EITH DAVISON

THEORY OF CLASSIFICATION

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This book, a concise treatment of an important branch of library science — the theory of classification — provides students preparing for their examinations with a guiding framework on the subject.

Mr. Davison begins with a brief review of the principles and application of the various systems of classification, emphasising the key features of each. He then briefly touches upon the theoretical principles applied in the construction and working of a classification scheme and proceeds to explain the problems involved in the formulation of special schemes. While underlining its limitations, the author brings out the importance of 'notation' in any scheme of classification and also considers the application of mechanical methods to classification and the relationship of classification to cataloguing and indexing.

A distinguishing feature of this study-aid is its analysis of important literature on the subject, including articles in periodicals, which enables students to plan out their detailed reading judiciously.

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THEORY OF CLASSIFICATION

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AN EXAMINATION GUIDEBOOK

BY KEITH DAVISON FLA

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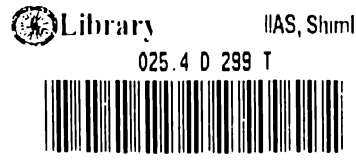

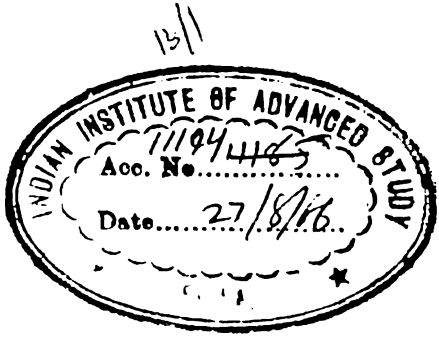

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PREFACE

THE *Examination guides* are a new concept in texts for librarianship studies. They are a series of short books designed to cater specifically for the Library Association final part II examination. They follow exactly the pattern laid down in the official syllabus. They are intended for use both within the framework of a library school course and also for students studying privately, especially those who need a ' key ' guide for speedy pre-examination revision.

Within the library school it is envisaged that the *guides* may be used by tutors as a supplement to formal lecture programmes and as a means of providing students with a guiding framework for each course. Specifications for essays, reports and drafts to be submitted for a tutor's consideration can be taken from the *guides* without the need for comprehensive lecturing which might reduce the likelihood of original, free thinking work.

The intelligent library student should find the *guides* invaluable companions in final revision work. The authors have analysed each subject and drawn attention to the key points in summary form, backed up with carefully selected readings to provide amplification. Thus any of the topics can be followed up directly in detail. For a student already familiar with the syllabus the *guides* provide both a method for revision and a fresh approach to their subjects.

Part time and private study students should not regard the *guides* as a substitute for wider and more detailed reading. Their prime function is to enable the student to recognise the key features in each subject. Too often students with little or no tutorial guidance fail to obtain a proper perspective and may spend a disproportionate amount of time on comparatively minor topics.

The *Examination guides* series is edited by Donald Davinson FLA, senior lecturer at the Leeds school of librarianship. Other *guides* which have already been published are *Academic and legal deposit libraries* by Donald Davinson FLA and *Public library administration* by George Jefferson FLA. Further titles are in course of preparation.

INTRODUCTION

THE syllabus calls for detailed knowledge of existing major schemes, familiarity with methods of compiling new schemes and an awareness of the growth of mechanisation and the development of computers.

Reading for this examination must be wide, and not restricted to old examination favourites. The examiners' major criticism of candidates in the past has been the apparent inability to discuss. Questions calling for description have been answered adequately, but those requiring discussion tend to show a general lack of reading.

I have divided suggestions for reading into three groups. These are firstly, texts which are essential throughout the course and which are referred to in this book just by the author's name (*eg Bliss*). Secondly, texts containing supplementary or background reading which are necessary to obtain a broad picture of the subject. This group is, of course, not exclusive. Thirdly, those periodicals which must be scanned regularly.

ESSENTIAL TEXTS

H E Bliss *Organisation of knowledge in libraries* (H W Wilson Co 1939). A formidable theoretician like Bliss cannot be ignored. Although he is often widely at variance with other authorities, he is a stimulating writer in depth.

J Mills *A Modern outline of library classification* (Chapman & Hall 1960). Based on lectures given to registration students at the North Western Polytechnic, this book is essential reading for all second year students.

C D Needham *Organising knowledge in libraries* (Deutsch 1964). This recently published book was designed for the part one examination paper, but is particularly valuable for the inter related treatment of classification and cataloguing.

B I Palmer and A J Wells *The Fundamentals of library classification* (Allen & Unwin 1951). A valuable introduction which should be read at the start of the course.

W C B Sayers *Manual of classification* (Grafton third edition reprinted with amendments 1958). This work is dated now, and the theoretical chapters on logical classification are only of historical interest. However, the careful descriptions of the schemes themselves and the author's knowledge of the personalities make very useful reading.

SUPPLEMENTARY TEXTS

Further readings are indicated throughout the following pages. This short list contains only some of the more directly relevant references.

D J Foskett *Classification and indexing in the social sciences* (Butterworth 1963).

D J Foskett and B I Palmer (*eds*) *The Sayers memorial volume* (Library Association 1961).

B I Palmer *Itself an education: six lectures on classification* (Library Association 1962).

S R Ranganathan *Elements of library classification* (Asia Publishing House 1962).

S R Ranganathan *Prolegomena to library classification* (Asia Publishing House 1957).

J R Sharp *Some fundamentals of information retrieval* (Deutsch 1965).

B C Vickery *Classification and indexing in science* (Butterworth 1959).

PERIODICALS

American documentation (Special Libraries Association) Published quarterly.

Journal of documentation (ASLIB) Published quarterly.

Library resources and technical services (ALA) Published bimonthly.

Library science abstracts (Library Association) Published quarterly.

Revue internationale de la documentation (Fédération Internationale de la Documentation) Published quarterly.

It remains only to stress that neither is the reading given above necessarily exhaustive, nor this book adequate by itself for proper and comprehensive understanding of the syllabus requirements. Consolidation of this material will only follow a substantial body of work by the student.

KEITH DAVISON

CHAPTER ONE
THE MAJOR CLASSIFICATIONS

THE examination syllabus lays special emphasis on the period after 1876. However a useful brief survey of earlier material appears in *Bliss* 193-198 where the author shows the haphazard nature of developments prior to this date.

A combination of factors at this time makes it a vital period in the development of librarianship. The most important was Dewey, who not only published the first edition of his scheme but also helped form the American Library Association and the Library Bureau, and was publisher and first editor of *Library journal.*

In discussing the development of classification theory it is inevitable that we start at this point. However, Dewey and several of his successors developed actual classifications and evolved the theory round the practical schemes. This is a method which has a great deal to commend it, and the student may benefit by knowing the schemes and their background first. Without this the development of ideas in classification is possible but less comprehensible.

The following notes on the schemes are brief memory guides only. Fuller studies are quoted for each scheme and should be followed through in reading. Remember also that the syllabus says 'a comparative study', so it is important not only to know each scheme but also to be able to compare them quickly and easily.

In addition it is useful to know the purposes of each classificationist in compiling his scheme. Dewey because a classification was needed; UDC to classify detailed documents on cards; LC to arrange two million books; Brown to obtain an English scheme; Bliss to demonstrate his theories of classification; Ranganathan because of dissatisfaction with all other schemes. This should help provide a general picture which makes comparative study easier.

DEWEY DECIMAL CLASSIFICATION

History: First produced as a thesis in 1873. Production as a scheme was in the first edition, published in 1876; anonymous but with copyright claimed by Dewey. Second edition in 1883 appeared

under his own name. Fourteenth edition 1942, fifteenth standard edition 1951, sixteenth 1958, seventeenth 1965.

Development of decimal classification up to the fourteenth edition was a progressive record of a clear policy pursued successfully by the author throughout his life. Histories of the classificationist are contained in F Rider 'Story of DC 1896-1951' *Library journal* 76 (6) 15th March 1951 473-476 and D Fellowes 'Notes on the development of DC' in *Cataloguers and classifiers year book* (ALA 1939).

Wide popularity of scheme was due to many factors; primarily because it was the right scheme at the right time. Introduction of open access coincided with the scheme and the concept of 'integrity of numbers' helped to maintain continuity.

1951 saw a change in this policy with the introduction of the fifteenth standard edition. It was very unpopular from the beginning, Harrison's review in *Librarian* July 1951 reflecting the general attitude of English librarians. The LA banned the edition for examination purposes.

1958 saw a reversion to Dewey's policy, although some of the changes already carried out were in fact maintained, particularly, the better reallocation of some numbers. Two good reviews of this edition by Coates appear in *Library Association record* 61 (8) August 1959 and 62 (3) March 1960.

In 1965 the seventeenth edition appeared, having been previewed by B A Custer *Library Association record* 67 (3) March 1965.

Construction: Basic decimal division, three figure base, extensive subdivision, even in the limited fifteenth and sixteenth editions, Ability to express detailed subjects despite long notation is still an inherent part of the scheme; not as extensive an enumeration in fourteenth edition.

One of the major criticisms was the form subdivisions, renamed 'standard subdivisions' in the seventeenth edition. Until 1965 there was a total failure to distinguish between inner and outer form, and we have the confusion of 01 PHILOSOPHY, 03 DICTIONARIES, 09 HISTORY, and geographical division. This created the obvious weaknesses that place cannot be expressed except as a historical concept and that there is no allowance for mountains, rivers, deserts, etc. This has been remedied in the seventeenth edition and we have a separate allocation for place, called an 'area table'.

The allocation generally is poor although reasonably relevant in Dewey's time. The weaknesses of science and technology are obvious; note however the equally poor law section which hopelessly confuses country and problem.

Principles: Bear in mind these apply to all editions except fifteenth which was a special edition.

1 Integrity of numbers—no alteration of any numbers from second edition onwards. Fifteenth edition involved major reallocation; 45 percent maintained in 16th, the balance returned to original places. *Needham* 95 shows how librarians can bring pressure to bear on the editors of an established scheme. Consider the problems of integrity—failure to reflect changing pattern of knowledge, no reallocation, weakness development only in chain; major classes should be changed.

2 Detail—great specificity possible, and encouraged by Dewey. Note that early BNB controversy was particularly stimulated by ' shelf location ' enthusiasts.

3 Purity of notation. Note however an occasional allowance to alphabeticise *eg* cameras and photography.

4 Emphasis on ' practicability '.

Revision: Good, now in its seventeenth edition, and new editions have appeared regularly since 1876. Note the revision within the framework of ' integrity of numbers ', which is the reason for the acceptance of revision, combined with basic out of date allocation.

Dewey kept rigid control during his lifetime. *Library journal* 81 (11) June 1st 1956 1363 contains a copy of his 1931 memorandum. Later, unauthorised changes tend to creep into such a popular scheme; Haykin *College and research libraries* October 1955 370-374 gives several examples of this.

Modernisation: The first true modernisation was the fifteenth edition supervised by the Library of Congress who now have a major interest in the decimal classification. See *Journal of cat and class* for the year 1951 which contained several articles on the scheme.

The protests at this modernisation were sufficient to give a swift reversion to ' normality ' in the sixteenth edition, but a good deal of the true modernisation *ie* reallocation was maintained.

A most important statement on the seventeenth edition has appeared in the *Library Association record* 67 (3) March 1965 79-83. Here the editor, Benjamin Custer, reviews the new edition and

shows that it will be substantially different to previous editions in many ways. The original Dewey concept of classification is to be restored—' hierarchical classification structure will be emphasised '. This suggests the classifier will have to check each step of the chain to ensure that all steps are relevant. Form divisions are to be reallocated, as are several major subjects, including the worst of all, PSYCHOLOGY. Many subjects have been expanded and the geographical subdivision recast. The index will be recast to be ' truly relative '; that is presumably some step towards a chain index. The proposed changes suggest a new revitalisation of Dewey on acceptable modern lines and it is interesting to note that these suggestions come from the Library of Congress, frequently suggested to be a home of reaction.

UDC

History: Based on Dewey's decimal classification scheme after the work of Otlet and La Fontaine and the Institut Internationale de Bibliographie for ' the establishment of a complete classified index to all published information '. Useful brief histories of the scheme are found in the Introduction to BS1000A British Standards Association 1961; also *Sayers* chapter fourteen and *Mills* chapter eight.

Note that from the beginning the idea was for a very detailed classification for the compilation of a bibliography of fugitive material, not merely a shelf ordering device. The article by Hopwood in *Library Association record* 9 (6) June 1907 shows how early the majority of the facet indicators were adopted, and how radically the scheme departed from DC. This has recently been confirmed by G A Lloyd in *Revue internationale de la documentation* 27 (2) May 1960 45-80 when he shows how little of the original Dewey concept remains even at the three figure level. He goes on in the same journal 30 (4) November 1963 132-137) to suggest future changes of pattern in UDC science and technology classes.

Application: The scheme is very widely used throughout the western hemisphere and is very popular in eastern Europe. There are frequent references to use in *Library science abstracts.* Further evidence is the translation into many languages, with thirteen abridged editions and seven full editions either existing or in preparation, BS1000C: *Guide to the* UDC by J Mills is the best account of this. A new variation is a medium sized edition in course of preparation in German.

Principles: Faceted scheme. Note how the scheme has grown through the years largely by ad hoc decisions, later proved to be theoretically good as well as practically possible. Great debt owed to Otlet and Donker Duyvis who have moulded the scheme.

Three principles are given in the introduction in BS 1000A, based on the title **1** classification; **2** universal and **3** decimal.

Construction: Basically as DC main classes subdividing by ten. Facet structure gives a general compact size of volume compared with DC. Main schedules are supplemented by a fair relative index, based on index to main schedules, not only abridged editions. Although *Mills* 84 claims index reflects chain procedure, this is accidental, as is shown frequently by repetition of numbers in their class sequence and inversion, *eg* ENGINEERING, CIVIL, ELECTRICAL, MECHANICAL *Auxiliary schedules* should be fully understood; purpose, use and examples of all should be known. The best description is in BS1000 19-22 and 52-57 and BS1000A 10-24. Particular attention should be paid to the distinctions between place, race, form. Also the method of separation of ' inner ' and ' outer ' form to avoid the confusion of DC.

The special auxiliaries should be noted and studied when common auxiliaries are fully understood. These special auxiliaries relate to specific classes only and have three distinct uses. The widest use is within the whole class, a good example being 621-1/-9 MACHINERY, details of which can be used through class 6; ·0 is used specifically where stated and applies only to the limited classes. For example in class 7, note the use of the ·0 throughout the schedule with slight changes of emphasis rather than meaning. The latest introduction, the apostrophe ', is used as a substitute for the chemistry sections when necessary to show specific chemicals in other fields. There is a brief (confusing) description on page 25 of BS1000A but if students consult the actual schedules under 546 and 547 the explanation will be clearer.

The filing order of the auxiliary schedules need not be learnt by heart but principles should be understood and section six of BS1000C should be consulted here.

Revision: The clearest statement of current revision policy is in BS1000A 5-6. Note that each country has its own national UDC committee with subordinate subject committees. These national committees report to the Hague.

The position is, however, still fluid and an important series of articles by F Donker Duyvis appeared in the *Revue internationale de la documentation* 1956-1958 in which he outlined what he considered to be a future policy of revision for UDC. H Wolbach has a detailed criticism of the present system and proposals for improvement in *Revue internationale de la documentation* November 1960 145-148.

Modernisation: The November 1963 issue of the *Revue* carried a group of articles under the common title 'The future of UDC' written by members of the Central Classification Committee. The general suggestions are contained in articles by Lloyd for 'Science and technology' and Rubuc for 'the Humanities'. In addition Barbara Kyle has a useful article on present position and future developments in art and social sciences in UNESCO *Bulletin* 15 (2-3) March-April 1961.

The most radical proposal is the abandonment of class 4 and its combination with 8 to allow expansion for science and technology; this has already been suggested in a recent PP note.

J D BROWN SUBJECT CLASSIFICATION

History: Subject classification the student must beware of, for there is far too great a tendency to treat this scheme merely as an object of ridicule. This is not deserved, and while it undoubtedly has many defects, the 'one place theory' has a great deal in common with faceted classification and cannot be totally ignored. This was Brown's third attempt at the compilation of a classification scheme. The first was a very broad classification in association with J H Quinn in 1894, and the second in 1897 'the adjustable classification' was based on the same ideas. However both of these were unsatisfactory and the subject classification is an entirely different scheme published in 1906. Brown accomplished this with the help only of his nephew J D Stewart, as he did again in the second 1914 edition. Stewart later produced the third edition in 1939 but it attempted no real revision of the classification.

Adoption: Now used in very few UK libraries. Probably the largest is Bournemouth, and in Middlesbrough there is the interesting combination of DC in the reference library with subject classification in the lending library. A recent LA survey of 716 libraries in UK showed that only nine used Brown.

Principles: Partially started as a rebuttal to Dewey's classification scheme. To start with a negative idea is not promising, but some of the principles have a great deal of value. They are usefully explained in the introduction, but as well as reading this, the student should consider the applications to modern theory. The main idea is that the subjects are ' concretes '. The subdivisions of a subject are aspects of these concretes and are consequently treated in the categorical tables. Study these categorical tables carefully, noting their availability for general aspects of many topics, and the potential use of these for alternative location. This idea of the categorical tables is in line with modern theory of allowing autonomy to the classifier to combine what he considers to be the most important subjects. The problem is lack of authority for methods of combination.

Brown thought artificial divisions between subjects, theory and application would disappear. This has not happened, and is one of the major weaknesses of Brown's scheme. Constant examples of such differences are given in most works and should be known. A review of the 1939 edition of the scheme in *Library world* 42 (481) 86 points out these separations superbly. The notation is fixed and decided in advance; the scheme works from a fixed basis.

Construction: **1** Main class order based on MATTER, LIFE, MIND, RECORD. See the introduction for good points; *Bliss* 279-289 for bad points. **2** Generalia unusual, although somewhat resembling the idea of ' Tool sciences ' of Bliss note; GRAPHIC ARTS is there because there was no other place for it! MATHEMATICS has some justification in generalia; mathematics however inevitably leads to applications and so ACCOUNTANCY comes here. Other schedules are equally limited. **3** Combination of main schedules and categorical tables is easy to use. It allows the facet indicator + to be used to join two coordinate subjects, rather than aspects by subordination from the categorical tables. **4** A surprising number of odd detailed divisions are quoted *eg* year numbers, figure numbers for biographical division etc.

Revision: Three editions have appeared but no real revision of the scheme has been attempted. Latest 1939 edition by Stewart did not substantially amend the scheme. No prospect of further revision.

Modernisation: Little possibility of an attempt being made on this scheme.

History: Note *Sayers* chapter sixteen, a useful survey of the early history of the LC in which he states that the *Outline of the Library of Congress classification* was not published until 1904. However, class Z had already been published in 1902. In 1965 publication is still not complete. Class K, LAW, is not yet published, and an article by L C Coffin in *Law library journal* 52 (4) November 1959 442-444 suggests that little progress has as yet been made. A report of a discussion on Library of Congress classification scheme for Anglo-American law is contained in the *Law library journal* 57 (4) November 1964 352-376. The various classes of the schemes should be considered separately, as each is an individual scheme with the largest 'literary warrant' of all. The medicine schedules are now in their fifth edition, others in their first or second. The type of development which has taken place is well illustrated by *Sayers* in chapter sixteen when he quotes the introduction to class T.

Adoption: Designed for the Library of Congress, this scheme would at the moment be used there even if no other library were interested. However the situation may change in that respect if a suggestion by J Mills in *Five years work in librarianship* (LA 1964) is in fact taken up. This is for a study of the use made of the classification in the Library of Congress itself. This follows a recent New York public library survey on similar lines, which showed how labour saving was possible by ceasing to use classification in the reference stocks.

However, since the war many American libraries have decided to change to LC and an article by Gore in *Library journal* 89 June 1st 1964 gives typical reasons for its popularity in many colleges and university libraries. Many also make use of the LC card service and this is often the strongest factor in deciding to change. Edinburgh public library have adopted the classification, and La Montagne in LC *Information bulletin* 18th December 1950 28 shows the adaptations which have had to be made. There is also an attempt being made to show that the change is not only justified on practical expense grounds, but is also theoretically sound. T Samore 'Form divisions in LC and DC classification schemes' *Library resources and technical services* 6 (3) Summer 1962 243-246, in comparing form divisions in LC and DC, shows the kind of thinking. Little attempt is made to consider the scheme in relation to faceted principles.

The weakness of adoption for any other library is the lack of any major linkage between the classes; there are no common facets and no general index. This can be overcome by the librarian using the LC *List of subject headings,* a dangerous but often inevitable practice.

Principles: General principles are very difficult to find, except that the classification is based on one of the largest collections of books in the world. This means that consideration has been given to ' groups of *books* not groups of mere subjects '. After the outline scheme had been compiled, roughly following Cutter's main classes, revision began first by true literary warrant, and secondly by potential demand and realisation of the changes which could be seen by virtue of the size of the collection of literature.

Alphabetical order is used excessively. This is a reflection of the American preoccupation with ' words ' as opposed to classification, and it is a disadvantage particularly in many of the technologies. LC is too often concerned with shelf location not classification.

Construction: Follows the class order of Cutter except for the ARTS which are in the middle of the scheme rather than at the end. Little attention is paid to main class order since the library is completely departmentalised.

Each class is worked out separately, the advantage being that it bears in mind literature and the potential needs of users; good where the library is strongest (in the social sciences), weakest for developments in technology and subjects where detailed scientific specification is required *eg* ELECTRICAL APPARATUS is arranged alphabetically.

Form divisions: Note geographical schedules, how and when used, and the different amount of space usually left at appropriate points. Gaps in the notation are generally filled by those schedules, which again are not common to all classes. *Mills* and *Sayers* show examples with extracts from schedules where possible.

Note the comparative irrelevancy of a great deal of the criticism of LC. Intended as a scheme for one library, it has been adopted and of necessity adapted by many other libraries; their construction problems are however irrelevant to LC.

Revision: Very good; some schedules are completely revised whenever this is considered necessary. The volume of stock added to the library reveals a need for revision before any other library would

notice. Medicine is now in the fifth edition. Revisions are always carried out by LC with its own needs in mind.

Modernisation: A complete change of basic plan is unlikely, particularly with the present trends towards automation. Students should however note the review of the conference report on 'Libraries and automation' *Library Association record* 67 (1) January 1965 30 which report includes a section on the potential mechanisation of Congress. Also the current study mentioned previously which may result in the Library of Congress abandoning the scheme itself. It is unlikely the scheme could survive such a blow.

COLON CLASSIFICATION

History: First produced 1933 by Dr S R Ranganathan after his period of study in England under Sayers. The first edition was actually rather a conventional scheme; Ranganathan himself admits it was hasty and probably the best account of the production of this and subsequent editions is contained in *Sayers memorial volume* (LA 1961) chapter seven, a fascinating vision of the range of Dr Ranganathan's mind.

Currently the sixth edition of volume one is in print, but so far there has been no appearance of the second volume, 'macrothought', to provide the greater depth of classification needed for analysis of documents as opposed to books. Note that Dr Ranganathan is the first to contemplate catering for the two levels of publication, the book and the graphic record, in the same classification.

Application: The major criticism of the colon classification is that it is not used in many libraries. This is true although it was tested on some 25,000 volumes of the Madras university library first. Even if it were not used in any library, value would still lie in the demonstration of the principles and practice of Dr Ranganathan. However, it is in fact in use in several government libraries in India and in one of the Cambridge colleges.

Principles: Probably no scheme is more firmly revised on sound theoretical principles, the best statement of which is found in S R Ranganathan *Prolegomena to library classification* (Asia Publishing House 1957). Most second year students will however find this very difficult reading indeed. Probably the best approach is a re-reading of *Palmer and Wells,* followed by Ranganathan's *Elements of library classification* (Asia Publishing House third

edition 1962). The student should have a clear grasp of what is so different about this scheme, and about Ranganathan's aims before attempting to use the scheme itself. Having read the above two books, *Mills* chapter eleven should be studied thoroughly for a guide to the scheme as a whole. Note however he is describing the fifth edition. There are substantial changes in the sixth edition.

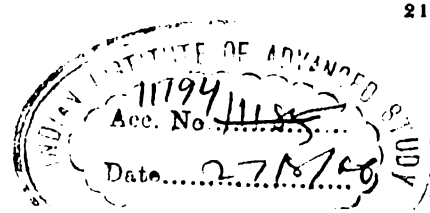
One of the best criticisms of Ranganathan's principles is an interesting article by R Moss 'Categories and relations: origins of two classification theories' in *American documentation* 15 (4) October 1964 296-301. In this Moss discusses the relationships between the work of Ranganathan and Aristotle, Farradane and Hume, and tries to suggest the invalidity of much of Ranganathan's work.

Terminology should be learned and understood. No one uses a more varied, but controlled, vocabulary and all terms should be properly assimilated. Do not half learn, as many librarians do, what Ranganathan is trying to say, and then pronounce his work irrelevant to librarianship. Nothing could be more vital and vividly expressed than his statement of an entirely new approach to classification, and through classification to librarianship as a whole.

The scheme is faceted, and the fact that the classifier is allowed to build his own numbers, not by statement of different alternatives, but by combining the parts of the schedule considered important, in a logical consistent order, PMEST, should be fully understood, as it is the basis for the whole schedule construction in colon. Good descriptions in *Mills* 13-14 and *Palmer and Wells*.

Once PMEST is understood the student should realise that the problem of PMEST is that it is only one approach to division. *Vickery* has suggested thing or substance, organ, constituent structure, shape, property, object of action, action, operation, process, agent, space and time. An interesting, if difficult, paper by Mane and Raizada in *Annals of library science* 10 (3) September 1963 97-102 suggests that all these categories, and others proposed by Kyle, are in fact within CC by virtue of Ranganathan's impositions of rounds and levels within the scheme.

These two terms must be clear; levels are the steps of division within a fundamental category, generally either P or E. In each of these there may be more than one method of division. Thus in *Political Science* we have the division into TYPE OF RULE [P] anarchy, monarchy, communism and PARTS OF RULE [P2] head,



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executive, legislature, party. These are obviously both an inherent part of personality but can be clearly separated. These are different levels of personality.

Similarly we have rounds, this is the recurrence of personality after the [E] facet. Quite often we can divide the energy facet by KINDS OF THINGS—these are personality so we have this problem recurring a second time round. Thus in chemistry we have the problem [E] ANALYTICAL CHEMISTRY this divides into *kinds* of personality macro, micro, volumetric etc. These are rounds.

Construction: Ranganathan considered his main class order unimportant, but it does greatly resemble that of Bliss; this was probably an unconscious influence. He did introduce the idea of partially comprehensive classes. These were classes for books which covered a wider range of subject than any main class, although not covering the whole of knowledge. The notation was by Greek letters, but as far as possible he has abandoned these and uses the last letter of the previous main class. Thus we have AZ MATHEMATICAL SCIENCES preceding B MATHEMATICS, BZ PHYSICAL SCIENCES preceding PHYSICS AND CHEMISTRY. This is in line with the idea of using the last digit as what Ranganathan calls ' a sectorising digit '.

Within each main class Ranganathan gives a strict facet formula which is to be followed exactly, and he gives the divisions under each facet when they are necessary. Very frequent use is made of divisions of other facets; this is of course the reason for the lack of bulk in the schedules.

The Index: Entries designed for use by the classifier, all entries being given merely by the notation. For example HAND G [P], K [P], L [P], 167, this means hand appears in BIOLOGY AND MEDICINE under the number 167. One big advantage of this is that it compels the classifier to compile a subject index for use by the public.

Note that the scheme is not flexible, since Ranganathan believed the job of the classificationist is to provide the librarian with the most helpful order, and that this is in fact the PMEST order already devised.

Revision: A continuous process with detailed examination being constantly made of all the scheme. Indeed, one major criticism of the schedules is that too frequent revision has made it very difficult to use the schedules even if one desired to do so.

Modernisation: The production of the ' macrothought ' volume will certainly produce the most modern scheme of all. It is, how-

ever, still doubtful whether it will be adopted in many libraries. Certain weaknesses remain, particularly in the detail of the scheme and the constant revision to keep up with the theories of Dr Ranganathan.

Comparative classification: A great deal of work has been done on the comparison of CC with other schemes, particularly DC and in this connection a most interesting book has appeared, R S Parkhi *Decimal classification and colon classification in perspective* (Asia Publishing House 1964). This is basically favourable to the colon classification but contains a great deal of interesting comparative study.

BLISS BIBLIOGRAPHIC CLASSIFICATION

History: A scheme which is very confusing to date. The last volume of the full schedules was completed in 1953; it could therefore be regarded as one of the most modern schemes. This, however, is misleading, because the first suggested outline was H E Bliss 'A Modern classification for libraries with simple notation, mnemonics and alternatives' *Library journal* 35 August 1910 350-358, and while the scheme was produced over the following forty years the thinking is basically that of the early 1900's. This is the last of the great enumerative classifications and must really be judged on that basis.

In 1935 a condensed version of the scheme was published, and followed by a rapid revision 1936; (*Mills* 133 is the best single volume for the study of BC). Full schedules were issued 1940-1953. It was literally a one man job to the extent that H E Bliss typed the schedules himself.

Application: Despite the formidable theory behind Bliss, the scheme has had relatively little success. Its major use is in government and educational libraries, particularly institutes of education where it is both popular and practicable. There is at least one public library system classified by the scheme (Northern Nigeria) and altogether it is used by about sixty libraries. A useful list of early users appears in the *Library Association record* 55 (6) June 1953 and 56 (1) January 1954 26.

Principles: No scheme is more closely tied by its principles than that of Bliss, and his basic theory is outlined in the two volumes *Organisation of knowledge* (1929) and *Organisation of knowledge in libraries* (H W Wilson Co second edition 1939). This is followed

by a clear description in the introduction to the scheme itself. *Mills* chapter twelve suggests main principles relating to his order of classes. The main class order is good. Coates has suggested that the Classification Research Group (CRG) classification main class order could well resemble that of Bliss. Idea of collocation and general theories should be clearly understood.

Mills has a great admiration for Bliss and has written much about him. Bearing in mind this known admiration, he should be closely studied as the outstanding guide to his work. A further useful guide is by Lim Huck Tee in the *Malayan library journal* 2 (4) July 1962 149-155; this includes a bibliography.

Construction: Students should clearly understand the main class order of Bliss and the implications behind it. *Sayers'* table eight (page 187) shows the development of the scheme very clearly and chapter eighteen is a fine exposition of the traditional approach to the problems of classification. *Mills'* analysis, chapter twelve, is a useful complement to this for the faceted approach to the scheme.

Notation is discussed in chapter four, but note *Bliss's* insistence on brevity for his scheme and his confusion with simplicity. This very brevity limits the value as a detailed classification.

Systematic auxiliary tables should be understood; note the confusion caused by inability to find tables readily. Lack of pagination in the volumes is a major weakness in practical use.

Alternative location has had great value placed on it. The wastage of notation and confusion in practical use frequently means compilation of a considerable authority file before classification is possible.

Revision: Owing largely to the enthusiasm of Mills, the *Bliss classification bulletin* was started. Organised by a British committee, it is published by H W Wilson Co. It was discussed in *Library Association record* 55 (6) June 1953 198-199. The *Bulletin* appears infrequently.

Modernisation: The last volume of the main schedules was published in 1953. It seems unlikely that any major modernisation will take place.

Comparison: A fascinating comparison between BC and CC by Mills appears in *Library Association record* 53 (5) May 1951 146-153.

CHAPTER TWO: THEORY OF LIBRARY CLASSIFICATION

In order to deal with the theory of classification it is essential to grasp the outline of the development of classification since 1876. Dewey published the first edition of his scheme in that year. However, following on his work we have various different streams of opinion, which have in themselves led to the existing theories of classification.

First we had Cutter with his attempts to simplify the catalogue and classification scheme, and the development of his work into the Library of Congress scheme. This was really an attempt to place two million books in context, with an approximate subject relationship, but with more consideration going to a shelf locating device. This was complemented by the work of later authors, particularly Wyndham Hulme who wanted a classification of books, not knowledge. About this time also we had the development of Brown's subject classification, leading away from the battlefield of theory towards a working practical scheme.

The trend is still alive today in what might be called the ' traditional ' picture of classification as primarily a shelf ordering locating device. This school of thought prefers short simple notation, broad general classes and no consideration of classification as an information retrieval tool. For this group classification is strictly a practical administrative tool on a popular level, with enumeration and no facet analysis.

In direct contrast to this is Bliss, who made classification a lifelong study; he thought over his theories for twenty five years and produced his classification really as a vindication of theory. His close association with the educational world makes his classification very strong in that field, but his theories are inherently interesting in themselves, rather than as support for his classification scheme. In spite of the power and clarity of his thought and its expression in two great works, his ideas have never had the influence to be expected from such a reasoned judgment on classification.

UDC on the other hand was conceived as a bibliographical tool to compile a card catalogue, and was therefore never concerned with the problem of shelf locating material. The concern was purely bibliographical, which really meant the best conceivable order for a detailed subject study. As a tool for the Institut International de Bibliographie it was useful, but the major development came with Otlet, Donker Duyvis and others who quickly realised the potential of this development of DC classification and made it a precise tool for scientific work.

It seems likely, although it has never been discussed, that UDC did have a considerable influence on Ranganathan and the early editions of CC certainly suggest this. However, Ranganathan is another great theorist of the classification world who sought constantly to discover why things happened as they did, for his own classification. The result of this questioning was the *Prolegomena* in 1937 and a tremendous amount of stated theory of classification, ranging from elementary knowledge to complex theories of division.

It is unlikely that this theory would have had the impact it has had in Western Europe but for the work of Palmer and Wells, as *Fundamentals of library classification* shows. Allied to this of course is the fact that Wells has been in charge of BNB since 1950 and has closely followed faceted procedure, so can elucidate the practicability of the ideas as well as their theoretical value.

The work of these two writers and Ranganathan's visits to this country resulted in the formation of the Classification Research Group culminating in the authoritative statement 'The need for a faceted classification as the basis for all methods of information retrieval'. This is reprinted in *Proceedings of the international study conference on classification for information retrieval* (ASLIB 1957) as appendix two.

This is briefly the picture of classification as it is today.

However, another challenger has appeared on the scene in the form of coordinate indexing. This device, largely American inspired, results basically from a distrust of classification and a desire to see concepts established regardless of their order. One of the first to develop this indexing technique was J Kaiser who published *Systematic indexing* in 1911. In this he worked, as did Brown, on a system of concretes, and processses affecting the

concretes. The only difference was that these were listed alphabetically with no insertions. A good description of the Kaiser system and how it works is in *Mills* 183-185.

The general principles of coordinate indexing do not seem to have been widely understood and the following is an attempt to supplement existing reading.

The major feature of all coordinate indexing techniques is that they do not show the relationship of subjects but merely endeavour to identify the important concepts in all subjects. These are not contained in a given hierarchical order but are coordinated at the time of search. This allows the user to formulate his own concepts and search for the appropriate terms. The advantage is obvious, that there is no longer any dependence on the left hand element in filing; no longer does the searcher have to employ the hierarchy of the classificationist; instead he merely has to think of the appropriate words for the subject.

The last sentence of course contains the weakness of the idea. ' Merely thinking of words ' is as difficult as thinking of any other subject relationships. There are problems of synonyms, related subjects, incorrect expression, exactly as in classification.

When first recreated, the idea behind coordinate indexing was that vocabularies should be virtually uncontrolled, and should allow the searcher to think of the appropriate terms and locate the documents. The index theory was strongly supported by Luhn and the early computer users. But it quickly became obvious that this was not very satisfactory. The searcher often failed to find the right synonyms and a greater number of ' false drops ' ensued.

Discussion of the various practical applications of coordinate indexing can be found in chapter five. Here we are concerned largely with the principles. It long ago became obvious that there was a need to control vocabulary in some way. This was done first by elimination of synonyms, then by the introduction of roles and links. These are basically devices for designating the role of a word in a particular context. Thus it is very convenient to be able to distinguish clearly between lead pipes and the piping of lead. This indication of the role of a word in a particular context is, of course, merely one aspect of classification.

Similarly, other techniques are gradually being practised, such as grouping together related words. This gradual return to a form

of classification, whatever it may be called, shows the validity of the basic techniques of classification and their application to many fields. As a result we must again look at the basic elements of classification. At this stage the student should still be carefully considering the question 'why classification?' The introductory chapter of most books on classification will try to answer this question but particularly valuable are *Sayers* chapter one; *Needham* 9-13; *Vickery* chapter one; and *Mills* first two chapters. Note the development of importance of documents. It is becoming increasingly true that the book is by no means the only important provider of knowledge. Instead we now have documents, pamphlets and microdocuments, with equal problems of organisation.

It is really at this early stage that thinking in classification divides and that is the reason teaching today is concentrating on the information retrieval aspects of classification. Note the article by Langridge on teaching classification in *Library Association record* (67) 4 April 1965 127-130. It is true that the average public library is, and for some time will be, primarily concerned with the book. However the development of education and the demands on the library make the growth of demand for 'information' inevitable. It is here that broad classification is already beginning to break down under the strain of the volume and detail of literature; and the information demands of scientists make the demand for information type reference services increasingly insistent. This means that some considerable increase in the utilisation of resources is inevitable. Interlending and bibliographies will help to a certain extent, but it will still be essential to improve the use of stock. Many librarians believe the answer lies in the catalogue, but in this country the catalogue is generally classified, and so the better the classification the better the cataloguing. In the case of the dictionary catalogue, the better the subject analysis compelled by the classification, the better the dictionary cataloguing is likely to be.

Not enough use is made of classification for it to be true to say its resources are fully exhausted. A usable theory of classification has now fully grown up and established itself. It is up to the student to understand and apply it in all circumstances. We will therefore examine the construction of a classification scheme and see how the work develops examining valid theoretical principles as we come to them.

The first essential is a study of the literature, to discover what concepts are contained in the field; these can be listed in the order in which they are cited and are known as isolates. Here we have Wyndham Hulme and his 'literary warrant' vindicated. The problems of dealing with concepts within a subject are complex, but even worse are the problems when we have to deal with all knowledge and therefore to relate subjects together. This is explained by E J Coates with his CRG proposals for a new general classification in his contribution to *Some problems of a general classification scheme* (LA 1964).

Note here the statement that the main class order seems to resemble that of Bliss showing his ideas that the order of all classes including the main classes were fundamentally correct. This basic step of main class order is one of the most difficult and CRG are still concerned with this stage. Integrative levels are being closely discussed and J Farradane 'Scientific theory of classification and indexing and its practical application' *Journal of Documentation* 6 (2) June 1950 83-99 and 8 (2) June 1952 73-92 should be read. See also Foskett and Farradane in *Sayers memorial volume.*

Having sorted out what subjects exist and which isolates there are within a subject, there is then the problem of grouping the isolates into facets with their individual foci. Having got this far it is essential to reconsider the causes of classification. *Sayers* chapter nine is a very useful introductory statement of causes, not only his own but also those of leading classification theorists. Note also the developments of *Vickery,* and Farradane in 'Psychology of classification' *Journal of documentation* 11 (4) December 1955 187-201 and in 'Relational indexing' *Indexes* 2 (3) Autumn 1961 127-133.

After studying these it will be seen that facets must be mutually exclusive and the foci totally exhaustive, not only for existing knowledge but also to be capable of expansion for future requirements. These steps are common basically to all forms of classification; the difference at the next stage is that faceted classification endeavours to avoid enumeration as far as possible. Synthesis of facets is the desirable aim and to achieve this there have to be recurring facets and a basic facet structure. This is where the PMEST formula and Vickery's expansion of it are important. From them we get not only the idea of basic order of facets within any

one category, but also that of assistance in the combining of facets into different categories.

The problem of order in arranging is equally difficult and Ranganathan in *Elements of library classification* (Asia Publishing House 1962) chapter five gives the possible orders which should be understood. The citation order for facets should also be clear and *Needham* 75-77 gives a very concise account of this problem, as he does in the following section on arrangement of facets schedule order. Notice that in this he (rightly) dismisses the problem of schedule inversion at this stage. However the second year student must understand schedule inversion.

The point is that clear distinction must be made between the subject analysis of a book and the allocation of notation to allow the arrangement of a collection of books on the shelves. When we classify an individual book we analyse it from its major subject to the minor aspects of it, that is in PMEST order. Thus a book on building brick houses in nineteenth century England would analyse into BUILDING: HOUSES: BRICK: ENGLAND: NINETEENTH CENTURY. This is the subject of the individual book to which must be allocated a notation both to express the subject and to allow the books to be arranged on the shelves in general to specific order. Thus when we have a collection of books they would be arranged BUILDING HOUSES; BUILDING HOUSES IN NINETEENTH CENTURY; BUILDING HOUSES IN ENGLAND, etc. In order to get this general to specific order we must allocate the notation thus:

A	BUILDING HOUSES	
B	NINETEENTH CENTURY	Time
C	ENGLAND	Space
D	BRICKS	Matter

so that a collection would have the following notation:

A BUILDING HOUSES

AB BUILDING HOUSES IN THE NINETEENTH CENTURY

AC BUILDING HOUSES IN ENGLAND

ADCB BUILDING BRICK HOUSES IN ENGLAND IN THE NINETEENTH CENTURY.

The general to specific order is in fact the direct reverse of the analysis order of the individual book. The importance of this is that we use some citation order in analysing subjects to construct a classification scheme. When we come to compile the actual

schedules they must be placed in the reverse order TSEMP. *Mills* deals with schedule inversion from 8-20.

A great deal of what has been said so far is the basic theory of the construction of classification schemes. The student should also consider further problems of classification.

One problem worthy of study is that of terminology. The student should be familiar with the basic standard terms and phrases, but the potential permutations for the 'short notes' question are constantly growing. Ranganathan has himself several times referred to this problem, *eg* in 'Standardisation and documentation' *Library herald* 4 (3-4) October 1961 and January 1962 95-100, and the Indian Standards Association is producing a standard glossary of terms in classification. This has been further complicated by the growth of information retrieval, mechanised techniques and the American coordinate indexing work, which in turn make the problem of coordination of terminology even more vital. The best recent example is the Cranfield Research Project changing 'relevance' ratio to 'precision' ratio to accommodate the American use of 'relevance'. The student should note definitions of words as they occur and help compile his own glossary. Note the occasional extension or intension of terms by certain writers, particularly Vickery and Farradane whose terminology is clearly defined, if hard to follow.

The cost of classification is a subject on which many are ignorant. Several articles have appeared on this subject, most pleading for a particular cause. Any sound analysis of cost would be welcome. Gore in *Library journal* 89 (11) June 1st 1964 2287-2291 suggests that by Dewey the cost is thirty-five cents a title in proportion to Library of Congress which he calculates as one cent. Adding Cutter numbers for authors is an irrelevancy to classification, yet he makes a great deal of the levels of Dewey application, all of which are unnecessary. The only impartial figure we have to work on is the Cranfield figure of four minutes per item indexing time, which at least gives some guidance. Other cost studies as they are published should be noted and compared.

This leads into the general problem of research in classification. A great deal has been said about the problem and work is now being done on a reasonable scale. The first major piece of work

was the Cranfield Research Project directed by Cyril Cleverdon. This is extremely important and should be fully understood; the *Report on the testing and analysis of an investigation into the comparative efficiency of indexing systems* (ASLIB 1962) should be studied, not only for its results, but also for the investigation technique which proved so successful. The major results of the original test were the comparatively small differences between the various systems tested and the development of a technique for testing indexes in the future. The results have caused a lot of heart searching and enquiry since, and have been frequently subjected to intense criticism. The best positive summary of this work is F W Lancaster and J Mills 'Testing indexes and index languages devices: the ASLIB Cranfield Research Project' in *American documentation* 15 January 1964 4-14. The most thoughtful criticism of the scheme is by D R Swanson in *Library quarterly* 35 (1) January 1965 1-20.

Note also the developments from the work of testing the English Electric scheme and the Western Reserve University index to metallurgical literature. Partly as a result of these tests, both have made substantial alteration to their methods of working.

The present project is trying to discover what influences various factors have on indexing and how these can be accurately assessed to give a twenty five percent precision with a normal seventy percent recall rising on occasions to 90 percent. If such factors can be accurately given, they will be of enormous help in the design of a general classification.

There are however many problems to be considered.

The Classification Research Group is concerned primarily with the problems of compiling a new general classification, and here one can do no more than read *Some problems of a general classification scheme* (LA 1964); this is the report of a London conference organised by the CRG for invited members. It is a stimulating document which gives many of the important guides to further research. This was a follow up to the ASLIP *Proceedings of the international study conference on classification for information retrieval* in 1957. This is generally known as the 'Dorking conference' and contains many valuable papers apart from that on notation, which is discussed in chapter four.

This study in general classification should be considered to-

gether with Dr J Campbell's article ' Making your own information systems in science and technology ' in ASLIB *Proceedings* 15 (10) October 1963 282-303. This also contains a useful vocabulary of terms and some extremely valuable definitions; note also the use of precoordinate and postcoordinate systems. Precoordinate systems are those which are coordinated at the time of indexing, as with classification; postcoordinate are those in which the terms to be searched for are selected at the time of enquiry.

As well as these studies in general classification, other work is going on in special fields. Ranganathan suggests fields for research in *Sayers memorial* volume 94-98, and usefully divides these into fundamental research and routine work. This was followed by a very fine survey of research past and present by Ranganathan in *Annals of library science* 10 (3) September 1963 85-96.

In his article on information systems Campbell also raises some of the problems of classification, and its limitations. This is also discussed by *Mills* 182-189, and another article much more severely critical of classification is that by R Moss ' How do we classify? " in ASLIB *Proceedings* 14 (2) February 1962 33-42.

The valid criticisms raised by these two articles include first and foremost the changing pattern of knowledge. The problem of hospitality is dealt with elsewhere, but it is important to realise that knowledge does change in many ways. Faceted classification gives us the best opportunity of coping with this problem, for instead of having a fixed location for everything we have the possibility of combination of subjects' main classes and any idea already expressed in the classification.

The weakness of the article by Moss is his failure to consider the impact of modern classification theory on both practical classification and notation. This is considered in an interesting contribution by Moss in *American documentation* 15 (4) October 1964 296-301 (see page 21). Dr Campbell raises a most important factor in his article cited above that a classification must be for the service of people educated in its use.

One minor point to remember is that for the examination students have to be able to prepare a guide to the use of the classification scheme for users. This is more frequently asked as a cataloguing question, but is nevertheless something that everybody should be able to cope with adequately. In preparation students

should use frequent examples to avoid theory and to concentrate upon the use not the librarian. It is also a valuable exercise in ensuring that the classification scheme is clearly understood.

A further practical problem raised by consideration of the advantages of faceted classification is whether or not the advantages of reclassification outweigh the obvious disadvantages. Here the student should read as many accounts as possible of reclassifications carried out, and note the benefits which have accrued and the reasons for change. The main reason for change in most cases is the failure of the existing classification to keep up with the demands the library makes upon it. In this country this has meant libraries using Brown changing to Dewey because of the influence exerted by BNB. In America many libraries are changing from Dewey to Library of Congress because of the influence of LC cards. It has also been pointed out that every time a new edition of a classification appears, a certain degree of reclassification is essential.

Once a decision has been made that reclassification is desirable, stock should be carefully examined and weeded—a task outside the classification field. Routine processes should also be examined to ensure they fit the pattern of the new classification. The actual method of reclassification varies with the time and resources available. Birmingham public library completed the reclassification of all their material in preparation for a future move to a new building, whereupon immediate change will be possible. Others have adopted or adapted Ranganathan's principle of ' osmosis '; that is, to decide on a new classification, classify all material from a particular date, reclassify only such material as is still of importance, leave the remainder under the old scheme until the obsolete material finally disappears. Others prefer change with two simultaneous sequences, and yet others the reclassification of the whole library followed by the change to the new scheme. Whichever method is adopted, experience has shown that a change is perfectly feasible to undertake. This is not only for small libraries but also for many with very substantial collections. The following articles on this subject are American, and they give a practical approach to reclassification. A Tauber ' Partial reclassification ' *Journal of cat and class* 12 (4) October 1956 221-225; M C Maly ' Reclassification for the divisional plan ' *Library resources* 6 (3) Summer 1962 239-242; F Rachman ' Cornell's reclassification programme ' *Col-*

lege and research libraries 23 (5) September 1962 369-374 and 440-450. The last is a detail of a change in a library of some 600,000 volumes. There are many other articles of equal value.

Also in a practical vein, consider guides to practical classification and how they can be used. Of particular importance here is W S Merrill *Code for classifiers* (ALA 1939); note what it contains and how it could valuably be updated as a practical tool.

In studying the theory of classification the student should always be aware that theory is learnt only to ensure that a library will be more efficient in supplying information to its users. A sound grasp of theory is the basic essential for correct application in practice.

CHAPTER THREE: SPECIAL SCHEMES

THE first thing to be considered when looking at special schemes is their purposes. Try to see why they have been compiled, their value in relation to the particular field and the reasons for the inadequacy of a general classification.

There are really two classes of special schemes, those compiled for a specific library and those compiled for a subject. Either may be effective, the criterion being why a special scheme and not one of the traditional classifications. *Mills* 152-159 deals with the general problem well, and the construction of the British Catalogue of Music classification is discussed in detail as a scheme constructed for a subject.

Another important example in this field is the SfB *Classification for building*. This is discussed in detail here to show how a scheme may be altered to suit various purposes. It was the first major faceted scheme for building, produced in Sweden during 1946-1950 by the Technical Secretariat of the Coordinating Committee for Building. It is now known as the SfB system and is recommended for adoption by the International Building Classification Committee as being suitable for use in conjunction with the UDC. In addition to wide use in Scandinavia and the Netherlands the system is now officially sponsored in England by the RIBA, and applied to articles in *Architects journal* and *Builder*, among other journals. A great deal of trade literature and advertising is also preclassified by the manufacturers. The original purpose of SfB was mainly as a complement to UDC for arrangement of the contents of bills of quantities, building specifications and data on building prices; also for the filing of technical information in the office and the filing of working drawings.

In the scheme itself there are three facets, BUILDING PRODUCTS, CONSTITUENT MATERIALS and BUILDING ELEMENTS, all of which need definition. BUILDING PRODUCTS are all building components and formless products (*eg* aggregates) which are used and remain in the building when it is completed, for instance doors, window panes

etc. CONSTITUENT MATERIALS are the substances of which the products consist, or from which it has been manufactured, such as wood or concrete. BUILDING ELEMENTS are any part or detail of a building when the building is completed; thus a window is a PRODUCT when it is installed and an ELEMENT when the building is completed. Each facet is allocated a separate notation in the scheme. Thus BUILDING PRODUCTS has the capital letters D-X, D for formless products, aggregates, builders chemicals etc, X for wires and mesh. The CONSTITUENT MATERIALS facet is allocated the lower case letters ' d-w ' each being divided numerically as ' f ' concrete, ' f1 ' sand lime concrete, ' f4 ' lightweight concrete. The BUILDING ELEMENTS are indicated by a numerical sequence in brackets (1)-(9), (1) external elements (2) primary elements (3) secondary elements (16) foundations: general (21) external walls (31) windows.

By different combinations of any of these symbols any building product or element can be more or less exactly indentified, as can various specific concepts. The aim of this scheme is practical grouping; therefore the classification scheme has only one place for fixtures, seats, screens, garden equipment. If subdivisions for extension of the system are needed, it is possible to use ' point numbers ' to supplement the notation, although this should be avoided until wide experience of the scheme is obtained. All three facets are thus clearly separated and may be combined to express any particular specific subject. The order of symbols reflects the importance of different aspects of the subject concerned *eg* RO (22) glass sheets used for internal walls, (22) RO internal walls made of sheet glass. In the SFB/UDC *Building filing manual,* published by the RIBA technical information service, there is a recommendation that the preclassification of material should be carried out according to the enumerative schedules listed in the volume. The danger of this is that a rigidity of structure, never intended in the original scheme, may be built up. There is however a note under ' Filing order ' which shows the true value of the original suggestions on flexibility.

This flexibility can be inserted by an expert on building classification. At the same time the scheme is perfectly operable, as was originally intended, by secretaries and unskilled typists in architects' offices. The main reason why such a classification was needed is that the building industry is basically an assembler of other industries' materials, and it has always to store records of these

materials for future reference. Thus good classification is essential. In fact building is a subject which is very badly treated in most of the conventional classification schemes. The combination of these factors ensured the international success of SfB. When the problem arose of arranging various architects' bills, quantities, etc for processing by computer, the scheme was adapted for this purpose. An interesting account of this new classification, the Coordinated Building Communication (CBC) is given in a series of articles in *Architects journal* commencing in April 1964 through to September 1964.

SfB is an example of a successful scheme for a subject. Schemes for a library are not so frequently publicised, for fairly obvious reasons. One of the best of them is the English Electric faceted scheme, originally compiled by Jean Binns. A full description of the scheme is given in the current edition of J Binns and D Bagley *'English Electric' a faceted classification for engineering* (English Electric Co third edition 1961), and it should be known in detail.

After a study of the literature the following facets were chosen for this scheme: INDUSTRIES AND PROFESSIONS; PLANTS AND MACHINES; COMPONENTS; MATERIALS; PHYSICAL PHENOMENA; OPERATIONS; AGENTS (INSTRUMENTS AND EQUIPMENT); LANGUAGE AND FORM OF PUBLICATION; GEOGRAPHICAL DIVISIONS.

Note the provision in the first facet for related marginal material; this is a problem which all special schemes must solve. After this the facets follow PMEST order. Note the essential features of levels and rounds—vital if only PMEST is recognised.

Following this division into main class order, sub facets were created. Then (and only then) was the notation allocated. Note that the notation could now be allocated in correct sequence, fixed according to literary warrant and not by arbitrary methods.

The main notation is capital letters with the subdivision by lower case letters.

Combination order is specified, as always in a good faceted scheme; in this case in schedule order. Certain symbols (full stop, stroke) are used and their filing value has to be learned, but this is a comparatively small task.

Certain problems arose initially in fixing combination order and schedule order. With the complex entries coming early in the

schedules it is now possible to work from general to specific then back again to general. Thus we have ' performances in digital computers ' giving a suggested order TCZN performance : digital computers. A synthesis within a facet is possible and the facet indicator of a capital letter may be dropped.

The English Electric scheme was the first to be tested by the Cranfield Research Project after the method of testing had been successfully evolved and confirmed by the results of the Project. They also made one major change in the original scheme. Previously the indexing had been strict chain indexing with the preferred order. As a result of the Cranfield test, preferred order was abandoned in the two new plants. Recent conversations suggest that this has resulted in a major improvement, and the Cranfield amended programme bears this out.

These two schemes were chosen as good examples of specific schemes. If the student reader has reason to know others well they should be studied.

The major purpose in learning about special schemes is to obtain practical examples of what can be done by the correct application of the principles of faceted classification. See especially B C Vickery *Faceted classification* (ASLIB 1961), which should be well understood and related to the special schemes actually discussed.

Practical experience of the operation of special schemes is an enormous help. It is good practice to obtain copies of the scheme and try to classify some periodical literature.

In addition to special schemes for specific subjects there are also problems of classification for physical forms of material (pictures, gramophone records) or those restricted by the form of presentation (fiction, plays). Generally speaking this material can be classified in the usual manner by a suitable scheme. However consideration should be given to any special problems which arise (*eg* maps where division is usually by place, then subject). Students should consider special features of a firm or industrial operation which might make special classifications desirable.

In the case of fiction the degree of classification to be achieved is the important criterion. In many libraries fiction classification consists simply of picking out general heads (love, crime, cowboy), the debatable value of which is a book selection problem. Other libraries consider that fiction should be given full classification

treatment, and an interesting article by Walker in *Librarian* 47 (2) February 1958 21-28 discusses the reasons for the classification of fiction. He mentions the Burgess scheme of classification based on 'Authors intention ' and mentions an experiment in Lanark county libraries with a classification based on author, narrative and subject expanded in terms of PMEST. Little has been heard of this attempt since, but it would be a pity were this not to be discussed further.

CHAPTER FOUR
NOTATION

NOTATION has fascinated librarians for many years. The first thing to realise is the basic limitations of notation and this is strongly brought out by all writers. Thus *Bliss:* ' The notation is a system of symbols correlative to the order of the classification and it is subsidiary '; *Sayers:* ' It is merely a symbol for terms; it cannot be more important than the terms '; *Vickery:* ' Notation is only a tool; it must always be subservient to the indexing order it is designed to preserve and display; it must never be allowed to dictate that order '; *Coates:* 'A piece of mechanism which is merely ancillary to the original structure of a classification scheme '.

Each of the above quotations is taken from a substantial chapter on notation. The most interesting studies for second year students are E J Coates ' Notation in classification ' in *Proceedings of the international study conference on classification for information retrieval* (ASLIB 1957)—the Dorking conference—and *Vickery* chapter three on notation for the classified catalogue. Both of these sources will repay intensive study by the student, and the notes which follow are intended to supplement and aid the study of them, not to replace them.

The first step is to investigate traditional thinking to see what ideas inspired the notations which are attached to the majority of classification schemes. The work of Sayers and Mills is the obvious starting point, and, as might be expected, the most lucid explanation by a classificationist is *Bliss* which should be carefully studied.

Having seen how carefully librarians devalue notation it is useful to establish what its purpose really is. The main aim is to consolidate an agreed order of schedules. To do this notation must fulfil three functions: **1** It must provide a clear alternative name for the subject; this name is the actual notation symbol which is used to express the subject in a simple short form. **2** It must be clearly distinguishable from all other symbols so as to individualise the concept and enable the second function to be carried out, that of relocating the subject when it has been put into the system.

3 The notation should relate the subject to subordinate, coordinate and superordinate terms, either directly or indirectly. To achieve this the first thing which must be done is to decide the nature of the symbols to be used to fulfil the functions. It is obvious that, ideally, such symbols must be instantly comprehensible and have an agreed filing order. The only symbols which meet these obligations in the western world are the figures 0/9 and the letters A/Z. Either of these sets of symbols can be used to convey order and relationship, so those are the prime ingredients of the notational mixture. They can be used either individually or combined in some valid viable order, and a great deal of argument has taken place about this basic point. Coates points out the inherent dangers of mixing symbols for memory purposes, but recognises that symbols broken up by interrupters may in fact be the most useful. The majority of schemes use mixed notation and seem to have good mnemonic qualities as well as the wide base which this basis of notation offers. A solution to the problem of symbols advocated by the French, particularly G Cordonnier and Eric de Grolier, and obviously of great interest to Vickery, is the use of pronounceable symbols. In this a limited number of the letters A, E, I, K, L, M, N, O, P, S, T, U, V, are used, and they produce either individual letters or combinations which are pronounceable. Thus TOP, TAP, MO, these can in fact be combined to produce quite acceptable phrases, MOTOP, TAPTOP etc.

The symbols used in notation can be displayed in two ways: either hierarchical, revealing the innate structure of the classification, or in ordinal or non structural notation. Hierarchical expressive notation was at one time so common that it was regarded as a fundamental part of the principle of notation. Indeed it is noteworthy that many classifications used an ordinal notation but the significance of this was not really noticed. A major influence on current thought is the work of Coates in producing *British catalogue of music*. Here was a real awareness of the validity of a totally different approach to notation and its symbolism.

Hierarchical notation demands that each step of division reveals the structure of the scheme by being larger than the last. The easiest example is DC SCIENCE 500, MATHEMATICS 510, ALGEBRA 512. This is certainly helpful to the outsider and is therefore often assumed to be the only way with notation. But the disadvantages

are its obvious clumsiness with complex relationships, the potential rigidity of such a hierarchy, and the possibility that in fact the notation may actively prevent hospitality rather than encourage it, as it is supposed to do. Finally, expressiveness ceases, even with DC, to prevent excessive length of notation. For opposition to this point of view note B R F Kyle in *Some problems of a general classification scheme* (LA 1964).

Ordinal notation, on the other hand, is considerably easier to employ, since no value is implied by any number and relationship is implicit in the schedules, not the notation. The important thing about ordinal notation is it can simplify notation quite considerably, particularly as regards hospitality.

This naturally leads to consideration of what characteristics a notation should possess. *Sayers* states that a notation should be brief, simple, flexible; this was extended in *Mills* to include hospitality, mnemonics and synthesis. Coates has reduced the qualities to comprehensibility, ease of retention and viability.

Comprehensibility has already been discussed.

Ease of retention incorporates certain factors by implication. The first of these is brevity. Clearly a notation needs brevity and simplicity for ease of retention. (Note the confusion in *Bliss* equating brevity with simplicity.) Brevity is, as *Mills* points out, a combination of length of base and good allocation. As well as considering this in the abstract, compare the various schemes and see how they measure up to this standard. Note the disadvantage of Dewey's ' integrity of numbers ' in this respect. One other factor to be considered as an aspect of ease of retention is the previously discussed problem of pure and mixed notation.

The third point, viability, has worried many. The dictionary definition of ' viable ' is ' capable of maintaining life, able to live or exist in a particular climate '. This gives the clue to its vital nature. It is the combination of flexibility, hospitality and synthesis. In order to be viable, a scheme must be capable of growing and existing in a changing climate of knowledge. To do so it must assimilate new subjects and occasionally reallocate old ones. As well as flexibility on the part of both scheme and classificationist, it must be possible to alter the notation fairly easily.

Here the advantages of ordinal notation show themselves, and in the question of viability ordinal notation is more satisfactory than

hierarchical notation. There are no difficulties in interpolating new subjects into the sequence—with the single exception that no symbol can end with the first digit of the base. This is fairly obvious, since it is not possible to interpolate anything before the first digit. Thus 1, 12, 13, allows the insertion of 112, 113. This does not indicate a species of subject subordinate to 1, 12, but merely one occurring *between* 1 and 12. It may be subordinate or coordinate. The best examples of this type of notation can be seen in any of the quarterly volumes of the *British catalogue of music;* for example R organ, RW string instruments, S violin.

At this point it is useful to consider the problem of retroactive notation. This is also a phrase which worries some people, but it simply means that each common facet has its own indicator which is constantly used. The notation for each individual class must therefore start its own divisions after the last reserved part of the notation. Thus if we have used the letters A-L for common facets class, we would have to start its divisions M N etc. This allows a simple combination of facets without other facet indicators being used. A clear explanation of this is in *Mills* 44-45 and page 62 of Coates' article in the *Proceedings* of the Dorking conference, cited at the beginning of this chapter.

A further by-product of retroactive notation is its mnemonic qualities, which are as general as any mnemonic. This subject is slightly regarded and all are agreed that mnemonics should be accidental rather than forced. The best discussion of mnemonics is still *Bliss* 58-60. An extensive discussion of mnemonics in relation to CC is included in R S Parkhi *Decimal classification and colon classification in perspective* (Asia Publishing House 1964). It is important to remember mnemonics as a librarian's aid rather than a reader's guide. Readers tend to work to shelf locations rather than by any form of classification or notation.

Consider notation as part of the compilation of a classification scheme and not only as a shelf ordering device. This confusion is one which has caused a great deal of argument and discussion particularly between the ' broad ' and ' close ' classifiers. It ties in very closely with the principles and theory of classification. Notation is primarily an internal ordering device which assists in shelf location but only incidentally. UDC, the ' broads ' favourite target, is effective in spite of its notation because there are various ways of over-

coming the problem of shelf order. The British Institute of Management, for instance, use letters for the most frequently consulted parts of their classification; this means only one symbol is used on the spine for the equivalent of, say, 658·3.

Use of notation is best evidenced in the classified catalogue where the material is all displayed regardless of physical form, and where a detailed analysis of stock is essential. Here notation brings out the minor differences clearly. On the shelves a reasonably broad classification and notation may be acceptable. In the catalogue the greater the detail the greater the potential value of the scheme.

CHAPTER FIVE: RELATIONSHIP BETWEEN CLASSIFICATION, SUBJECT CATALOGUING AND INDEXING

THE best tribute to the close relationship between classification and cataloguing is that they are now recognised in the Library Association part one syllabus as parts of a complex subject ' the organisation of knowledge '. It is assumed here that cataloguing will always be taken with classification, so no reference will be made to actual cataloguing techniques; but the relationship must be clearly shown.

In England the majority of libraries use the classified catalogue. For them the classification chosen is obviously vital, because the better the classification the better the catalogue. The whole idea of a classified catalogue is that it should show not only each desired subject but also its relationship to other subjects and how they complement each other, as well as being an additional guide to the user who cannot identify the required subject.

In reference libraries the classified sequence is vital to a good information service. A closed library which is not arranged on classified lines cannot give a true information service without a classified catalogue which has been guided to show not only main classes but also the various subordinate classes and general lines of division.

Such a classified catalogue cannot work on its own and it must have indexes to accompany it. These are discussed later in this chapter. The best general guide to the classified catalogue is J H Shera and M E Egan *The classified catalogue* (ALA 1956). Chapter two is particularly important. In addition see *Needham* 128-130, the introduction to *Sayers* chapter twenty six and a new edition of Ranganathan *Classified catalogue code* (Asia Publishing House 1964).

The syllabus, in demanding conversance with the relationship of classification to subject cataloguing, implies a much wider study than merely the classified catalogue.

The other major form of catalogue is the dictionary catalogue where words predominate, and there are lists of subject headings. However L Jolley states in *Principles of cataloguing* (Crosby Lockwood 1960) ' all subject headings catalogues are based on a system of classification. The cataloguer . . . cannot hope to enumerate all possible specific headings within a subject except by a process of consecutive subdivision. The more thorough his analysis of the relationships of different terms, the more accurate will be his definitions '. Jolly goes on to state his objections to the classified catalogue and has interesting objections to classification in general. Despite his subsequent justification of dictionary cataloguing, it remains true that classification acts as a guide for subject heading work and does aid the right decision about choice and specificity of entry. It also helps in choosing *' see '* and *' see also '* references through the structure of the scheme. Again the better the scheme, the better the possibility of a good reference structure.

One further point is the relationship of classification to indexing. In general subject indexing, the emphasis is on alphabetic order. It must be realised that classification cannot exist without an alphabetic guide to subjects. It is useful to consider not only indexing by itself, but also the compilation of indexes to classification schemes. This is a devolution from part one examination studies, but must be more thoroughly understood. First comes what *Sayers* called the ' specific ' index of Brown's sc. This term is itself a misnomer, for it suggests a specific location for topics, which in Brown it is not. It is a one place index which does not show any other aspects of the subject, but presupposes that the classification has brought all aspects of all subjects together. This is false because, for example, in certain cases the concretes are in one place (as with ROSES), in others (such as MANAGEMENT) they are widely scattered. This means in fact that the ' specific ' index is an incomplete relative index.

The relative index is, at present, the most widely used in classification schemes. It brings together distributed relatives which are perforce scattered by the nature of classification. It should not be used to show the relationships which already exist in the classification. Thus we should index CIVIL ENGINEERING, MECHANICAL ENGINEERING but *not* ENGINEERING, civil
mechanical
The latter is a repetition of the schedules, a mistake to be avoided

since it lengthens the index, makes it more difficult to consult and does not serve any useful purpose.

Chain indexing evolved from the need to eliminate repetitions, and to ensure that all steps of the classification were systematically indexed, while at the same time cutting out wasteful steps. Ranganathan in CC has used what is now known as chain procedure in his scheme. There have been frequent descriptions of chain indexing, but the best is J Mills in *Library Association record* 57 (4) April 1955 173-178. Note however the limitation which has been placed on the method since the Cranfield Research Project. Cranfield showed that failure to invert the terms in certain cases caused delays and failure in the faceted classification. The researchers therefore abandoned strict chain procedure and improved their performance with faceted classification. The limitations on chain indexing are that it is less valuable for very detailed indexing of a limited field. However it is not only adequate but essential with general classification, as BNB has shown.

This general discussion on indexing in classification leads to discussion of the use of indexes to the classification scheme. First they are auxiliary to a scheme and not substitutes for a scheme. This is what *Bliss* called the 'subject index illusion'—that it doesn't matter where material is classified as long as it is indexed properly. This, as Bliss pointed out, is nonsense. A good index will find a specific topic, but it does not show the inherent relationships of that subject and how they can be followed up.

Another general mistake is to use the index to the schedules as a subject index to the library. This is wrong because few libraries follow schemes exactly, the index is rarely up to date in terminology and it does nothing to reflect the stock of the library. This tendency was strongest among Dewey users, but the seventeenth edition statement on the index by C A Custer in the *Library Association record* 67 (3) March 1965 82 shows that this will no longer be possible in future.

From indexing in classification some further consideration must be given to coordinate indexing techniques. The nature of coordinate terms has already been shown. Here we are concerned with the methods of applying the terms. There is, for example, what we might call content indexing. Basically this is an analysis

either of the title or of brief notes of contents of an article, with promotion of the words to form an alphabetical list of subjects. This method is popular in content indexing and does provide some form of subject guide. It employs a kind of dictionary technique and does not endeavour to show relationships. However, more sophisticated systems have evolved and it is from these that some relationship to classification can be deduced.

Two expressions which must be fully understood are ' item on term ' and ' term on item '. In ' item on term ' methods, also called ' invested systems ', the item numbers of documents are all entered on the relevant term cards. Thus if documents 24, 36 and 40 all refer to prestressed concrete, these document numbers will be written on both the card headed PRESTRESSING and the card headed CONCRETE. The commonest forms of indexing using this method are PEEKABOO, in which the document number is punched out in a grid system, and UNITERM where the numbers are written on the card with terminal digit filing.

This simple ' item on term ' method is very popular in this country and PEEKABOO is being used by several firms for indexing items on concrete (a subject badly treated by most classification schemes). However the method is really only feasible where the terms are simple and generally mutually exclusive. The relationships between documents as terms cannot be shown, and it is therefore of comparatively little value for complex searches.

For the latter purpose the sequential ' term on item ' method is more useful. In this each document card has every term entered on it, or alternatively a notation for every term. This means that every time a query is placed *all* documents have to be searched. It is a slower method, but is becoming more popular with the increasing use of mechanisation, and in the United States sequential scanning is now used with the majority of systems.

Fuller descriptions of these two major systems of coordinate indexing can be found in A Kent *Textbook on mechanised information retrieval* (Interscience 1962) and R S Casey *Punched cards* (Chapman & Hall 1958). These two books will also be useful for the following chapter on mechanisation of information systems.

CHAPTER SIX: RELATIONSHIP OF CLASSIFICATION TO MECHANICAL METHODS

It should perhaps be emphasised that mechanical and electronic methods of information storage and retrieval are not ends in themselves, but supplements and complements to the common task of retrieving information quickly and efficiently.

An analysis of the two main terms 'information storage' and 'information retrieval' can help here. Information storage is simply an extension of the catalogue, from the storing of books to the storing of alternative forms of information, pamphlets, periodicals, articles, etc. Information retrieval is the technique of retrieving on demand any piece of information which has been fed into the system, whatever the form of the information.

All library and information services are still largely concerned with providing the enquirer with a document which they hope will give the answer to his question. Few have yet got round to considering what must be the ultimate aim, the provision of actual items of information. This technique is known as 'data providing', as opposed to reference providing. The best discussion on data providing systems is the Library of Congress, National Science Foundation and Council on Libraries Resources report *Libraries and automation* (Library of Congress 1964). A review of this vital document appears in *Library Association record* 67 (1) January 1965 30-31. All librarians concerned with automated systems should study this at first hand, for it covers all aspects of library automation, and also pays some attention to a frequently neglected topic—cost.

The cost of automation and mechanisation should be looked at very carefully before a decision to instal any particular system. A careful analysis should be carried out to determine what gain will be achieved and how it will actually help before expensive equipment is installed. It must first be ensured that all present systems are working to maximum efficiency, and this of course includes the classification system. It is often possible to increase

efficiency at little extra cost by improving existing work rather than by making major changes.

The improvements which can be carried out involve firstly the use of either edge punched or centre punched cards. It is important to remember that mechanical methods are not necessarily synonymous with coordinate indexing. The two do work very comfortably together, but either can exist without the other and mechanical methods can operate in conjunction with classification not only ' word indexing '.

There are three basic uses for the common seventy six hole single row edge punched card. Firstly for applications where the items of information to be coded number seventy five or less. This involves straightforward coding of single items round the edge of the card. It is generally better to sort the information into basic groups for retrieval purposes. This in itself is an elementary form of classification. A good example is for student record cards, where hole one is punched if male, holes two to seven record type of library experience, eight to ten formal education, and so on. This straightforward coding is good for limited information and is retrieved by merely putting a needle through the appropriate hole.

The second coding application, frequently described as indirect coding, occurs where there are more terms required than there are positions available on the cards. In this method meanings are assigned to certain combinations of holes, the first of which is the ' selector code ' where the card is divided into a series of fields each containing four holes, each hole being given a numerical value of seven, four, two or one. A combination can be obtained of nine numbers from only two holes; 1 : 2 : 3 is a punch of both holes one and two; 5 is a combination of one and four, and so on. This means that using two fields allows the potential punching of one to ninety nine in only eight hole positions.

Thus on a seventy six hole card we have the potentiality of nine fields each with a maximum of ninety nine positions. This raises the potentiality considerably, and allows the possibility of classification in the traditional sense.

The third application is random coding, where each previously determined class subject is given a random pair of numbers which can be punched on the edge of the cards. In the cards of a seventy

six hole card the potential of such a system is some five and a half thousand positions. If this potential were used with a synthetic classification it is obvious that a classification like colon could be accommodated, although the random coding is the commonest used.

For example, if the combination 22-39 were to represent classification and 45-35 libraries, then a book on library classification would be needed in 22-39, 45-32. The less used subject would always be searched for first to throw out the minimum number of cards for the second search.

Centre punched cards can be used either for traditional classification or for various forms of indexing. The basic idea of punched cards is that there are a certain number of columns, usually eighty, on a card and each column can be used to convey a prescribed piece of information.

The information which is to be given must be sorted out very carefully beforehand so that each column always contains the same information. If a document is to be recorded the first ten columns could be given to the class number, the next sixty nine to titles, with the final column indicating the form of document. If the author was also required then this could be included instead in, say, columns 12-25. This means that the first ten columns would be left for class numbers and the author starts in column twelve. These fixed areas of information are known as 'fields' and can be anything from one to eighty columns in length.

The technique can have a valid use in classification. For example one project on the punched card machinery at the College of Commerce in Birmingham was the reproduction of a completely new classification. This was done from an existing but inadequate scheme. New notation was given and the classes slightly rearranged. Using only the punched card equipment it was possible to produce a list in old order with new notation beside it, a new order with the old notation and an alphabetical order of subject with the new notation. All this was produced from one set of cards.

Production of punched card indexes and guides using machines is the obvious next step from the edge punched card. The sub-

sequent development is into electronics and the result is the computer.

A great deal is written about the computer and its potential applications. But before we consider computer use in relation to librarianship, it is important to see what processes are involved in the science of information retrieval.

First we have the analysis of documents to decide their meaning; then we have a translation of this analysis into terms of an index language (*eg* UDC or UNITERMS). These terms must be linked with related terms either in a classification or a controlled thesaurus to ensure retrieval of related documents. The decisions taken must be stored in an index file together with some form of document identification. The documents themselves must be stored for easy retrieval from the document identification. In actually retrieving the material it is necessary first to translate the question into the system language, then devise a search programme and search for document identification, and finally the document itself or a copy must be retrieved.

Deciding which of these processes can be done by machine at the present time, which are potentially capable of mechanisation and which are economically capable of mechanisation, demands great care. Most writers on mechanisation tend to assume that the process of the future has already arrived and is at work in libraries. This is not true. A great deal of speculative writing is being done, but at the present few libraries have their own computers, and most, when they do automate, are going to rely on buying time from other departments. This means that few libraries will have the resources to carry out large scale mechanisation, but leaving aside the matter of cost, the mechanical potential of automation is worthy of note.

For analysis of documents there is still no machine which can read ordinary and variable forms of typescript. Optical scanning will come in the future but for the moment documents have to be translated into machine readable form before they can be analysed, and it is therefore still quicker for human beings to carry out the analysis. Translating the analysis arrived at into the system language can be done by machine, provided no uncommon terms are involved. The problem of translating new terms into the system is considerable and expensive. Linking with

existing terms can be rapidly achieved if notation is used. Mechanisation can quite easily adapt existing notation.

Storing decisions on description, together with the document identification, is easily accomplished by machine once the decisions have been put into machine readable form. Storing the documents themselves is a task that machine systems have concentrated on, and this can already be accomplished with a reasonable degree of efficiency. The document is microfilmed, the microfilm inserted into a punched card and the classification number then placed on the card.

The first stage in retrieval is understanding the question and translating it into machine readable form. This must be done by man, and the search programme must also be manually devised. The computer can in some cases now devise its own search programme for a given set of terms or classmarks. The actual search is done by machine, ensuring maximum coverage and the elimination of error (or at worst there is consistency of error). Once the document number is discovered, manual retrieval is generally made.

At the present moment comparatively little can be done by computer. The computer is not a wonder machine which will reveal all known knowledge, but one which is capable of utilising and processing information *which it has been given* to a pre-ordained pattern. The limitations of computer work are admirably described in M Taube *Computers and common sense* (Columbia University Press 1961).

It is necessary to view computers in perspective. They are extremely efficient tools which will considerably improve library potential, but they are decidedly not a panacea for all information problems.

It is desirable to have direct knowledge of how computers can be used in relation to classification. The best description is by R R Freeman ' Computers and classification systems ' in *Journal of documentation* 20 (3) September 1964 137-143. Here the author suggests that multi language editions of UDC could be printed simultaneously, and valuable technical translating dictionaries could incidentally be provided as well. A computer could be used for compiling up to date indexes to UDC (or any other classification) whenever required, simply by an alphabetical print out of all stored terms.

Another speculative suggestion is that in the future computers may be used to do statistical analysis necessary for ' literary warrant ' in compiling new classifications. This implies that documents will be machine translated, then scanned and significant words and phrases picked out by counting the frequency with which they occur. The technique is already available where the document is translated into machine readable form and is also the basis for the production of abstracts which can also be accomplished by computer.

Another technique closely akin to those of classification is the ' selective dissemination of information ' currently being practised by the IBM Corporation. This is very well described by Trischler in ASLIB *Proceedings* 14 (12) December 1962 473-502. The important point to notice here is that as well as the abstracts being translated into machine readable form, a ' profile ' of the readers' interests is also obtained. This profile consists of a set list of keywords which are retrieved when the frequency factor in the document is high enough to suggest that an article would be of interest. This is one of the most advanced dissemination of information techniques, yet it is interesting to note how well the classification scheme, if projected, could perform a similar task. Closely classified documents could be compared with a classified list of readers' profiles in the computer in the present manner. At any time readers' interests in a particular field could be narrowed or broadened simply by scanning a different range of the classification, which would provide a similar type of print and information.

The main consideration in reading on automation and mechanisation is to distinguish clearly between what is possible at the moment and what is going to be possible in the future. Once this has been done, the next stage is to decide what kind of service should be supplied to users; then to establish where machines are needed to make the service a practical possibility and how much they will cost. But before these points are considered the question must be answered whether existing resources have been utilised to the point where change is essential. The question is not conservative, but an elemental part of the proper utilisation of classification, machines and indeed librarianship as a whole.

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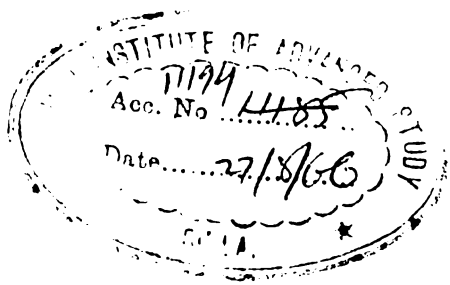

Academic and Legal Deposit Libraries

DONALD DAVINSON

This book, an essay on various aspects of the working of academic and legal deposit (generally the national) libraries, could be used with great advantage by students preparing for degree and diploma examinations in library science. The critical guidance that it offers for further reading on every topic enhances the value of this book.

... in fact the only up-to-date book ... devoted to the functions and administration of academic and legal deposit libraries, and for this reason, apart from others is to be warmly welcomed ....

THE LIBRARY WORLD

Public Library Administration

GEORGE JEFFERSON

This guidebook, neatly summarising different facets of the subject for students preparing for the final part II examination of the Library Association of England, will benefit Indian students considerably, since public library administration forms an integral part of library science curricula in all universities.

... can be used within the framework of a library school course and also by students studying privately ... should have a special appeal to students of librarianship overseas.

BRITISH BOOK NEWS

An Introduction to the Dewey Decimal Classification

C. D. BATTY

This book teaches the rudiments of practical library classification with Dewey's Decimal Classification, 16th edition. Apart from being a student's study-aid, it will be of great use in library inservice training and training of teacher librarians.

The problems of originating programmes and applying the new method to the teaching of practical classification are considerable and Mr. Batty is to be congratulated on his enterprise and skill. ...

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