

Parkville N.2, Victoria

13th April, 1967.

Dr. K. W. Edmondson,
Medical Officer,
National Health and
Medical Research Council,
Box 93 P.O.,
CANBERRA ... A.C.T.

Dear Dr. Edmondson,

Thank you for your letter of 14th March 1967.
I hope I shall be able to meet you at some stage, as I should
very much like the opportunity to discuss the content of your
letter in more detail than is possible in this reply.

I agree wholeheartedly that the time is ripe
for a move towards a medical library service on a national
scale, and should very much like to see a survey done, leading
to a report and recommendations along the lines of the Simon
Report in Canada and the Esterquest Report in New York. The
great weakness in Australia is the lack of any medical library
sufficiently large, well-staffed and well-financed to serve as
an adequate base library for a state service, still less for a
national service. It is terribly difficult to build a large
number of small disparate libraries into a national structure -
we really require a sub-structure at state level, and a national
centre capable of serving as a base for the state systems.

The Central Medical Library Organization is a
scale model of an attempt to form an integrated medical library
service. It began in 1953 with a union catalogue, a duplicate

... 2 ...

- 2 -

exchange, a system for procuring references not available in Australia, and negotiations for the consolidation of older periodicals and broken sets in one library. It is still performing these functions, on a larger scale, for a larger membership, and is of course extremely valuable, but it has not gone beyond its original enterprises to the formation of a co-ordinated medical library service.

To refer to your specific projects:-

Union Catalogue.

This would be extremely useful, but some thought should be given to the relative value of state union catalogues versus a national catalogue, or a mixture of the two. The holdings of the University and State libraries will appear in the National Union Catalogue. Inclusion of small library holdings there will bulk the catalogue with entries for books which are probably neither unique copies, nor of a type to be made available for interstate loan. Some extension of the National Union Catalogue to cover significant library holdings not already included, plus state union catalogues for all medical holdings, might be more manageable, and better value for money. Whatever is decided should be publicized widely and promptly, as union lists of one sort or another are frequently initiated on a local basis. Continuity is vital in this and other schemes. We must be able to ensure that projects are such that they can be continued, and do not collapse or fall behind.

Index to Australian Medical Literature.

A substantial amount is already being done by C.S.I.R.O.'s Australian Science Index, which has considerably increased its coverage of medical periodicals. The editorial staff would be glad to have its responsibilities more clearly delineated. Once again, a well-conceived national plan would avoid partial, overlapping, and sometimes amateurish efforts. Retrospective coverage, and adequate cumulation, would be technically possible and most useful to a broad range of medical, historical and sociological scholars and students, but would certainly require most careful pre-planning, and considerable finance.

Medlars Centre

I suspect that it is still too early to contemplate a Medlars Centre in Australia. See the Bulletin of the Medical Library Association, v.54 no.4 October 1966 for a review of recent

U.S. experience. A great deal of preliminary training and planning would be required over quite a long period.

Journal Coverage.

I am sceptical of schemes for securing poor quality journals in order to remedy 'deficiencies' in coverage, at a time when books and periodicals of undoubted merit, and staff and facilities for servicing them are in such short supply. Some selective acquisition might be worthwhile. Consolidation of little-used periodicals in one centre with facilities for quick service would certainly be worthwhile. An official national exchange would be worthwhile in dealing with Communist countries, not because we want a monolithic system, but because they have one, and official exchange would relieve other Australian libraries of the burden of this kind of negotiation. Consolidation of broken files, and selective cancellation of surplus subscriptions, would be very worthwhile, but terribly difficult to achieve. It would be very helpful to achieve a quick and efficient service giving access to overseas library resources for material not available in Australia, and to make the system independent of affiliation. We have resources available at the University of Melbourne which can be used by University staff only. This creates difficulties for the bona fide scholar who does not happen to have the required affiliation.

The important points in any scheme would be:-

1. Knowledge of the overall situation and projections for the future.
2. Sound feasibility studies, with special reference to the number and calibre of staff required to inaugurate and maintain the proposed services.
3. Knowledge of work already in hand, so that overlapping and gaps in service can be avoided.
4. Adequate consultation in advance, and publicity during the establishment of new schemes, so that the sponsors can secure a good feedback from the people who are to use the services.

I shall be attending the Seminar organized by the Postgraduate Committee in Medicine, University of Sydney on April 19th, but understand that you will not be present. I shall hope to meet you on some other occasion.

Yours sincerely,

(Miss) Anne Harrison,
Medical Librarian.

KWE:AL

66/2361

Miss A. Harrison,
Medical Librarian,
Brownless Medical Library,
University of Melbourne,
PARKVILLE. N.2. Vic.

Dear Miss Harrison,

Thank you very much for your letter of 13th April, and for your comments on the projects which have been put forward by a number of persons concerning coordinated medical library service on a national scale.

I would entirely agree with your summary of the important points to be considered and also that organisation on a local level must precede organisation on a national level. I believe this may have been stimulated in certain parts. The interest of the Department of Health in such national coordination was stimulated by inquiry from various medical professional groups and from medical librarians and it was felt that the least that could be done was to ~~give~~ give some impression as to whether other medical librarians thought this desirable.

I am sorry that I was unable to meet you at the Seminar organised by the Postgraduate Committee of Medicine on April 19th as I did not return from Perth until the 20th. I hope I may be able to remedy this sometime in the future.

Yours sincerely,

K.W. Edmondson
(Medical Officer)

AUSTRALIAN MEDLINE SERVICEMeeting, 28th May 1976Agenda

1. Introduction
2. Review of MEDLINE (Technical paper, no. 1)
3. Financial commitments by participating institutions
(Technical paper, no. 2)
4. Roles and responsibilities of participating institutions
and the National Library of Australia. Establishment of
a Life Sciences Liaison Group. (Technical paper, no. 3)
5. Costs of service to ultimate users.
6. Training programme (Technical paper, no. 5)
- * 7. Document backup (Technical paper, no. 4)
8. Other business

A MEDLINE demonstration will be available in ANSTEL from
12 noon to 12.30 p.m.

Lunch will be provided in the Council Room at 12.30 p.m.

Morning and afternoon tea and coffee will be provided at
appropriate times.

LIFE SCIENCES INFORMATION NETWORKTECHNICAL PAPER NO. 4Document Backup For Medline

1. The use of a computer-based information service like MEDLINE will increase demand for access to the documents covered by the data base. Organisations providing library services to MEDLARS will be aware of such demands presently being made on their library services. The introduction of a MEDLINE terminal is expected to increase this demand.
2. MEDLINE currently covers about 2,800 journals. No other type of library material is covered. A recent check of these titles undertaken for ANSTEL showed that over 1,800 were held in ANSTEL, nearly 500 further titles were held elsewhere in Australia, and over 400 were not available in the country. It is ANSTEL's policy to work towards complete coverage, paying particular attention to those not held in Australia. Progress in this respect is presently severely limited by lack of funds.
3. ANSTEL offers a National Lending Service aimed at providing rapid access to any scientific or technological material. In recognition of its particular responsibilities in the MEDLARS Service, ANSTEL guarantees to supply a copy of any document notified through the MEDLARS Service, and if necessary photocopies are obtained from another Australian resource or an overseas organisation. Also, there is the long established inter-library loan system which operates in Australia, and the union list 'Scientific Serials in Australian Libraries'.
4. MEDLINE centres may like to consider what action, if any, should be taken to ensure more effective document backup to the MEDLARS Service. Such action could include:
 - (i) identification of a core list of serials, each of which should be held at each centre. ANSTEL staff are preparing such a list which should be available at the meeting on 28th May 1976,
 - (ii) the preparation of a union list showing locations for all MEDLINE serials. This would not only be a working tool, but it would also reveal deficiencies in the current holdings, and could lead to
 - (iii) arrangements for cooperative acquisition and/or storage,
 - (iv) arrangements to monitor and notify changes in the journals covered.

Life Sciences Technical Liaison Committee

Agenda for meeting to be held in the Fourth Floor Conference Room of the National Library of Australia at 10.00 a.m. on Friday, 28th April 1978

1. Introductions
2. Apologies
3. Report of last meeting
4. Matters arising not covered elsewhere
5. Review of network developments
6. Training of analysts and standards of service
7. Telecommunications
8. Future developments
9. Regional responsibilities
10. Document backup
11. List of experts
12. Audio-visual materials
13. Future composition of Life Sciences Technical Liaison Committee
14. Other business

Morning tea will be served in the Conference Room at 9.45 a.m. prior to the meeting.

Lunch will be taken at 12.30 p.m. The Committee will be joined for lunch by the AACOBs Working Party on User Needs, the Director-General, and senior National Library staff.

Afternoon tea will be served at an appropriate time.

NATIONAL MEDICAL LIBRARY SERVICES

A meeting was held on Friday the 24th February to discuss the possible establishment of some preliminary form of national medical library service in Australia. The meeting was called by Mr. W.H. Bier (Librarian of the School of Public Health and Tropical Medicine) at the request of Dr. Edmondson of the Commonwealth Department of Health. It was attended by Medical Librarians of the Sydney metropolitan area and was addressed by Dr. Edmondson.

It is understood that:-

1. There have been preliminary discussions between Dr. Edmondson and senior officers of the National Library of Australia on the need for some form of national medical library service in Australia and that the National Library of Australia will probably make recommendations on this matter to the Department of Health in the near future.
2. Dr. Edmondson suggested the establishment of an Australia-wide union catalogue of monographic medical material in Canberra and the establishment of Medlars in Canberra with the indexing of Australian medical literature for the National Library of Medicine in Washington.
3. He also foreshadowed the possibility of the establishment of a national medical library collection in Canberra built on the collection of the Commonwealth Department of Health.
4. No difficulties were foreseen by Dr. Edmondson in establishing in the first instance a bibliographic service separated by long distances from the textual resources of Sydney and Melbourne and from the centre of gravity of the scientific community which will be the potential users of this service.

While it is agreed that there is an urgent need for some form of a nationally coordinated effort in the Biomedical Library field in Australia, the location and form of the centre (or centres) of this coordinated effort is open to discussion.

The Board of Regents of the National Library of Medicine in Washington have laid down a set of criteria governing the selection of Medlars Search Centres (MLA Bull.54:400-401: 1966). These criteria are germane to the problem of location and form of a National Medical Library service in Australia which would presumably be equipped with Medlars computerised information retrieval in the future.

These criteria are:-

- 1) Service policy of the institution - willingness to provide regional service.
- 2) Computer resources - equipment and personnel.
- 3) Library resources - collection and personnel.
- 4) Geographic location and distribution of scientific community to be served.
- 5) Support from top management of the institution.

6) Related items -

- a. Potential of the staff for research in information science.
- b. Potential use of MEDLARS data in training library and other information specialists.
- c. Existence of specialised information centres to be served by extracting data from MEDLARS tapes.

The alternatives to a national medical library service located in Canberra are:-

1. The division of Australia into two nationally coordinated regions with centres in say Sydney and Melbourne or Adelaide (for example, a centre in Melbourne or Adelaide serving Victoria, South Australia, Western Australia and Tasmania) and a centre in Sydney serving New South Wales, Queensland, the Northern Territory, Papua and New Guinea and possible New Zealand).
2. A national medical library service in either Sydney or Melbourne serving the whole of Australia.
3. Services in areas of various sizes which can meet the criteria set out above.

In considering these alternatives in relation to the criteria listed above the following points emerge:-

- a. Both Sydney and Melbourne have institutions already providing an informal regional service and which would be willing to provide formal regional service in the future.
- b. Both Sydney and Melbourne have the necessary computer facilities (IBM 360 series computers or KDF 9) while the Commonwealth Department of Health has access to a CDC computer at the Bureau of Census and Statistics. This computer has an IBM tape deck which makes possible the conversion of IBM tapes to tapes suitable for use on a CDC computer.
- c. Library resources in regard to collections and staff are much greater in Sydney and Melbourne and Adelaide than in Canberra.
- d. The centres of gravity of the scientific community to be served are located in Sydney and Melbourne rather than Canberra.
- e. At present the only graduate library school in Australia is located in Sydney.
- f. Most specialised information centres in the Biomedical field are located in either Sydney, Melbourne, or possibly Adelaide.

-3-

However the strongest arguments against the location of a national medical library service in Canberra (and therefore for for location of this service in Melbourne and/or Sydney and/or Adelaide are

1. The desirability of developing a national medical library service from the basis of a strong centralised non-lending reference library with a staff having adequate experience in providing a regionalised service and which can be adequately developed to provide a wider regionalised service.
2. The undesirability of establishing a bibliographic information service separated geographically from both textual resources and from the scientific community. This separation from the scientific community is undesirable especially in view of the apparent need for lengthy direct dialogue between the scientists and the MEDLARS searcher.

Has a Honeywell also but unlikely to be time available.

36

6. Librarians' Meeting Friday 24th Nov.

All the librarians from major medical libraries - universities, hospitals and A.M.A. attended.

General agreement and support for all I had to say.

6.1 Union Catalogue.

6.2 Australian bibliography index as a possible approach to

6.3 Medlars - x most seemed to know about this already and several had tried to get NLM to do searches but have been refused.

6.4 Suggested that the physical library must come, but that it would be a librarians' library only and not for general call (at least in early stages) and would be better if concentration on journals was made.

6.5 I was rather surprised at the suggestion that librarians might be prepared to exchange or give over substantial sections of libraries to improve distribution. This was suggested by one and met with no objections whatever. It looks as if cooperation might be surprisingly easy.

6.6 Almost all admitted their own inadequacies with respect to notification of journal holdings to S.S.A.L. and feel that something needs to be done. The C.S.I.R.O. librarian was present and thought that the help would be appreciated but thought it might be a good idea if I discussed with Miss Doubleday.

7. Another suggestion from Balnaves. Should consider whether Department of Health ought to have statutory authority for medical library services on a national scale - in the same way as National Library has for general subjects, and Forestry has for its own special subject.

8. I feel that I should discuss this with librarians in Brisbane, Melbourne, Adelaide and Perth if given the go-ahead (Perth can be covered in April).

MINUTES OF THE MEETING HELD AT THE UNIVERSITY OF NEW SOUTH
WALES ON MONDAY, 30 OCTOBER 1967, COMMENCING AT 10.00 A.M.

PRESENT:

Acting Convener : Miss J. Waller
Members : Mr. J. Balnaves
Miss A. Harrison
Miss J. A. Lloyd
By invitation : Dr. K. Edmondson (Dept. of Health)
Mr. A. R. Horton (Agenda items 4-7)

APOLOGY

Dr. Foote, the Convener, was unable to be present owing to his recent illness.

AGENDA ITEM 1.

TERMS OF REFERENCE (Document 3)

"To investigate and report back to Standing Committee on the effect that the introduction of MEDLARS into Australia will have on medical Library Services". (AACOBS Standing Committee Resolution SC/9/68).

It was agreed that the MEDLARS service must be considered in relation to the total pattern of biomedical information services in Australia.

AGENDA ITEM 2.

METHODS OF PROCEDURE (Document 4)

RESOLUTION 1. That no further meetings of this Committee be held before the AACOBS Standing Committee meeting on December 8, 1967; and that the Committee continue its work for the time being by correspondence.

RESOLUTION 2. That it be recommended to Standing Committee that the Committee on Medical Library Services should be re-appointed after making its report, possibly with an enlarged membership, in order to study in detail the broader aspects of biomedical information in Australia.

AGENDA ITEM 3.

INSTITUTION OF MEDLARS BY THE NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL

(a) Statement by Mr. Balnaves (Document 5)

Mr. Balnaves reported:

- (i) that 50 libraries had received copies of the list of the titles indexed in Index medicus and not recorded amongst current Australian holdings;

- (ii) 5 more serial titles have been reported as being currently held;
- (iii) some libraries are interested in subscribing to some of the unrecorded serials.

The Committee agreed that the purpose of the list was not to persuade libraries to acquire all the titles, although some larger libraries might advantageously increase their holdings in some fields.

RESOLUTION 3. That Mr. Balnaves continue to circulate the list of unrecorded serials.

The Committee noted Dr. Foote's comment that the unrecorded titles were "relatively insignificant as far as the potential information retrieval power of MEDIARS is concerned", and that it would not be necessary to attempt a full coverage as had been done in England. (Document 6)

RESOLUTION 4. That Miss Harrison with Dr. Edmondson's assistance make a critical evaluation of the unrecorded periodicals as a basis for deciding whether it is necessary to ensure exhaustive holdings of the Index medicus list.

RESOLUTION 5. That in the second half of 1968 a seminar should be arranged to teach medical librarians the essentials of the MEDLARS search technique.

(b) Progress report by Dr. K. Edmondson on the proposed Australian MEDIARS centre. (Given verbally)

- (i) The U.S. National Library of Medicine has agreed to a three-year trial of an Australian MEDLARS centre.
- (ii) The National Health and Medical Research Council has made a research grant to the University of Sydney to develop the MEDLARS search service using the University's computer.
- (iii) If the trial run is successful, the service will be continued, with the National Library of Australia providing the National Library of Medicine with index entries for Australian medical literature.
- (iv) Sweden has begun to supply entries to the National Library of Medicine in conventional form, not on computer tape.
- (v) Mr. R. Donnelly of the University of Sydney's computer centre is at present following the course of training offered by the National Library of Medicine, concentrating on the programming aspect, and will return to Australia in April 1968. Dr. Edmondson will be visiting the United States in 1968 and will study MEDIARS indexing and the formulation of search requests.
- (vi) Even by the end of 1968, the MEDLARS service will not be available to all Australian medical librarians, as it will be necessary to make progressive improvements to the system in the early stages.

RESOLUTION 6. That the Committee considers that access to the MEDLARS search service should initially be on a selective basis.

- (vii) After the trial period to establish the system, the Department of Health may have its own computer which would be available for the MEDLARS service.
- (viii) During the trial period there will not be any charge for MEDLARS searching and there may be no charge when the service is established, unless service facilities are required by a firm such as I.C.I.
- (ix) Professor Bennett believes that it would be possible to develop facilities for remote consultation of the MEDLARS index.

RESOLUTION 7. That Dr. Foote prepare an article in consultation with Dr. Edmondson and Committee members for the Australian Library Journal on the development of biomedical library services in Australia in relation to an Australian MEDLARS centre.

Mr. Balnaves reported that the National Library would begin a serious study of medical indexing in December 1967, with a view to producing an "Australian medical index". (Medical literature is already excluded from the CSIRO's Australian science index.) The National Library already receives 80 relevant serials on legal deposit, about 36 of which may need comprehensive indexing.

It was agreed that there was a need for international co-operation to improve certain deficiencies of the MeSH list.

It was agreed that requests for MEDLARS searches should come only through larger medical libraries, to ensure that proper use is made of conventional search facilities before recourse is made to MEDLARS, and that in practice this would mean channelling requests through the university medical libraries.

AGENDA ITEMS 4 & 5.

BIOMEDICAL INFORMATION IN AUSTRALIA : IMPLICATIONS OF MEDLARS.

(Documents 7-9)

The Committee considered the possibility of State regional centres for biomedical information and reached agreement on the following points:

- (i) Consideration of regional medical library centres should be related to present discussion of regional centres at present taking place in AACOBS and the Book Resources Committees.
- (ii) The State libraries are the obvious regional centres for most purposes, but their holdings and bibliographical resources are inadequate in medicine, while the cost of building them up to an adequate level would be prohibitive.
- (iii) The decision to refer a search to MEDLARS must be made by a librarian, which means that there must be regional centres of some kind where a reference interview can take place. Extra staff may be required if the university medical libraries are to serve as such centres, since improved reference service invariably produces an increased demand.

RESOLUTION 8. That AACOBS be requested to draw the attention of university library authorities to the need for adequate staff and resources if the MEDLARS project is to be successful.

- (iv) Regional centres for biomedical information do not imply regional union catalogues. The high cost of compilation is not warranted when national facilities are available.

The Committee also considered the fact that there is no institution responsible for building a comprehensive national medical collection in Australia, and that the existing resources are widely dispersed. There is thus a need for co-ordination in the development of medical collections and of the MEDLARS system.

- RESOLUTION 9. That an agency be established to co-ordinate the development of the MEDLARS system in Australia, and that this agency should be established within the National Library-AACOBS structure.
- RESOLUTION 10. That AACOBS be requested to investigate the possibility of securing a foundation grant to promote the full use of MEDLARS.
- RESOLUTION 11. That Miss Harrison prepare a statement of the reasons for which a grant is required to support the MEDLARS project.
- RESOLUTION 12. That Dr. Foote be requested to draft a questionnaire to assist in determining the extent and character of biomedical bibliographic resources in Australia and the best method of their co-ordination, in time, if possible, for it to be presented to Standing Committee with the report.

It was agreed that the questionnaire should provide information such as the following :-

- (a) the libraries which hold relevant materials;
- (b) quantity and quality of current and retrospective holdings;
- (c) acquisition policies;
- (d) staff;
- (e) loan policies;
- (f) clientele;
- (g) access to photocopying facilities;
- (h) access to telex;
- (i) cataloguing practices;
- (j) contribution to SSAL and other union catalogues;
- (k) statistics where available (loans, enquiries, etc.);
- (l) exchange arrangements.

AGENDA ITEM 6.

INFORMATION NEEDS IN THE BIOMEDICAL SCIENCES IN AUSTRALIA

- RESOLUTION 13. That Dr. Foote be asked to draft a statement on the information needs of the biomedical scientific community in Australia.

AGENDA ITEM 7.ALTERNATIVE METHODS OF MEETING INFORMATION NEEDS.

RESOLUTION 14. That the attention of Standing Committee be drawn to the need to evaluate the MEDLARS service, possibly by organising feedback from users to the co-ordinating centre suggested in Resolution 9.

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