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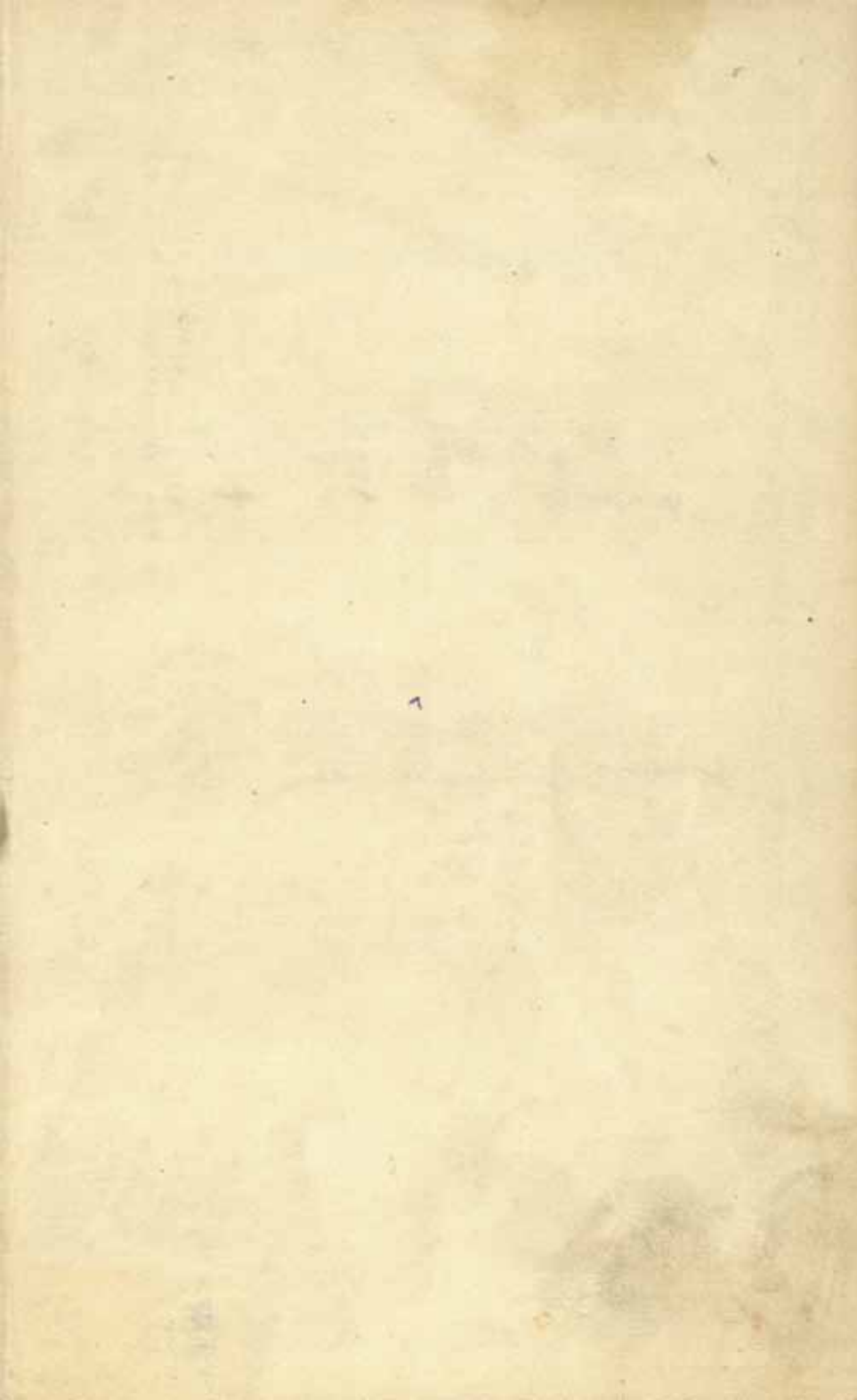
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THEORY OF CLASSIFICATION

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Philosophy of User Education (Co-author)

Bibliography (Co-author)

Granth Vigyan (Hindi) (Co-author)

Suchikaran ke Siddhant (Hindi) (Co-author)

THEORY OF CLASSIFICATION

KRISHAN KUMAR

Professor

Department of Library and Information Science

University of Delhi

79861

FOURTH REVISED EDITION

025.4

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List of Abbreviations

BBK	<i>Library-bibliographical classification</i>
BC1	<i>Bibliographic classification (1940-1953)</i>
BC2	<i>Bliss bibliographic classification (second edition, 1977—)</i>
CC	<i>Colon classification (CC7 represents 7th edition. Similarly CC6 stands for 6th edition)</i>
DDC	<i>Dewey decimal classification (DDC19 represents 19th edition. Similarly DDC18 stands for 18th edition of DDC)</i>
EC	<i>C.A. Cutter, Expansive classification</i>
ISI	<i>Indian standard glossary of classification terms</i>
LC	<i>Library of Congress classification</i>
<i>Prolegomena</i>	<i>S.R. Ranganathan, Prolegomena to library classification, 3rd edn., Bombay, Asia Publishing House, 1967</i>
RIC	<i>Rider's international classification</i>
SC	<i>J.D. Brown, Subject classification</i>
UDC	<i>Universal decimal classification, abridged English edition, 3rd revised edn., 1961</i>

Preface

0 REVISION

The field of library classification is an extremely active to the extent that the need was felt to bring out a revised edition. The decision was also prompted by the excellent response to the third edition. The text of this edition has been prepared keeping in view the recent developments. In this edition, *Broad System of Ordering*, *Universal Decimal Classification* (International Medium Edition) etc. have been described in some detail. A number of additional examples and comments have been added. Some new readings have also been added to bring further readings up to date.

1 DEVELOPMENTS

Library classification is an important area of study and research. During the last twenty-five years, tremendous developments have taken place in the theory and practice of library classification. These have an important bearing on the efficiency of services to be provided by libraries, documentation centres and information centres. The developments have implications for a student of library classification as well as a practicing librarian. A dynamic theory of library classification has been formulated and highly sophisticated notational techniques have been evolved. These have made it possible to design a freely faceted analytico-synthetic scheme for classification, which is better fitted to face the onslaught of the universe of subjects.

The important publications such as *BSO—Broad System of Ordering ; Schedule and Index*, *Bliss bibliographic classification* (BC2) (it is being brought out in parts) and *Colon classification* (7th edition) (it is also being brought out in parts) are going to have far reaching implications. BSO is a classification of the whole field of knowledge including about 4000 terms in English. It is meant to serve as a switching language between information systems. It is expected to

meet the requirements as a means for referral to the contents of the information systems. BC2 and CC7 are being developed as powerful tools, keeping in view the latest developments in theory and practice of library classification.

The research in classification has become diversified in nature. An impressive progress has been made. There is every hope that the research in this field will continue to be exciting and fruitful. Libraries of tomorrow will become more of information service centres. As such, these would require more powerful tools for the storage and retrieval of information. This would require intensive research.

In recent years, there has been some decline in the study of classification but in the changing context especially due to the introduction of computer new approaches to classification are being studied with vigour, giving Impetus to this area of study.

2 SCOPE

The book seeks to provide a coherent account of the theory of library classification. Due emphasis has been laid on historical perspective. Contributions made by theoreticians like E.C. Richardson, J.D. Brown, W. Hulme, W.C. Berwick Sayers, H.E. Bliss and S.R. Ranganathan have been dealt at length. However, the theory put forward by S.R. Ranganathan predominates the whole book because his contribution is far more than any body else. He may be regarded as the genius of twentieth century. He succeeded in systematizing the study and practice of classification. Five major schemes of classification (*Dewey decimal classification*, *Universal decimal classification*, *Library of Congress classification*, *Colon classification*, *Bliss bibliographic classification*) have been dealt in detail. These schemes have been examined at length so as to find out how these have observed normative principles of classification. This study also takes into its stride the rapid developments, which have taken place in the field. The terminology used in this book is the one evolved by S.R. Ranganathan. The concepts behind these terms have proved to be valid.

3 AIM

Library classification is a specialized area of study. In recent years, library classification has become a vast and complicated field of study using highly technical terminology. Therefore, a special attempt has been made to provide descriptions as simple and direct as could be possible. Examples from major schemes have been provided in large number to illustrate the theory of classification. The purpose of this book would be well served, if the interest of the readers in the subject of library classification is aroused, encouraged and developed along the right lines.

With the above points in view, this book has been especially written to meet the requirements of students preparing for their library science/documentation/information science diplomas and degrees. Classifiers in libraries/documentation centres/information centres will also benefit equally from it.

4 PRESENTATION

A special attempt has been made to make this work readable. Description of topics has been made as simple as could be possible. Large number of example have been provided to facilitate understanding of the subject. As far as feasible, the presentation follows the order of development of ideas.

Large number of headings and subheading have been provided, each of which has been assigned a number based on sector notation, where 9 has been used as a sectorising digit. Thus the following numbers represent coordinate headings : 1 2 3 4 5 6 7 8 91 92 93 94 95 96 97 98 991 992 993 998, etc.

The subdivisions of 1, for instance, would be represented by the following coordinate numbers : 11 12 13 14 15 16 17 18 191 192 193 ...198, etc.

Similarly subdivisions of other numbers have been constructed.

Where essential, footnotes have been given and at the end of each chapter a list of further readings has also been provided. The aim of further readings is to stimulate the reader to use these for further study.

KRISHAN KUMAR

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Chapter 1

NEED AND PURPOSE

0 INTRODUCTION

Classification pervades all the various activities of our life. Those who are orderly in life make a greater use of classification, though unconsciously. Most of us are unaware of the fact that we classify to a large extent in our daily lives. Without classification, human progress would be impossible. For this process helps convert unorganized thoughts and impressions into recognizable patterns.

In everyday life, we can distinguish people on the basis of height: short, medium and tall. We can see that a green grocer arranges his groceries, as well as a shoemaker his shoes, according to size or quality. All this is done so as to improve the efficiency of their operations.

1 MEANING OF CLASSIFICATION

In ancient Rome, nobility was arranged in six orders or ranks, based on real or supposed qualities of blood or wealth. These classes were distinguished from the lower orders. The term *classis* was used to refer to a group of persons possessing certain qualities in common, as well as belonging to the same class. The word "classification" comes from the Latin word *classis*.

Ordinarily, classification is a process of grouping. It involves putting together like entities and separating unlike entities. The characteristics of entities are used as a basis for determining the likeness or unlikeness between them. Human beings themselves are divided into classes each class contains a set of human beings placed together on the basis of certain common characteristics. Thus we find Indians, Burmese, Iranians, and so on. Actually, the mental process of grouping is basic to human beings. In the above example, likeness has

2 Theory of Classification

been used as a basis of placing the entities in different classes.

Likeness, thus, is identity in kind, but certainly not in substance. Indians, as individuals, resemble in certain respects, but they are not identical. Thus a class would consist of entities which are like in some respects, and possessing certain qualities in common, which help in distinguishing them from another class of entities.

The term "classification" is used in many senses. S.R. Ranganathan has recognized five. The term is thus a homonym. In order to avoid the problem of communicating a particular sense we shall, throughout the book, restrict the meaning of the term "classification" to Sense 5.

11 Sense 1

The meaning of classification in Sense 1 is "division" (*Prolegomena*, p. 77). A child practises classification in this sense. Early man too practised classification through the method of division.

12 Sense 2

The meaning of classification in Sense 2 is "assortment" (*Prolegomena*, p. 77). Assortment is "the process of the division of a universe into groups plus that of arranging the groups in a definite sequence—that is, of ranking—that is, assigning a rank to each resulting group" (*Prolegomena*, p. 58). Such a classification is a neural necessity. It brings about a clarity in thought, expression and communication. The contribution of philosophers and taxonomists to classification is generally limited to classification in Sense 2.

13 Sense 3

The meaning of classification in Sense 3 is "classification in sense 2 plus representing each entity by an ordinal number taken out of a system of ordinal numbers, designed to mechanise the maintenance of the sequence

1. Either when an entity has to be replaced after having been taken out of its position;

2. Or when a new entity has to be interpolated or extrapolated in the correct place in the sequence" (*Prolegomena*, p. 77).

Classification in this sense is made by large business firms when dealing with a large number of commodities, which are entered in published lists or arranged in a store. Classification in Sense 3 is practised on a wide scale.

14 Sense 4

The meaning of classification in Sense 4 is "classification in sense 3 when complete assortment is made of an amplified universe—that is, when the entities and the pseudo-entities arising in the process of successive assortment stand arranged in one filiatory sequence, each with its class number" (*Prolegomena*, p. 78). According to Ranganathan: "Each class of an array will contain one or more entities. Before their assortment, they would have been contained in their common immediate universe. Into this immediate universe, introduce the emptied immediate universe itself as an additional entity. This additional entity will be called its pseudo-entity" (*Prolegomena*, p. 65). Further, he adds that an amplified class is "a multiple class enriched by the addition of its pseudo-entity" (*Prolegomena*, 65). The filiatory sequence is the "sequence of pseudo-entities and the entities resulting from a complete assortment of a completely amplified universe" (*Prolegomena*, p. 65). In a filiatory sequence, each multiple class formed in the process of complete assortment is incorporated into its filiatory position.

Classification in this sense is limited in use.

15 Sense 5

The meaning of classification in Sense 5 is "classification in sense 4 with all the entities removed but only the pseudo-entities or classes retained—each class having the number representing it" (*Prolegomena*, p. 78).

The following assumptions have been made in this regard:

- (a) the individual entities do not occur in complete assortment;
- (b) classes take the place of entities; and
- (c) each class, including the original universe, is a class of classes.

Note: A scheme for classification is associated with classification in Sense 5. However, the scheme of classes is associated with classification in Sense 2.

Classification in Sense 5 is either used when the universe to be classified is infinite, or when some of the entities are unknown and unknowable at any despite moment, the universe to be classified being finite.

Classification in Sense 5 is practised widely. And as mentioned earlier we shall, throughout this book, confine ourselves to classification in Sense 5.

4 Theory of Classification

2 IMPORTANCE OF CLASSIFICATION

One cannot perform the act of reasoning unless one possesses the power of classifying. We can go to the extent of saying that in order to distinguish objects, we should be able to visualize or see them together. Classification is considered an important field of study but there is no university training available in this field. The interest in classification is widely scattered among a very few persons belonging to different countries. The profession of classifiers or classificationists has yet to be recognized as a separate profession. Classification as a field of study is making some progress in the areas of its application such as libraries/documentation centres/information centres; scientific organizations (biological taxonomy etc); trade organizations (cataloging and classification of commodities) etc. Today, classification systems are in great demand but the existing systems have been criticized a great deal due to being found inadequate for the purpose. There is a need for better understanding and appreciation of classification so that this area could be developed further for the benefit of mankind.

3 LIBRARY CLASSIFICATION

In ordinary classification, we deal with the arrangement of ideas and objects in a systematic order. But in library classification we are concerned with documents, and the aim is to arrange these in the most helpful and permanent order. The term "document" refers to printed, handwritten or engraved material, including books, periodical publications, microfilms, photographs, gramophone records, tape-records and so on. Library classification thus provides formal access to the documents in a library.

Keeping in view the question of utility, Sayers defined library classification as "the arrangement of books on shelves, or description of them, in the manner which is most useful to those who read."¹ The emphasis is on usefulness, so that users can search for books without difficulty.

According to Mann, classification "is the arranging of things according to likeness and unlikeness. It is the sorting and grouping of things, but, in addition, classification of books is a knowledge classification with adjustments made necessary by the physical form of

¹W.C. Berwick Sayers, *Manual of classification for librarians and bibliographers*, 3rd edn., Andre Deutsch, 1964, p. 1.

books."² Classification is thus a process, which brings together like documents and separates unlike ones.

4 NEED FOR LIBRARY CLASSIFICATION

A service library acquires books for use. These are arranged so that their utility increases to the optimum level. Library classification aims to achieve the same.

If the collection of documents in a library is small, running into a few hundreds only, a librarian would be able to lay his hand on a required document immediately without much problem. There would be no need for a systematic arrangement. However, a person other than the librarian or the one who collected those documents, would find it difficult to locate a particular one. He would not have enough time at his disposal to patiently search through the entire collection.

When the collection grows beyond a few hundred, a librarian or collector of documents would find it difficult to lay his hand on a required document. A person other than the librarian or collector would find it even more difficult to locate a particular document. The same problem would be faced if there was a demand for documents on a given subject.

Due to the varying forms and purpose of documents, it becomes essential to arrange them systematically on shelves. A user would be in a better position to help himself if shelves are provided with an adequate number of shelf guides, bay guides and so on. Thereby, he would require less assistance from the reference staff.

In an unclassified collection, guides would be of no use, and a user would most likely feel lost. So in order to provide an effective reference service, it is essential that the documents are arranged systematically. This would also help save the time of the reference staff and as well as that of the readers themselves.

Library classification aims to create a system out of disorder, and provide a comprehensive view of the documents on a subject. Once an orderly arrangement has been achieved, then it will save the time of successive readers as well as librarian.

It leads to the maximum use of a collection of documents. This, in turn, satisfies the laws of library science, as formulated by S.R. Ranganathan.

²Margaret Mann, *Introduction to cataloging and classification of books*, 2nd edn., Chicago, American Library Association, 1943, p. 33.

The laws of library science govern the various fields of study falling within the purview. These laws are enumerated as follow:

Books are for use (first law)

Every reader his book (second law)

Every book its reader (third law)

Save the time of the reader (fourth law)

Save the time of the staff (corollary to the fourth law)

Library is a growing organism (fifth law)

The basic aim of librarianship is to bring the user in contact with a specific document or information. Various techniques are adopted by a librarian to achieve this aim. Library classification is one such technique, which helps in the organization of documents and information so that the user can use sources of information effectively.

From the above discussion, it follows that library classification is a necessity in a service library. Library classification is no more the simple operation it once used to be. It is becoming more and more complicated as well as more and more sophisticated in nature.

5 TYPE OF ARRANGEMENT

In the process of arranging books, we can think of physical or content value as the basis of our arrangement. A large variety of arrangements are possible. Study of the history of library classification shows that in the past, these varied. We may refer to pinake, a catalogue of subject location prepared by Callimachus to serve the purpose of arranging documents in the Alexandria Library according to size. However, present day libraries ordinarily arrange documents subjectwise.

Any systematic arrangement which breaks the entire collection into groups is certainly better than an unsystematic arrangement. Thus, we should choose an arrangement, which meets our requirements in the best possible manner. Our choice should take into consideration the various purposes for which books are to be used by the users.

The colour of binding, size, author, title, publisher and subject are some of the criteria which can be employed to achieve a systematic arrangement of books. In the choice of a suitable criterion for arrangement, the following qualities may be kept in view:

- (i) the number of groups formed should be large enough;
- (ii) each group should include a large number of documents;

- (iii) the grouping should be helpful;
- (iv) the grouping achieved should be permanent in nature; and
- (v) each group should be meaningful.

Most readers are not able to pinpoint their interests. Therefore, the shelf arrangement should display a full panorama of the fields of interest of the users, including their expressed as well as unexpressed interests. The display should be such as to enable a user to become fully aware of requirements, about which he was only vaguely conscious before. This kind of function should be performed by the particular arrangement of documents to be chosen by a library.

A criterion which satisfies the above considerations to the maximum extent should be considered more useful. Let us try to study how far the above qualities are satisfied by systematic arrangements based on various criteria.

To begin with, let us attempt to group books on the basis of the colour of their binding. In case a book is rebound, the colour of binding can get changed depending upon the colour of material used for binding. The number of effective colours, available for the purpose is small numbering a dozen or so; thus, too many books would be bound in the same colour. Besides the colour of binding is not permanent. Also, the colour of a book would indicate hardly anything about its contents. Therefore, this basis for classification of books is not suitable.

If books are arranged according to size, then they would be classified on the basis of accidental likeness, which would again bear no relation to their content. Such a classification would not provide answers to questions relating to the author, subject or title. This arrangement would hardly, then, be of any use to the users, and would not help seek information of interest to the user, or serve the needs of a user interested in a subject of specific interest.

Thus, let us arrange the books in a library according to the names of the authors. As the number of authors is very large, the number of groups shall be large enough. Within each group, however, the number of books would normally be small. Such an arrangement would be helpful if somebody was looking for a work by a particular author. For a corporate body such as the Government of India, there would be too many books entered under various ministries, departments and so on, as subheadings. In such a case, locating a book can sometimes prove difficult, even though the exact name of the author might be known. The grouping can be permanent in nature, The authorship would indicate the possible subject of the book, unless the

person has written on more than one subject. Such an arrangement would be of no help to a person interested in a book on a subject, unless he knows the author. However, in the case of fiction, many libraries adopt the author arrangement of grouping their titles together. But CC (Edition 6) prefers the date of birth of the author as a basis for the arrangement of fiction. The accepted practice for non-fiction, however, is to adopt the subject arrangement.

Let us suppose that the books are arranged according to title. The number of groups thus formed would be very large indeed. Each group would be too small consisting mostly of one item only. The titles would sometimes change from one edition to another. The title of the same book would often differ from language to language. Sometimes, the same title may be published in different countries under different names, though the language might be the same. The title of a book very often indicates the subject dealt in it. However, this arrangement would result in books under terms such as "Introduction," "Preface" and so on. This kind of arrangement would be useful to very few users. In the case of periodicals, many libraries prefer to arrange them title-wise. However, *Colon classification* recommends the subject arrangement.

If books were arranged under various publishers the grouping would, to a large extent, be neither helpful nor meaningful. The publisher of a book might sometimes indicate the quality of work or subject (if the publisher specialised in a particular subject), or level of the work. Normally, readers do not approach a book through the name of its publisher.

6 SUBJECT ARRANGEMENT

The subject approach, which brings together books on the same subject and on related aspects of the subject, is both convenient and essential, especially in an open-shelf collection. Books on Indian philosophy, for example, would be found together, so that a user, looking for a specific title, can also locate other works on the same subject lying nearby. In case the specific work he is interested in is not available on the shelf at the time, he can, possibly locate another work on the same subject which might serve the purpose.

The subject approach is also useful, when a user would like to consult a whole group of books on a given subject before he is able to decide upon which book or books meet his requirements. The subject

approach, then, is the best approach, because most readers are in search of books in terms of the subject involved.

Subject arrangement also makes it possible to bring books together under one subject. Related books will lie in close proximity. As a result of such an arrangement, a user interested in locating material on one subject will easily move towards another subject closely related to it.

The subject arrangement has also been found to be useful to reference librarians. When a reference librarian goes to the shelves, he would prefer to find all the books on one subject together at one place, and books on related subjects nearby.

The ordinary user of a library would normally walk into a section containing books of interest to him. Mostly his approach would be through subject. The subject approach, as a basis for the classification of books, is thus considered the most popular and convenient method. The experts in classification are unanimous on this point.

The experience of librarians indicates that more users make requests for books on a particular subject than for books by a particular author. Therefore, we can say that the subject-wise arrangement of books will satisfy more users, leading to a greater use of books. This will also satisfy the laws of library science.

It is the considered opinion of experts that any basis of classification other than that according to subject is liable to fail in a modern library. Besides, the users, who approach a book through its author's name or its title, can be satisfied by the library catalogue.

7 PURPOSE OF LIBRARY CLASSIFICATION

Irrespective of the size of a collection, it is essential that library classification, should make each document readily available. In other words, one should be able to locate a document immediately. (The purpose, herein, being to satisfy the laws of library science).

71 Helpful Sequence

The basic purpose of any library classification for a service library should be to arrange the documents in a method most convenient to the users and to the library staff. The documents should be arranged in classes, and based on the mutual relations between them. This would bring together closely related classes. In other words, related documents would be grouped in close proximity, the basic idea being

that like classes are brought together and unlike classes are separated. Besides, most closely related classes, are brought together, in close proximity.

72 Correct Replacement

Documents, after being taken out from shelves by the users or by the library staff should, after being used, be replaced in their proper places.

It is essential that library classification should enable the correct replacement of documents, after these have been returned from use. This would require a mechanized arrangement, which has been discussed in the next section.

73 Mechanized Arrangement

If it is decided that a particular arrangement is suitable then, ordinarily, it should not be changed. The sequence should be determined once and for all, so that one does not have to redetermine the sequence of documents once again when these are returned after being borrowed, or for the interpolation of new documents in their correct places. This is done by allocating notation, which expresses order. Thus, it becomes possible to easily insert or reinsert the various documents in their correct places. This is how we are able to mechanize the arrangement.

74 Addition of New Documents

A library would acquire new documents from time to time. Therefore, library classification should help in finding the most helpful place for each of these among the existing collection of the library. There are two possibilities in this regard. The new books may be on a subject already provided for in the scheme of library classification, or it may be on a newly emerging subject, which may not have been provided for in the existing scheme. In the second case, the scheme should have inbuilt qualities which may allow fixing the position of the newly emerging subject amidst another subject having literary warrant.

75 Withdrawal of Documents from Stock

In case, the need arise to withdraw a document from the stock for some reason, then library classification should facilitate such a withdrawal.

76 Book Display

In a restricted sense, the word "display" is adopted for a special exhibition of books and other materials on a given topic. In the widest sense, the term is used to indicate that the collection in an open access library is well presented and guided. Library classification should be helpful in the organization of book displays.

77 Other Purposes

Library classification should also be able to serve the following purposes:

- (a) compilation of bibliographies, catalogues, union catalogues and so on;
- (b) classification of information;
- (c) classification of reference queries;
- (d) classification of suggestions received from the users;
- (e) filing of non-book materials such as correspondence, photographs, films and so on;
- (f) classification of statistics of various kinds, for instance the classification of statistics with regard to the issuance of books would reflect the pattern of demands in various subjects;
- (g) arrangement of entries in classified part of the catalogue;
- (h) assist the cataloguer in deriving subject headings by means of chain procedure;
- (i) assist the cataloguer to analyze the thought content of books for deriving subject headings, in case a list of subject headings is used;
- (j) assist the user of a catalogue to refer to the location of the document on the shelf; and
- (k) assist the library staff to prepare a list of documents of a branch library or lending centre from the stock of the central library.

8 SOME SPECIAL CONSIDERATIONS

Librarians are greatly interested in the concepts (real or unreal) in documents, and their logical relations. This is because the organization of knowledge in libraries, documentation centres and information centres is based on the understanding of concepts and their logical relations. In the grouping of documents, the considerations kept in view are:

- (a) documents should be grouped on the basis of thought content (i.e., subject-matter), except in some cases and

12 *Theory of Classification*

(b) the different groups should be arranged among themselves on the basis of mutual relations. Related groups must be brought together and unrelated ones separated from one another.

In addition to the above, each group of documents is allotted a number in the artificial language of ordinal numbers.

91 CLASSIFICATORY LANGUAGE

In a library classification scheme, words are used to denote concepts and notation is made use of to denote the ranking of the concepts. Each classification scheme evolves a language to serve its aims. Such a language is called a classificatory language. A classificatory language consists of ordinal numbers in the form of digits or symbols.

92 PROBLEMS

The universe of subjects is phenomenal, and has registered a dynamic growth rate in the modern world today. New subjects in various forms are always cropping up. With the increasing complexity of subjects, there have developed equally complex relationships between various subjects. This has created tremendous problems for researchers as well as those dealing with the organization of documents or information. Library classification is one technique which helps in the organization of documents and information, so that the users can use sources of information effectively. It has also helped create order out of much chaos.

The nature of universe of subjects is multi-dimensional. It is the job of classification to map out multi-dimensional universe of subjects along one line. This is a very difficult task, and we have not yet been able to find a complete solution. New developments in knowledge have to be incorporated in the classification scheme. Thus, a scheme has to keep pace with developments in the universe of subjects. Our experience shows that this requires more and more intricate symbols as well as better notational techniques. This leads to increasing difficulties, both in the classification of documents and in the decoding of their symbols for the purpose of retrieval.

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- , *Prolegomena to library classification*, 3rd ed., Bombay, Asia Publishing House, 1967, part C.

Chapter 2

BASIC CONCEPTS AND TERMINOLOGY

In order to study the schemes of library classification, and its theory in precise and concise terms, it becomes essential to understand the fundamental concepts and terms used in this discipline. These concepts and terms may be called the elements of library classification.

It is also important to define them, so that it becomes possible to have precision in communication. The definitions have been taken mainly from the writings of S.R. Ranganathan and A. Neelameghan. Some of the definitions have also been drawn from *Indian standard glossary of classification terms*. In many cases, references to sources have been provided here. In other cases, it is implied that the definitions have been drawn from the works of Ranganathan. The terminology of classification is extremely large and well developed. No attempt has been made to make the coverage comprehensive. Many other terms have been defined and described in appropriate places in relevant chapters. The terms have been grouped more or less on the basis of their mutual relationships. For instance, terms like book classification, depth classification, universal classification and special classification have been grouped together. Another group consists of class number, book number, ultimate class, collection number and call number. The definition of ultimate class has been placed along the definition of book number, because the definition of book number introduces the term ultimate class. (In order to locate a term, refer to the index to this book.)

Analysis: Breaking down a subject into facets.

Array: The classes derived from a universe on the basis of a single characteristic, at any one step in the progress towards its complete assortment, and arranged in the preferred sequence (*Prolegomena*, p. 61).

EXAMPLE:

Teachers
 By subject
 Physics
 Chemistry
 Botany

In this example, those teaching physics, chemistry and botany belong to the same array.

Characteristic: An attribute or any attribute-complex with reference to which the likeness or unlikeness of entities can be determined, and at least two of them are unlike (*Prolegomena*, p. 55).

Attribute: Any property or quality or quantitative measure of an entity (*Prolegomena*, p. 53)

EXAMPLE:

Boys
 By height
 Tall
 Average
 Low

In the above example, height as a characteristic has been used to divide the universe of boys into like groups. Thus, "by height" can be considered a characteristic (provided we are not dealing with boys of the same height), but the possession of eyes or ears will merely be considered as attributes, which are likely to be shared by all normal boys.

Classification: See Chapter One

Classification scheme: A scheme of classes fitted with terminology and notation (*Prolegomena*, p. 72).

Facet analysis: Analysis of a subject into its facets, according to the postulates and principles stated for the purpose (*ISI*, p. 62).

Facet synthesis: Synthesis of the focal numbers of a subject into class numbers according to the postulates and principles stated for the purpose (*ISI*, p. 62).

Facet: A generic term to denote any component—be it a basic subject or an isolate idea—of a compound subject and also its respective ranked forms, terms, and numbers (*Prolegomena*, p. 88) (Sense 1).

A generic term to denote facet idea, facet term and focal number (Sense 2).

Anlytico synthetic classification: Scheme of classification involving the analysis of a subject into its facets in the idea plane, transformation in the verbal plane, translation from the focal terms in the verbal plane to the focal numbers in the national plane, and the synthesis

of the focal numbers into class numbers in the notational plane.
 Alternate term FACETED CLASSIFICATION.

Note: Such a scheme of classification does not usually give ready-made class numbers for any, but the very basic subjects. It gives schedules for basic subjects and for isolates in diverse facets. Its schedule is thus not a monolithic one. It is a polythetic one. (*ISI*, p. 72).

S.R. Ranganathan's approach involves breaking down of a subject into a basic subject and isolate ideas; translating them into the respective kernal numbers; and finally synthesising the later into a class number.

Classificationist: One who makes a scheme of classification (Ranganathan). But Bliss uses the term "classifier."

Classifier: One who classifies (Ranganathan). But Bliss uses the term "classer."

Classifying: Classifying is equivalent to translating the name of a subject from natural language into classificatory language—that is, a language of ordinal numbers (*Prolegomena*, p. 439). Bliss, however, prefers the term "classing."

Book classification: A scheme for the classification of macro subjects, usually presenting not more than five facets, including the basic facet (Ranganathan).

Depth classification: A scheme for the classification of micro subjects, presenting a large number of facets, unlike a macro subject (Ranganathan).

Universal classification: A scheme designed for use in book classification as well as in depth classification (Ranganathan).

Special classification: A scheme designed for the depth classification of micro subjects, going only with one and only one specified subject field (Ranganathan).

Class number: The class number of a book is a translation of the name of its specific subject into the artificial language of ordinal numbers. . . (*CC6*, p. 1.5).

Note: Ordinal numbers are those which are used for ordering or arrangement.

Book number: Ordinal number which fixes the position of a document in a library relative to the other documents having the same ultimate class (*ISI*, p. 78).

Ultimate class: The ultimate class of a book is the class of the smallest extension admitted by the scheme of classification, into which it can be placed (*CC6*, p. 1.8).

Collection number: The collection number of a book denotes the collection to which it belongs (CC6, p. 1.18).

Call number: The call number of a book unit is the symbol used to fix its position relatively to other books (CC6, p. 1.3).

Facet: A generic term to denote any component—be it a basic subject or an isolate idea—of a compound subject (Sense 1).

A generic term to denote facet idea, facet term and facet number (Sense 2).

EXAMPLES:

Consider "injuries to corn in France in 1978."

Injuries belongs to the disease facet; corn belongs to the cultivar facet; France belongs to the geographical facet and 1978 to the time facet.

Facet idea: An Idea manifesting itself as a facet of a compound subject.

Facet term: A word or word group in the preferred natural language denoting a facet idea.

Facet number: A number in the preferred classificatory language of ordinal numbers representing a facet idea.

A facet can have two components, such as basic facet and isolate facet.

Basic facet: Basic facet is a context specifying element.

In order to determine basic facet of a compound subject, one should have knowledge of the schedules of basic subjects. In 'Human diseases', Medicine is a basic facet. In 'Indian libraries', Library Science is a basic facet.

Isolate facet: Isolate facet can have the following components: personality, property, action, space and time.

Focus: A generic term to denote any isolate or any subject, and also the number representing any of them as well as the name denoting any of them.

Idea: A product of thinking, reflecting, imagining, etc., got by the intellect by integrating, with the aid of logic, a selection from the apperception mass, and/or what is directly apprehended by intuition, and deposited in memory (*Prolegomena*, p. 81).

Isolate: Generic term to denote isolate idea, isolate term or isolate number

Compound isolate: "An isolate consisting of two or more isolates taken from one and the same schedule of isolates."¹ We can form a

¹S.R. Ranganathan, *Colon classification edition 7 (1971): a preview*, Bangalore, Sarada Ranganathan Endowment for Library Science, 1969, p. 9.

compound isolate by combining two or more isolates. We can also form a compound isolate by combining an isolate and a speciator. "Veins of hands" is a compound isolate, the "veins" and "hands" being two independent isolate ideas belonging to the same schedule of isolates. Similarly, "urban youth" is a compound isolate. "Urban group" and "youth" are two independent isolate ideas belonging to the same schedule of isolates.

Isolate idea: Any idea or idea complex fit to form a component of a subject, but not by itself fit to be deemed a subject (*Prolegomena*, p. 83).

EXAMPLES:

Child; Gold; India.

Basic subject idea: A basic subject is a subject without any isolate idea as a component. Basic subject ideas are enumerated in the schedule of basic subjects in a scheme for classification of subjects.

Speciator idea: A speciator idea, when combined with a basic subject idea or an isolate idea, produces a change in their respective connotations. In this sense, a speciator is a modifier (quoted by A. Neelameghan).

Combination of ideas: The combination of a basic subject idea with one or more speciator ideas is a compound basic subject.

A combination of an isolate idea with one or more speciator ideas is a compound isolate.

A subject consisting only of a basic subject idea is a simple subject.

A subject consisting of a basic subject idea and one or more isolate ideas is a compound subject.

Two or more subjects—simple or compound—studied in mutual relation to each other give rise to a complex subject.

Macro subject: A subject of great extension and small intension, usually embodied in a whole book single volumed or multi-volumed (Ranganathan).

Macro document: Usually a book—single volumed or multi-volumed.

Micro subject: A subject of small extension and great intension, usually embodied in an article in a periodical, or in a part of a book (Ranganathan).

Micro document: A document, such as an article in a periodical or the part of a book, not having an independent physical existence (Ranganathan).

Host document: A periodical or a book viewed in relation to a

micro document contained in it (Ranganathan).

Planes of work: Ranganathan has recognized three planes of work, namely, idea plane, verbal plane and notational plane.

Idea plane: The plane of concepts viewed by themselves, that is independently of the terms denoting them and the numbers representing them; in other words, independently of their expression in a natural language or their representation in an artificial language of ordinal numbers (ISI)

Verbal plane: The plane of expression of a concept in a natural language; in other words, the plane of words, word groups, phrases, clauses, sentences and paragraphs in natural language (ISI).

Notational plane: The plane of numbers representing concepts (ISI).

Equivalent terms:

<i>Idea Plane</i>	<i>Verbal Plane</i>	<i>Notational Plane</i>
class	subject	class number
isolate idea	isolate term	isolate number
facet idea	facet term	facet number

Isolate idea: Any idea or idea complex fit to form a component of a subject, but not by itself fit to be deemed a subject.

Isolate term: Term denoting a ranked isolate; this is the name of the isolate. (Ranked isolate is an isolate taken along with rank, as fixed in the course of the successive assortments of the universe of isolate ideas.)

Isolate number: The number denoting the rank of a ranked isolate and representing it.

CHART OF EQUIVALENT TERMS (ISI, pp. 39-40)

<i>Generic</i>	<i>Idea Plane</i>	<i>Verbal Plane</i>	<i>Notational Plane</i>
<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
Focus	[Class Isolate idea Array-isolate idea	[Subject Isolate term Array-isolate term	[Class number Isolate number Array-isolate number
Basic focus	Basic class	Basic subject	Basic class number
Main focus	Main class	Main subject	Main class number
Canonical focus	Canonical class	Canonical subject	Canonical class number
Isolate	Isolate idea	Isolate term	Isolate number
Common isolate	Common isolate idea	Common isolate term	Common isolate number
Anteriorizing	Anteriorizing	Anteriorizing	Anteriorizing
Common isolate	Common isolate idea	Common isolate term	Common isolate number
Posteriorizing	Posteriorizing	Posteriorizing	Posteriorizing

1	2	3	4
Common isolate	Common isolate idea	Common isolate term	Common isolate number
Array-isolate	Array-isolate idea	Array-isolate term	Array-isolate number
Facet	[Basic class isolate idea	[Basic subject isolate term	[Basic class number isolate number
Basic facet	Basic class	Basic subject	Basic class number
Isolate facet	Isolate idea	Isolate term	Isolate number
Compound focus	Compound class	Compound subject	Compound class number
Complex focus	Complex class	Complex subject	Complex class number
Complex isolate	Complex isolate idea	Complex isolate term	Complex isolate number
Complex array isolate	Complex array isolate idea	Complex array-isolate term	Complex array-isolate number
Biassing focus	Biassing class	Biassing subject	Biassing class number
Biassing isolate	Biassing isolate idea	Biassing isolate term	Biassing isolate number
Biassing array-isolate	Biassing array-isolate idea	Biassing array-isolate term	Biassing array-isolate number
Comparison focus	Comparison class	Comparison subject	Comparison class number
Comparison isolate	Comparison isolate idea	Comparison isolate term	Comparison isolate number
Comparison array-isolate	Comparison array-isolate idea	Comparison array-isolate term	Comparison array-isolate number
Difference focus	Difference class	Difference subject	Difference class number
Difference isolate	Difference isolate idea	Difference isolate term	Difference isolate number
Difference array-isolate	Difference array-isolate idea	Difference array-isolate term	Difference array-isolate number
Influencing focus	Influencing class	Influencing subject	Influencing class number
Influencing isolate	Influencing isolate idea	Influencing isolate term	Influencing isolate number
General relation focus	General relation class	General relation subject	General relation class number
General relation isolate	General relation isolate idea	General relation isolate term	General relation isolate number
General relation array-isolate	General relation array-isolate idea	General relation array-isolate term	General relation array-isolate number

Speciator: Speciator is an idea or idea complex used or intended to be used as a qualifier going with a host basic subject or a host isolate idea.² However, a speciator idea when combined with a basic subject idea or isolate idea produces a change in their respective connotations, then in that sense a speciator becomes a modifier. Thus a speciator can be a modifier or qualifier. We may recognize speciators of two kinds, Speciator kind 1 and Speciator kind 2.

Speciator Kind 1: Any recognized isolate idea or a subject may be a speciator for another isolate idea.³

EXAMPLE:

Christians

By standard of living

Lower class

Upper class

Middle class

Note: In the above example, "By standard of living" is a characteristic used to divide "Christians." Upper class, middle class and lower class are speciators. "Upper class" is a speciator which is an isolate idea representing a social group by standard of living. It is speciator for "Christians"—an isolate idea representing a social group by religion.

Speciator Kind 2: An idea which is not by itself an isolate idea or a subject but can be used as a speciator, going with a host isolate idea or its sub-divisions.⁴

EXAMPLE:

France

By orientation

North

South

East

West

Note: In the above example, "By orientation" is a characteristic which has been used to divide "France." France is a principle isolate. East is a speciator representing an idea, which by itself cannot be considered as an isolate idea or subject. Therefore, it is considered a speciator of kind 2.

Speciators of basic subjects: The following four varieties of non-

²M.A. Gopinath, *Classification research* (India); 1968-73, Bangalore, DRTC, pp. 22-23.

³*Ibid.*

⁴*Ibid.*

primary compound basic subjects can be obtained on the basis of speciators:

Specials compound basic subject [examples (a) and (b) stated below].

Environmented compound basic subject [examples (c) and (d)].

Systems compound basic subject [examples (e) and (f)].

Multiple compound basic subject.

In the above subjects, "by specials" "by environment" and "by system" are the characteristics used to generate a variety of speciators. The speciators, when attached to their primary host subjects, form compound basic subjects.

EXAMPLES:

(a) Medicine

By age

Child

Adolescent

Old age

(c) Medicine

By environment

High altitude

Underwater

Desert

Space

(e) Medicine

By system (or school
of thought)

Ayurveda

Siddha

Unani

(b) Medicine

By sex

Male

Female

Eunuch

(d) Psychology

By environment

Space

Industry

War

(f) Psychology

By system

Experimental

Gestalt

Psycho-analytic

Let us take the first example. "By age" is a characteristic used to derive the speciators like child, adolescent and old age. The attaching of these speciators to medicine (a primary basic subject) leads to specials compound basic subjects, such as Medicine child; Medicine-adolescent; and Medicine-old age. In the second example, "by sex" is a characteristic used to derive the speciators. The characteristics such as "by age," "by sex" and so on can be grouped under "by specials." That is why the compound basic subjects of this kind have been named specials compound basic subjects.

Examples (c) and (d) lead to the formation of environmented compound basic subjects. These involve use of the characteristic "by environment." Examples (e) and (f) give us systems compound basic

subjects. These involve the application of the characteristic "by system." Similarly, we can achieve primary basic subject by using, successively, speciators derived on the basis of two or more of the variety of characteristics mentioned earlier. We may use, successively, the special characteristic and the systems characteristic, thus obtaining a multiple compound basic subject.

On the basis of the above, we may recognize three types of speciators:

By specials.

By environment.

By systems.

We may thus conclude that a *speciator attached to a basic subject gives rise to compound basic subject.*

Speciators of isolates: Speciator attached to an isolate gives rise to a compound isolate.

Compound property isolates, compound energy isolates, compound space isolates and so on have been obtained by attaching a speciator to an isolate.

Compound property isolates: A compound property isolate is obtained by attaching a speciator to a property isolate.

EXAMPLE:

Fever

By condition

Mild

Acute

Note: Speciators derived on the basis of the characteristics "by condition" are mild and acute. "Fever-acute" and "Fever-mild" are compound property isolates.

A compound space isolate is obtained by attaching a speciator to a space isolate.

EXAMPLE:

India

By geographical feature

River

Desert

Forest

Note: In space isolates, characteristics such as "by geographical features," "by orientation," "by population cluster" and so on are used to obtain speciators. In the above example, "India-rivers" is a compound space isolate.

Speciator idea: A speciator idea, when combined with a basic sub-

ject idea or isolate idea, produces a change in their respective connotations. In this sense speciator is a modifier (A. Neelamegham).

Sequence of speciators: The sequence of speciators going with one and the same set of host isolate ideas for forming compound isolates, can be determined with the aid of the wall-picture principle and its derivatives.

Subject: The universe of entities is infinite. When a knower interacts with a knowee, ideas are generated. The systematized body of ideas takes the form of a subject. In library classification, we are concerned with the universe of subjects. Therefore, let us try to understand the scope of the term "subject." Subject refers to "an organised systematised body of ideas, whose extension and intension are likely to fall coherently within the field of interest and comfortably within the intellectual competence and the field of inevitable specialization of a normal person" (*Prolegomena*, p. 82). Every subject is deemed to go with a basic subject.

The manifestation of a subject can be expressed in terms of three elementary constituents: basic subject, isolates idea and speciator. Let us now define the terms "basic subject" and "isolate idea." The term "speciator" has already been described. It may be added that an elementary constituent term occurring in the form of the name of the subject can take the form of a term denoting a basic subject, a term denoting an isolate idea or a term denoting a speciator.

Specific subject: Specific subject of a book is that division of knowledge whose extension and intension are equal to those of its thought content.

Basic subject: "Every subject has a basic subject." Therefore, every subject must belong to one or another basic subject. A basic subject has been defined as, "a subject without any isolate idea as a component" (*Prolegomena*, p. 83). Here, we have introduced the concept of an isolate idea, which needs to be explained before describing the basic subject any further.

Isolate idea : An isolate idea is considered to be "any idea or idea-complex fit to form a component of a subject, but not by itself fit to be deemed to be a subject" (*Prolegomena*, p. 83).

"Iron" represents an isolate idea. By itself, it cannot be a subject. It can form a component of other subjects, for example the chemistry of iron, the mining of iron ore, the economics of iron and so on. Each of these forms an area of specialization, which can be pursued by a specialist. Normally, no single person would be able to pursue all these fields at a specialized level.

"France" represents an isolate idea. By itself, it cannot form a subject. However, it can form a component of other subjects, for example, the agriculture of France, the culture of France, the education in France, the socio-economic structure of France and so on. Each of these forms an area of specialization which can be pursued by a specialist. Normally, no single person would be able to pursue all these fields at a specialized level.

"Person" represents an isolate idea. By itself, it cannot form a subject of study. However, it can form a component of other subjects, for example the right of legation by a person, crime by a person, person (morphology) in linguistics and so on. Normally, no single person, again, would be able to pursue all these fields at a specialized level. Each of these fields can form an area of specialization to be pursued by a specialist in the field.

Identification of a Basic Subject

"Basic subject" is a generic term used to represent either the primary basic subject or the non-primary basic subject. In the preceding pages we have tried to provide the definitions of "basic subject" and "isolate idea." But so far, it has not been possible to find a clear-cut distinction between the two. In the light of this, the schemes for classification have been forced to postulate a schedule of basic subjects for their purpose. Ideally speaking, such a schedule should conform to conventions current among scholars and also currently included in the curricula of educational institutions. Such a schedule should also be modified from time to time, keeping all the changes taking place in view. In order to obtain consistency in the identification of a new basic subject, a few criteria have been worked out for this purpose. These are stated below:

1. A subject which calls for schedules of special isolates forming facets of a set of compound subjects going with one and the same host subject;
2. A subject which has to be taken as the central subject and in which one cannot distinctly recognize isolate facets; a subject not having any isolate facets. In the other words, a subject which cannot be expressed as the compound subject; and
3. A subject which has some specialization in academic circles—such as degree courses, periodicals, etc.⁵

⁵M.A. Gopinath, "Colon Classification" in Author Malt by. ed., *Classification in the 1970s; a second book*, London, Bingley, 1976, pp. 54-55.

The universe of subjects consists of simple subjects, compound subjects and complex subjects.

Simple Subject: A simple subject consists of a basic subject only.

EXAMPLES :

Chemistry, Mathematic, Physics, etc.

Compound subject : A Compound subject is "a subject with a basic subject and one or more isolate ideas as components" (*Prolegomena*, p. 84). In "chemistry of halogens," chemistry is a basic subject and halogens an isolate idea. In "treatment of diseases of lungs in medicine," medicine is a basic subject ; diseases, lungs and treatment represent three isolate ideas. Other examples of compound subjects are "teaching technique for children," functions of the President of India," "strike of clerical staff in chemical industry" and "velocity of sound in water."

Complex subject: Complex subject is a "subject formed by coupling two or more subjects expounding, or on the basis of, some relation between them" (*Prolegomena*, p. 85). For example "statistics for economists," "influence of politics on science," "difference between history and political science," "influence of Buddhism on Christianity" and "Unani treatment of the diseases of lungs, compared with Ayurvedic treatment."

Basic subjects can be categorized into primary basic subjects and non-primary basic subjects.

Primary basic subject : A classificationist, covering all or several subject fields in the universe of subjects, generally finds it convenient and helpful to begin with the formulation and enumeration of an initial set of basic subjects. A basic subject in this set is a primary basic subject.

Primary basic subjects can be formed by the following modes of formation:

Fission, distillation (Kind 1 and Kind 2), fusion and clustering.

Traditional or canonical primary basic subject: The initial set of primary basic subjects included in a scheme for library classification are formed by the division of the universe of subjects by fission. These basic subjects are postulated by the classificationist. Therefore, the resulting divisions have been called *traditional* or *canonical* primary basic subjects.

EXAMPLES:

Colon classification 1 (1933) enumerated the following set of primary basic subjects:

9 Generalia

N Fine arts

A Science (General)	O Literature
B Mathematics	P Philology
C Physics	Q Religion
D Engineering	R Philosophy
E Chemistry	S Psychology
F Technology	T Education
G Natural Science (General) and Biology	U Geography
H Geology	V History
I Botany	W Politics
J Agriculture	X Economics
K Zoology	Y Miscellaneous social sciences including sociology
L Medicine	Z Law
M Useful arts	

Fission : Mode of formation of the first set of primary basic subjects is by fission. Fission is the process of division, or splitting, or breaking up into parts. It is an internal process of division without the interference of any outside agency.

Distilled primary basic subjects (Kind 1): The idea of "management" can occur in a variety of subjects going with different primary basic subjects. A theory of management has been distilled out and people have started specializing in this area. Therefore, it has been found convenient to deem management as a primary basic subject. This has been formed through distillation of Kind 1.

EXAMPLE:

In CC7, the following have been enumerated as primary basic subjects : systematology, management science, metrology, standardization, research methodology, conference technique and so on.

Distilled primary basic subjects (Kind 2): In the case of the distillation mode (Kind 1), "the new primary basic subject essentially accommodates the theory—that is, the relevant set of postulates, and guiding principles—of the discipline emerging or distilled out of an idea (s) occurring as a practice-in-action in subjects going with diverse subjects. In distillation of Kind 2..., the idea occurs in subjects going with a particular basic subject only and there may be a trend towards the formulation of a new discipline with recognisable literary warrant and, perhaps, some principles and postulates for guiding its development."⁶

⁶A Neelameghan, *Primary subject by distillation*, Library Science, 10, 1973, p. 168.

EXAMPLES FROM CC7:

Statistical calculus, operations research, information theory, cybernetics, foundry, welding, cytology, etc.

Fused primary basic subjects : Interdisciplinary research has led to the emergence of new ideas and new subjects of an interdisciplinary character. In the initial stage, interdisciplinary subjects may be placed with one of the primary basic subject. But later, a classificationist may deem it necessary to postulate a new primary basic subject. This is thus formed through fusion.

EXAMPLES FROM CC7:

Astrophysics, astrochemistry, astrobiology, biomechanics biophysics, biochemistry, geophysics, geochemistry, econometrics, socio-cybernetics, etc.

Primary basic subject by clustering : "When an idea becomes the focus of study from the viewpoint of specialists in different subject fields, when the results of their investigations are brought together in a document, and when specialists begin to ask for such a collection by the name of the core idea of study, the need arises to assign the core idea to single basic subject. Further, the treatment of the core idea from different specialists view-points may not remain disjunctive and separate, but there may arise interdisciplinary ideas and subjects, and greater integral relation among the subjects embodied in the document."⁷

EXAMPLES FROM CC7:

Japanese studies, Indology. European studies; Gandhian studies, Vinoba studies; Gold (in all its aspects), peace research, leisure research, surface science, materials science, ocean sciences, space sciences.

Non-primary basic subjects : These are all formed from primary basic subjects. Also, they do not have an independent existence.

We may recognize the following varieties of non-primary basic subjects:⁸

- (a) secondary basic subject by fission of primary basic subject.
- (b) compound basic subject by lamination of Kind 2.
- (c) agglomerate basic subject.

Secondary basic subject by fission of primary basic subject: In the development of subjects, a point is reached when the number and

⁷A. Neelameghan, *Primary subjects by clustering*, Library Science, 10, 1973, p. 183.

⁸A. Neelameghan, *Non-primary basic subject*, Library Science, X, 1973, p. 189.

variety of subjects going with a particular primary basic subject of any one variety (as described earlier), might be too large, and also non-homogeneous to form a convenient field of specializations. Thus, a further division may become necessary. The division, by fission, of a field of specialization, going with a primary basic subject leads to canonical divisions of the primary basic subject concerned. These divisions have been named as secondary basic subjects of order 1.

EXAMPLES FROM CC7:

Under Physics (fissioned primary basic subject), we have fundamentals, properties of matter, sound, heat, radiation, electronics, electricity and magnetism (all secondary basic subjects).

Under Geophysics (fused primary basic subject), we have subjects like volcanology, seismology oceanology etc. (all secondary basic subjects).

We may recognize two varieties of secondary basic subjects as below :

(a) Secondary basic subjects of Order 2, and

(b) Compound secondary basic subjects,

Secondary basic subjects of order 2: We have already seen that secondary basic subjects of Order 1 can be formed by the fission of a primary basic subject. It is possible to achieve secondary basic subjects of Order 2 by dividing Order 1 further, by means of fission, if required.

EXAMPLES:

Atmospherology belongs to Order 1 and meteorology, aeronomy, ionosphere studies to Order 2.

Compound secondary basic subjects : Attachment of speciator (that is, lamination of Kind 2) to a secondary basic subject leads to compound secondary basic subjects.

The following varieties of compound secondary basic subjects are possible:

(a) Specials compound secondary basic subjects.

(b) Environmented compound secondary basic subjects.

(c) Systems secondary compound basic subjects.

EXAMPLES:

Physics, properties of matter and low temperature environment (here, physics is a primary basic subject, properties of matter is a secondary basic subject derived by fission from physics—low temperature environment is a speciator).

Economics, consumption—capitalist system (here economics is a primary basic subject, consumption is a secondary basic subject and

capitalist system is a speciator).

Compound basic subject by lamination kind 2: In order to achieve divisions of a primary basic subject, one can use a specific explicit characteristic. "The ideas derived on the basis of a characteristic are used to qualify or speciate the totality of the subjects going with the primary basic subject concerned. Here, each of the ideas derived on the basis of a characteristic is called a speciator. The attachment of a speciator to the primary basic subject to be qualified is called compounding or lamination of Kind 2."⁹

This leads to primary basic subjects or compound basic subjects.

A variety of compound basic subjects recognized on the basis of variety of the speciators used in lamination are:

- (a) Specials compound basic subjects.
- (b) Environmented compound basic subjects.
- (c) Systems compound basic subjects.
- (d) Multiple compound basic subjects.

Specials compound basic subjects: "The core entity of study in the subjects going with a particular primary basic subject may be restricted or qualified using speciators derived on the basis of relevant characteristics specific to the subjects concerned, not amounting to any of the anteriorising isolates or any other isolate."¹⁰ This is how specials compound basic subjects come up.

EXAMPLES:

Medicine-child; Medicine-adolescent; and Medicine-old age are examples of Specials compound basic subject.

Medicine is a primary basic subject. The core entity of the study of the subjects going with medicine consists of the human body and its organs. The study of the core entity (that is the human body and its organs) can be restricted or qualified by the use of speciators derived by means of relevant characteristics such as "by age," "by sex" and so on.

Thus, the speciators derived on the basis of "relevant" characteristics can be attached to the primary basic subjects for qualifying the totality of the studies falling within its purview, leading thereby to the specials compound basic subjects.

Environmented compound basic subject: "The core entity of study in the subjects going with a primary basic subject may be restricted or qualified using speciators derived on the basis of the characteristic "By environment." That is, the totality of the studies in the subjects

⁹*Ibid.*, p. 190.

¹⁰*Ibid.*

going with the primary basic subject is qualified by the core entity of the study being placed within an extra-normal environment."¹¹

This leads to environmented compound basic subjects.

EXAMPLES:

Medicine-high altitude environment; Medicine-underwater environment; Medicine-desert environment; Medicine space environment and Medicine-industry environment.

Medicine is a primary basic subject. The core entity of the study of all the subjects going with medicine consists of the human body. "Each of the studies can be restricted or qualified by speciators denoting various extra-normal environments in which the human body may be placed. Thus, the speciators derivable on the basis of the characteristic "by environment" can be attached to the primary basic subject "medicine" to denote the extra-normal environment of study."¹² Thus, the speciators are derived here on the basis of the characteristic "by environment." Also relevant are high altitude environment, underwater environment, space environment and industry environment. Attaching these speciators to the primary basic subject "medicine" leads to environmented compound basic subjects.

Systems compound basic subjects: "The core entity of study in the subjects going with a primary basic subject may be restricted or qualified using specialators derived on the basis of the characteristics "by system" (or School of Thought). The attachment of such a speciator to the primary basic subject gives rise to the systems compound primary basic subject or systems compound basic subject."¹³

EXAMPLES:

Medicine-Ayurvedic system; Medicine-Siddha system; and Medicine-Unani system are examples of systems compound basic subjects.

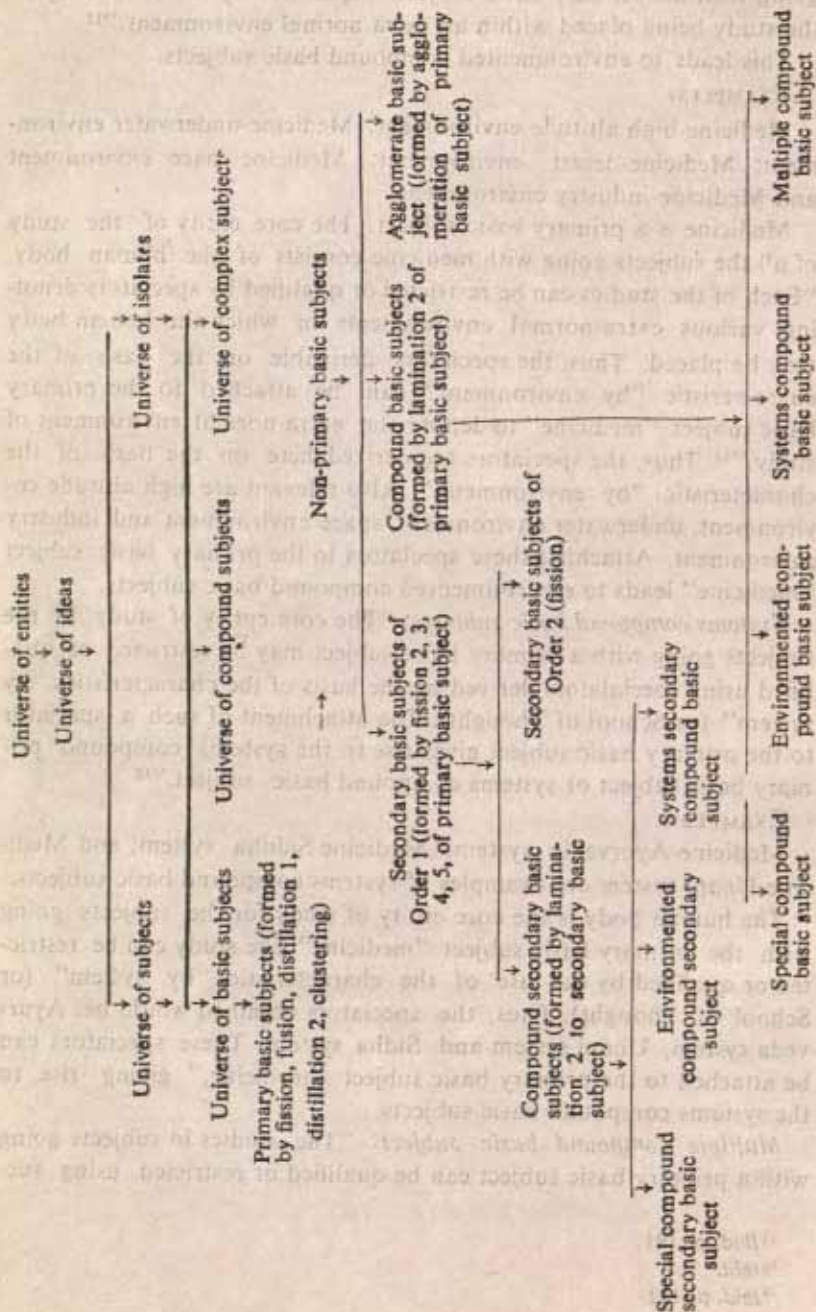
The human body is the core entity of study for the subjects going with the primary basic subject "medicine" The study can be restricted or qualified by the use of the characteristic "by system" (or School of Thought). Thus, the speciators obtained would be: Ayurveda system, Unani system and Sidha system. These speciators can be attached to the primary basic subject "medicine," giving rise to the systems compound basic subjects.

Multiple compound basic subject: "The studies in subjects going with a primary basic subject can be qualified or restricted using suc

¹¹ *Ibid.*, p. 191.

¹² *Ibid.*

¹³ *Ibid.*, p. 192.



cesively speciators derived on the basis of two or more of the variety of characteristics mentioned in the preceding sections—that is special characteristic, environment characteristic, and systems characteristic.”¹⁴ The speciators can be attached in the prescribed sequence to the concerned primary basic subject, and thus obtaining multiple compound primary basic subject or multiple compound basic subject.

EXAMPLES:

Medicine—Ayurvedic system—Old age

Medicine—Unani system—Tropical environment

Medicine—Tropical environment—Female

Psychology—Psycho-analytical system—War environment.

Agglomerate basic subject: “An agglomerate of Kind 1 (earlier called partial comprehension) consists of subjects treated integrally or disjunctively in one and the same document. An agglomerate results from a process of agglomeration—that is collecting together of entities into larger masses without cohesion among the components. An agglomerate can be a basic subject, that is the first component in representing a subject.”¹⁵

The scope of an agglomerate basic subject has to be understood only with reference to the scheme concerned. Ordinarily, an agglomerate of Kind 1 covers subjects going with the successive primary basic subjects of a scheme.

EXAMPLES FROM CC7:

Natural science

Mathematical sciences

Physical sciences

Social sciences

History and political science

“Agglomerate of kind 2 is an agglomerate comprehending subjects going with non-consecutive primary basic subjects with respect to the schedules of a particular scheme for classification.”¹⁶ (CC does not have this provision. UDC has provided the digit “+” for this).

The following is a schematic representation, in the form of a diagram, showing the original universe of ideas in relation to its sub-universe of subjects and isolates. It also indicates the varieties of basic subjects.

¹⁴*Ibid.*, p. 193.

¹⁵A. Neelameghan, *Agglomerate basic subject*, *Library Science*, 10, 1973, p. 202.

¹⁶*Ibid.*, p. 209.

FURTHER READINGS

INDIAN STANDARDS INSTITUTION, *Indian standard glossary of classification terms*, New Delhi, 1963 (IS: 2550-1963).

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J. MILLS AND VANDA BROUGHTON, *Bliss bibliographic classification*, 2nd ed., London, Butterworths, 1977, Introduction and auxiliary schedules, pp. 95-107.

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Chapter 3

INTRODUCTION TO MAJOR SCHEMES OF CLASSIFICATION

0 INTRODUCTION

Generally, it is accepted that DDC, UDC, LC, CC and BC are the major general schemes of classification. This chapter provides an introduction to these schemes—the aim being to provide an overview, so that the reader should have a broad idea about the schemes before he goes into their detailed study. Many of the terms and concepts used in this chapter have not been explained—for the simple reason that these have been dealt with elsewhere. Therefore, the reader is requested to refer to later chapters for their explanation.

1 DEWEY DECIMAL CLASSIFICATION (1876)

11 Origin

Melvil Dewey was born in Adams Center, New York, in 1851. He graduated from Amherst College in 1874. Two years earlier, he had obtained the post of a student library assistant at Amherst College, and he now became assistant college librarian. Even as a student at Amherst College in 1873, he conceived of the idea of formulating a scheme of classification. Thus, in the same year, he put forward a plan for rearranging the library in a more systematic order. In 1876 was published the first edition of DDC, under the title *A classification and subject index for cataloguing and arranging the books and pamphlets of a library*. The name Dewey did not appear on the title page, but in the copyright notice on the verso of the title page. The first edition of 1000 copies consisted of 44 pages covering 12 pages of introduction, 12 pages of schedules and 18 pages of index.

12 Main Contributions of the First Edition

The edition contributed in many ways to library classification.

To begin with, librarians at that time used the method of "fixed location" for arranging documents on shelves. Many libraries did arrange documents subject-wise, but it was the practice to assign shelving areas to various subjects. Within each subject, books were arranged by accession number. Each book was allotted a shelf mark denoting its exact position on the shelves, based on room number, bay number, tier number, shelf number and its specific position on the particular shelf. The shelf mark was a permanent location number. A new addition to a subject was allocated a place at the end of the books on the subject. Melvil Dewey introduced the idea of "relative location," as opposed to "fixed location." He assigned decimal numbers (arabic numerals with decimal fraction notation) to books, and not to the shelves. As a result, a new book on a given subject could be interpolated in the existing sequence in a position prescribed by the decimal number. There was no need to put it at the end of the sequence, as was the practice in "fixed location." This method led to a mechanization of the arrangement of books by the use of the ordinal number. Dewey was the first to popularize the idea of mechanization. He was also the first person to use decimal fraction notation for arrangements on the shelf.

At that time, it was also an accepted practice to arrange books under a limited number of subjects. It was felt that a large number of shelves could not be left empty merely with the idea that books could be accommodated at the end of a large number of sequences. However, by introducing the method of relative location, it became possible for Dewey to provide a detailed specification of subjects. In his first edition, he introduced nearly a thousand subjects though he was criticized on this account for having given unnecessary details. However, the provision of relatively detailed subjects is an important contribution by Dewey to the development of library classification. In different editions, DDC has tried to provide an increasing amount of detailed subjects to serve the requirements of users.

Furthermore, the first edition provided a detailed relative index. It enabled an exact location of any topic in the scheme. Dewey also listed synonyms in certain cases.

13 Variety of Editions

DDC is now in its 19th (1979) edition in English. From 44 pages (1st edition), it has grown to about 3000 pages (19th edition). The

19th edition is in three volumes: *Introduction*, *Tables* (Volume 1), *Schedules* (Volume 2) and *Relative Index* (Volume 3). *Manual on the use of the Dewey decimal classification*: Edition 19 was published in 1982.

There is also an abridged version of the DDC. Eleventh abridged edition of DDC appeared in 1979. It contains 618 pages and 2,179 entries. This edition is meant primarily for use in schools and in small public libraries.

DDC has been translated, with or without abridgment, expansion or adaptation, into many languages such as Spanish, Danish, Turkish, Japanese, Sinhalese, Portuguese, Hindi, and so on.

14 Basic Plan

DDC is a hierarchical scheme of classification, which proceeds from the general to the specific. The basic arrangement is by discipline, and a specific subject can occur in any number of disciplines. This is due to the fact that each aspect of specific subject would go into a different discipline. And it is the relative index which brings together different aspects of a specific subject.

The universe of subjects has been divided into ten main classes (0, 1, 2, 3, 4, 5, 6, 7, 8, 9) as given below:

- 0 Generalities
- 1 Philosophy and related disciplines
- 2 Religion
- 3 The social sciences
- 4 Language
- 5 Pure sciences
- 6 Technology (applied sciences)
- 7 The arts
- 8 Literature (belles-lettres)
- 9 General geography and history and their auxiliaries.

But in practice, the notation always consists of at least three digits. This is achieved by adding zeroes with its normal arithmetical value, so that number becomes three digit. Therefore, the full number for the main class 7 is 700. However, a complete span of each main class consists of 100 three digit numbers. For example, 700-799 for the arts.

In view of the above, we may define a main class as "one of the ten major subdivisions of the classification, represented by the first digit in the notation, e.g., the 6 in 600" (DDC 19, Vol. 1, p. lxxx).

Therefore, in actual practice, the universe of subjects has been

divided into ten main classes, as stated below:

- 000 Generalities
- 100 Philosophy and related disciplines
- 200 Religion
- 300 The social sciences
- 400 Language
- 500 Pure sciences
- 600 Technology (applied sciences)
- 700 The arts
- 800 Literature (*belles-lettres*)
- 900 General geography and history

The above order of main classes is based on the inverted Baconian order. This seems to be the only explanation; otherwise, the basis of the above order cannot be explained logically.

The above main classes indicate that each main class represents either a broad discipline or a group of related disciplines. However, this is not true of 000 class. This class includes varied subjects such as bibliographies and catalogues, library and information sciences, general encyclopaedias, general serial publications and so on. These cannot be considered as related disciplines.

Each main class has ten divisions. The divisions are "the second degree of subdivision in the classification (the first degree of subdivision of one of the ten main classes), represented by the second digit in the notation, e.g., the 2 in 620. There are approximately 100 divisions (DDC 19, vol. 1, p. lxxix). These are numbered 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 and occupy the second position in the notation. Division 0 is allocated for general works on the entire main class, and 1 to 9 digits are used for subclasses of the main class. Therefore, 70 represents general works on the arts. Civic and landscape art is 71, Architecture is 72, and so on. But in practice, a zero is added.

The ten complete divisions of the main class 7 are given below:

- 700 The arts
- 710 Civic and landscape art
- 720 Architecture
- 730 Plastic arts Sculpture
- 740 Drawing, decorative and minor arts
- 750 Painting and Paintings
- 760 Graphic arts Prints
- 770 Photography and Photographs
- 780 Music
- 790 Recreational and performing arts

Each division has ten sections, numbered as 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. The digits representing section numbers are allocated third position in the notation. A section is "the third degree of subdivision in the classification (the second degree of subdivision of one of the ten main classes, and the first degree of subdivision of one of the 100 divisions), represented by the third digit in the notation, *e.g.*, the 9 in 629. There are approximately 1000 of these" (DDC 19, vol. 1, p. lxxxi). Thus, the full span of section numbers for divisions of 7 would be 700-709, 710-719, 720-729, 730-739 and so on. Again, within the sections, the 0 (zero) in the third position in the number is allocated for general works on the entire division, and 1-9 are used for subsubclasses.

Thus, 720 represents architecture in general, 721, 722, and so on represent subsubclasses, as stated below:

- 720 Architecture
- 721 Architectural construction
- 722 Ancient and oriental architecture
- 723 Medieval architecture
- 724 Modern architecture
- 725 Public structures
- 726 Buildings for religious purposes
- 727 Buildings for educational purposes
- 728 Residential buildings
- 729 Design and decoration

15 Decimal System

DDC is a decimal classification system. The universe of subjects is divided into ten main classes. Each main class is again divided into ten divisions. Each division gets divided into ten sections. So at each stage of division, a given number is subdivided decimally. The DDC numbers are also arranged decimally, as illustrated below:

- 500
- 631
- 713
- 720
- 720.28
- 721
- 721.04
- 721.0441
- 721.21
- 7271 5

727.50001

727.6

Because the first number has less ordinal value in a decimal system, 721.21 comes before 721.5.

16 Classification by Discipline

The concept of discipline, or branch of learning, forms the basis of DDC. "The primary basis of DDC arrangement and development of subjects is by discipline, as defined by the main and subordinate classes, while subject, strictly speaking, is secondary. There is no one place for any subject in itself; a subject may appear in any or all of the disciplines" (DDC 18, volume 1, p. 17). Such is the case with subjects like gold, India, disease, etc. A work on any of these subjects can be classed with any discipline. This is a basic feature of DDC, whereby it scatters subjects by discipline.

17 Hierarchical Notation

From the above, it follows that the hierarchical system of DDC is based on ten main classes, 100 divisions and 1000 sections. The numbers are lengthened by one digit at the stage of successive division, and we move from the general to the specific, as illustrated below:

700 The arts—Fine and decorative arts

720 Architecture

725 Public structures

725.8 Recreation buildings

725.82 Buildings for shows and spectacles

725.822 Theatre and opera buildings

In the above numbers the first, second and third digits in the notation represent the main class, division and section respectively.

Occasionally, in order to keep the notation as short as possible, a subdivision of a discipline or topic may not be represented by a number subordinate to the number representing the discipline or topic itself. For example, 574 represents biology. Its branches are classed in 580 and 590, not in 574+.

18 Hierarchy in Disciplinary and Subject Relationships

DDC is basically hierarchical in notation, as well in disciplinary and subject relationships. According to the editor's introduction:

"Hierarchy in disciplinary and subject relationship means that every concept in a notation more specific than that of a main class is

subordinate to all the broader concepts of which it is a part, and whatever is true of each whole is true of all of its parts." (DDC 18, vol. 1, p. 20). This would mean that whatever is true of 700 is equally true of all of its subdivisions, such as 710, 720, 730 and so on. A note given under 721 would be equally applicable for its subdivisions.

191 Memory Aids

There are a number of memory aids, which are available for subject synthesis. Auxiliary tables provide an important basis for preparing numbers which lead to uniform meanings of number when used in various contexts. There are other memory aids also, which have been used to achieve the subject synthesis. These are stated below:

(a) *Areas*: Areas table serves as the most important memory aid. Its application allows "constant repetition of a standard pattern of areal arrangement."

(b) *Languages*: The application of languages table allows common repetition of the numbers for languages.

(c) *Standard subdivisions*: The application of standard subdivisions enables one to achieve a special kind of patterned repetition. A subject or discipline can be presented in any common form and mode. The forms are: synopsis or outline, periodical, collection of writings, tables and so on. Modes of treatment include theory, technique, study and teaching, and history.

(d) *Others*: A full development of the schedule may be given at one place in the schedule, and by analogy the full development at one place can be repeated at other places. This may lead to a repetition of the pattern as a result of parallel development.

The above memory aids have been explained in detail in Chapters 17-21.

192 Adaptability of Notation

DDC can be used for broad classification as well as for close classification. The full edition is considered useful for general libraries (perhaps not large libraries), and the abridged edition is convenient for small libraries

193 Revision

Full and abridged editions are amended and corrected by means of a publication entitled *Decimal classification, additions, notes and decisions*.

194 Conclusion

DDC is the oldest and most widely used scheme of classification. It

has been adopted by a majority of libraries in English-speaking and British Commonwealth countries. According to one survey, it is used in England by 99% of public libraries, 85% of college libraries and about one-third of university libraries. DDC is also used in one form or another in a large number of current services such as the *Indian national bibliography*; *British national bibliography*; R.R. Bowker's *Publishers' weekly* and *American book publishing record*; Library of Congress catalogue cards and book catalogues; MARC (Machine Readable Cataloging) tapes from the Library of Congress, England and Norway; and so on. DDC is being used in thousands of reading lists, bibliographies and book guides.

Despite its severe criticism, it has been adopted in libraries all over the world. It has been adopted mainly due to its simple notation, its ease in application, the adaptability of its notation to the requirements of libraries of different sizes and nature (and for the fact that it can be expanded with ease), availability in a variety of editions and its use in bibliographies and printed catalogue cards.

2 UNIVERSAL DECIMAL CLASSIFICATION (UDC) (1899)

21 *Origin*

In 1895, following the first International Conference on Bibliography, the newly-founded Institut International de Bibliographie (IIB) sponsored a scheme initiated by two Belgians, Paul Otlet (an advocate) and Henri La Fontaine (a senator). The scheme was prepared for the classification of all published literature, so that a comprehensive classified index to all literature could be produced,

In early 1895, Otlet received a copy of *Decimal classification*. On 24 March, 1895, Otlet wrote a letter to Melvil Dewey seeking permission to use and develop his scheme. Dewey gave the Europeans the right to translate the scheme.

In the last part of 1895 and early in 1896, Otlet and La Fontaine made arrangement for the translation and subsequent publication of the parts of the classification. The first tables published between 1895 and 1896 were mere translation of 1894 edition of *Decimal classification* except for sociology and law. These applications formed a base for future developments. During the next few years a process of coordinated decentralization took place. The job of developing the tables was given to 'groups of outside collaborators.' However, Otlet and La Fontaine saw to it that consistency and uniformity were

maintained in the scheme as a whole. From 1899 to 1905, the extended tables for the whole classification were published in fascicules and in special subject *Manuals*. The first fascicule entitled *Classification Bibliographique Decimale: tables generales refondues* (Bruxelles, IIB, 1899) described "Summary of Rules adopted for the Establishment and Use of the Bibliographic Repertories." Work on classification started in 1895 but it was not until 1899 that the classification scheme began to show clearly its characteristic features.

Thus by arrangement with Melvil Dewey, who had just published the 5th edition (1894) of DDC, the IIB began expanding the schedules part by part. UDC was originally issued under the title *Classification bibliographique decimale* in 35 parts, from 1899 to 1905. In 1905 was published the first complete international edition in French entitled *Manuel du repertoire bibliographique universel*. Thus the first complete international edition was originally derived from the Dewey decimal classification (5th edn, 1894). The present editions have incorporated material from the later editions of Dewey decimal classification.

22 Variety of Editions

The second international edition in French, called the *Classification decimale universelle*, was published between 1927-33. In this edition Otlet and La Fontaine supervised the humanities and social sciences, and Frits Donker Duyvis of Dutch Patent Office provided supervision for the natural sciences. The third edition, entitled *Decimal Classification*, appeared in German, comprising seven volumes of tables and a three-volume alphabetical index, 1934-53. The fourth edition (full English edition) began in 1943, and it has not been completed as yet. It is being prepared and published by the British Standards Institution under the auspices of the Federation Internationale de Documentation. Some of the parts are over 30 years old, and need urgent revision. Other full editions under preparation include revisions of the French and German editions. In additions, full editions are prepared in Czech, Hungarian, Italian, Japanese, Polish, Portuguese, Serbo-Croat and Spanish. Abridged editions are available in some 17 languages. A tri-lingual (German-English-French) abridged edition was brought out in 1958. A ten year supplement to the abridged UDC edition was published in 1969.

In addition to the complete and abridged editions, medium editions have been produced in German, English, French, Russian and so on. A medium edition contains about 30 per cent of the entire tables.

Thus, it lies between an abridged edition and a full edition. Special subject editions are also being brought out. These provide detailed schedules for different areas of specialization, and abridged or medium editions can be used along with these for related sections. Such editions are based on the practices prevailing in large specialized libraries.

Today, various authorized editions are thus available in many natural languages, at varied levels according to the scope of the subject. FID-authorized as well as other UDC editions are published in at least 20 natural languages. These include the following variety of editions:

- (a) Full editions (consisting of 150,000-200,000 items);
- (b) abridged editions (10 per cent of the full edition);
- (c) medium-length editions (consisting of about 50,000 items or 30 per cent of the full edition); and
- (d) special-subject editions (central theme or subject is represented by the full-edition schedule and subsidiary topics by medium-length, abridged or further reduced schedules).

23 FID

UDC was initiated by Paul Otlet and Henri La Fontaine. They supervised it in its initial years, but the present form of the UDC owes much to the efforts of Frits Donker Duyvis. He became secretary of the IIB in 1929, and occupied that office till the 1959. It may be added that the IIB changed its name to Institut International de Documentation (IID) in 1931. Again, its name was changed to Federation Internationale de Documentation (FID) in 1937.

FID is the body which has overall responsibility for UDC. It works through its international committee on universal classification. National member committees are represented on it. Day-to-day control lies with the Central Classification Committee, called FID/CCC. Each member nation is supposed to have a national committee, which is made responsible for the editions in that language. Besides these administrative committees, there are international and national subject committees. The international committee reports to FID/CCC. Similarly, the national subject committees report to the concerned national committee.

24 UDC Versus DDC

UDC was originally derived from the 5th edition of *Dewey decimal classification* (1894). The present editions have incorporated much

material from the later editions of DDC.

UDC and DDC resemble at least in outline. Beyond that, the resemblance is lesser, mainly due to the greater use of notational devices.

Till the middle of the twentieth century, DDC and UDC were somewhat similar with regard to their main structures, to the extent that the libraries using DDC were often able to use UDC details as extensions. This was possible even in the 1960s. At one time it was hoped to achieve a unified DDC/UDC scheme, but this is possible no more, because of major relocations in UDC as well as in DDC.

25 Uses

It has been claimed that UDC can be used for the classification of articles and monographs. It may also be used for classifying items to be included in catalogues, indexes and bibliographies.

26 Users

UDC is used by a large number of libraries around the world. It has been popular in Europe, Latin America and Japan. In the USSR and the countries of East Europe, its adoption was virtually mandatory. UDC is now the official classification scheme in scientific and technical libraries in the USSR. Recently, some interest has arisen in the United States and Canada for its adoption in mechanized information systems, and for the purpose of serving as an alternative to LC for reclassifying from DDC. UDC is used far more throughout the world than CC or DDC or even LC.

UDC is used by a number of abstracting and indexing services, either as the basis of their arrangement, or else as an additional aid to users.

UDC class numbers appear on MARC tapes from Finland.

27 UDC (Abridged Edition)

271 Parts of the Scheme

The scheme consists of the main table (main divisions from 1 to 9, and the various series of special (auxiliary) subdivisions) and auxiliary tables (connecting signs and the common auxiliaries). The abridged edition has an index at the end. In each fascicule of a full edition, there is a separate index.

272 *Main Table*

The entire field of knowledge has been divided into 9 main classes, from 1 to 9 (with the use of 0 also as the tenth class). Thus the main outline (taken from the third abridged English edition of UDC, BS1000A; 1961) consists of:

0 Generalities

1 Philosophy. Metaphysics. Psychology. Logic, Ethics and Morals

2 Religion. Theology

3 Social Sciences. Economics. Law. Government. Education

5 Mathematics and Natural Sciences

6 Applied Sciences. Medicine. Technology

7 The Arts. Recreation. Sports. etc

8 Literature. Belles-lettres. Philology. Linguistics. Languages

9 Geography. Biography. History

Note: In the above outline, philology, linguistics and languages have been placed under 8 instead of 4. This change in UDC was incorporated after the publication of the abridged English edition (1961).

On the basis of the above outline, the notation has been extended by means of continuous extension of the decimal fractions, the principle adopted being to proceed from the general to the particular.

EXAMPLE:

3 Social Sciences

30 Sociology. Sociography

301 Sociology

301.15 Sources, motives of social phenomena and change

301.151 Social psychology. Instinct

It may be added that decimal divisions (tens) are used if ten or less divisions are required. However, centesimal (hundred) divisions are used if more than ten divisions are needed (e.g. 354.11, 354.12, ..., 354.88). Gaps have been provided for future interpolation.

273 *Auxiliaries*

Auxiliaries provide a means of synthesis. These are of two kinds: the common auxiliaries and special auxiliaries. Common auxiliaries may be used at any point in the main table. The special auxiliaries possess different meanings, depending upon the context.

The auxiliaries are as following:

(a) Addition and consecutive extension sign + and /

(b) Relation signs : [] ::

(c) Common auxiliaries of language =

- (d) Common auxiliaries of form (0...)
- (e) Common auxiliaries of place (1/9)
- (f) Common auxiliaries of race and nationality (=...)
- (g) Common auxiliaries of time "..."
- (h) Alphabetical and non-UDC numerical subdivision
- (i) Common auxiliaries of point of view 00...A recent addition is the use of .000.0/.9 to indicate the author's point of view
- (j) Special (auxiliary) subdivision—0/—9, .0 and'

Note: A recent addition to common auxiliaries is the use of—0... This is a common auxiliary, where—05 is for persons and similar divisions are available for materials also.

The examples for the application of auxiliaries have been provided in Chapters 17-21.

274 Notation

UDC uses ten Arabic numerals with decimal fraction notation. The decimal point in the beginning is omitted. A decimal point is usually placed after every three digits, merely to serve as a visual aid.

It has a pure base, linear, right-handed and decimal fractional notation.

UDC uses the following five species of digits:

26 Roman caps

26 Roman smalls (when alphabetical device is used)

Punctuation marks	" "(double inverted commas)
	-(hyphen). (decimal point)
	' (apostrophe)
	: (colon)
	:: (double colon)
Mathematical symbols	() (parenthesis)
	[] (brackets)
	= (equal sign)
	+
	/ (slash or stroke)

The scale of absolute values of digits is fixed by rules.

275 Guides

A useful guide in English was compiled by Mills.¹ It has proved to be very helpful to the users of UDC. Similar guides are also available in a few other languages. Two programmed texts by J.M.

1. J. Mills, *Guide to the Universal decimal classification*, London, British Standards Institution, 1963.

Perrault and H. Wellisch have appeared on UDC. Other works which can be useful have been written by J. Mills and A.C. Foskett.

28 UDC (International Medium Edition; English Text)

International Medium Edition of UDC is to appear in three versions (English, French and German). Now German and English versions are available. English version² has been issued by British Standards Institution, by arrangement with the International Federation for Documentation (FID). BS 1000M is the latest edition of UDC, replacing abridged edition of UDC (published in 1961). It consists of 2 Parts (Part 1—Systematic Tables; Part 2—Index). This is a scheme meant for classifying information on all subjects and all forms.

The table 1 gives the number of items contained in three editions of UDC:

Table 1

Edition	Number of items
Full edition	150,000—200,000 items
Medium edition	50,000 items or 30% of full edition
Abridged edition	10% of full edition

From the above table, it follows that the medium edition contains about a third of the items of the full edition or three times the abridged edition.

Compared with abridged edition, BS 1000M contains many more subject divisions as well as detailed classifications. Modifications 2 *Universal decimal classification*, International medium edition, English text, 2 parts, British Standards Institution, 1985-(BS1000M), authorized in 'Extensions and corrections to the UDC' up to and including series 9, no. 3 dated June 1977 have been incorporated. However, UK administration divisions given in table 1 (e) under (410) (authorized in series 11, no. 3 dated July 1983) in English version is a single exception.

The schedules (main tables and auxiliary tables) have been revised extensively. Within main tables, special auxiliary subdivisions have been listed rather extensively before principle divisions. These have been provided at many more places. Common auxiliaries have been expanded on a large scale. Common auxiliaries of materials and common auxiliaries of persons have been introduced. Symbol—03 ('hyphen nought three') is used to denote the "materials or constituents of which objects or products are made". Symbol—05 ('hyphen

nought five") is used to denote "the persons concerned or their characteristics, but not things or disciplines according to personal application".

Examples: 631.35—037.52	Glass fibre harvester
616.051	Medical staff: doctors, nurses etc
616.052	Medical patients

Many subjects have been reallocated class numbers. Class 4 represents linguistics in abridged edition. Class 4 representing linguistics was cancelled in 1963. Linguistics merged into class 8 with literature. As a result class 4 is vacant at present in BS 1000M.

BS 1000M employs :: (double colon). Symbol :: (double colon) may be used to "fix the order of the component numbers in a compound number, especially in a computer-based mechanical information system". It is to be kept in view that use of : (colon) allows reversing of the order of component numbers:

EXAMPLES:

622.341.1: 338. 124.4	Economic crisis in iron-ore mining
061.2 (100) :: 002 FID	International Federation for Documentation

COMMENTS: In the first example, the number may be reversed to form 338.124.4: 622.341.1 but in the second example, the number may not be reversed. In the first case, the changing of the order of elements does not in principle change the meaning. It means that the relationship is reversible. The numbers A : B and B : A are of equal significance. The use of :: (double colon) enables a classifier to classify relations between subjects.

BS 1000M employs the symbol [] (square brackets) for "algebraic subgrouping device when two or more main UDC numbers are linked by a plus sign or colon to denote a complex subject which is as a whole related to another by colon, or modified by a common or special auxiliary" (p.1).

EXAMPLE:

[622+669] (540) Mining and metallurgy in India

This work includes more examples, cross references, notes and instructions in the schedules. The terminology used in schedules has been updated. Classificatory terminology used in the 'Introduction' has been employed precisely, showing influence of terminology developed by late S. R. Ranganathan. This edition makes greater use of synthesis.

BS 1000M in addition to UDC notation, employs the following symbols;

→ (arrow)

meaning 'see' or 'see also'

≡

meaning 'subdivide'

BS 1000M is a great improvement over UDC abridged edition. It has been extensively revised to bring it up to date. It contains many more subjects as well as detailed classifications. It is rightly claimed that UDC can be used for "indexing, filing or shelving, preparing bibliographies and glossaries or simply as an aid to international communication". Further it can be applied to "reports, surveys, conference papers and proceedings, articles, abstracts, newspaper clippings, bibliographies, glossaries and other catalogues and indexes as well as non-book material. Its use aids interchangeability to information between departments, organizations and national institutions and across language barriers and it can be used as a basis for comparative terminology in technical vocabularies or glossaries" (jacket). There is no doubt that BS 1000M will prove to be more affective than UDC abridged edition in this regard. However, the cost (£ 300/=) will prove to be a deterrent factor for libraries in a developing country like India. A machine readable version of BS 1000M will be made available soon.

291 Conclusion

There was a time when it appeared that UDC had an uncertain future. But in recent years, certain developments have taken place, which have led to some optimism. It has been decided to revise the outline over the next few years to make it more up-to-date. Already, the subject of linguistics has been shifted from 4 to 8. The process of revision has proved to be a slow one. This is mainly due to a lack of funds. The procedure of revision has also proved to be cumbersome. A clear analysis of facets into limited number of categories will bring great improvement. In addition, there should be restricted use of : (colon).

3 LIBRARY OF CONGRESS CLASSIFICATION (1901)

31 Background

The Library of Congress was founded in the year 1800. The arrangement of the collection was according to size, till 1812. In 1815, Thomas Jefferson's collection came into the possession of the Library of Congress. The library adopted the classification used by Jefferson, which was an adoption of Francis Bacon's Classification of know-

ledge. Changes were made in the scheme later on. In 1897, the library shifted to a new building. In the same year, its Catalog Division was assigned the development of a new system of classification under the direction of J.C.M. Hanson.

The schemes of classification, existing then, such as the *Dewey decimal classification* and C.A. Cutter's *Expansive classification*, were carefully examined, but found unsuitable for the Library of Congress. It seems that Hanson greatly influenced the decision made in 1897 that a new scheme be prepared, which would reject the above mentioned two schemes. Thus it was decided to prepare a new scheme of library classification, keeping in view the character, growth and use of actual collections available in the Library of Congress. The aim was to formulate a scheme tailor-made for the collections of the library. It was also resolved to incorporate the best features from other schemes of classification.

The scheme was greatly influenced by the needs of the Library of Congress building itself, and by the needs of the various subject departments. Thus the scheme adopted a pragmatic approach to meet the requirements of the Library of the Congress.

After making a general plan and an outline of each class, schedules were designed to fit the way the actual books on the shelf grouped themselves. The theory of library classification was not taken into consideration here. The existing schedules have been expanded and revised to provide for new materials to be added to the Library of Congress, thus meeting the needs as well as helping in the use of large collections.

The *Library of Congress classification* consists of series of special classifications. Each special classification covers a major class. Each class has been devised by subject specialists on the library staff. The scheme is thus a team product.

The outline of the scheme was determined in 1901 but it took nearly forty years to reach somewhere near an approximate completion. The subject schemes have been published by the US Printing Office since 1901. The outline of LC was published in 1904, though class Z was published earlier.

The revisions, now, are made when necessary. Some schedules are already in their fifth edition. There are others which are still in the process of development. The prefaces to the published schedules indicate the methods adopted for their development.



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32 *Theory*

According to J.P. Immroth, "...LC classification's theoretical base, at least in regard to the emerging and prevalent theories of classification, is valid."³ Further, he adds: "Although LC classification does not meet all requirements of the theory of classification and classification scheme construction, it is clear that it does have some sound theoretical principles with which to face the future and in many instances is superior to either the Decimal Classification or the Universal Decimal Classification."⁴

33 *Main Classes*

The field has been divided into 20 classes, with an additional class for general works. The outline is given below:

A	General works. Polygraphy
B-BJ	Philosophy
BL-BX	Religion
C	Auxiliary sciences of history
D	History: General and old world
E-F	History: America
G	Geography, anthropology, folklore etc.
H	Social sciences
J	Political science
K	Law
L	Education
M	Music
N	Fine arts
P	Language and Literature
Q	Science
R	Medicine
S	Agriculture
T	Technology
U	Military science
V	Naval science
Z	Bibliography and library science

The base is quite broad. Main classes are denoted by single Roman capitals and two Roman capitals are used for subdivisions of main classes. However, in case of classes E, F and Z, these were developed

³ Arthur Maltby, ed., *Classification in the 1970s; a second look*, rev. ed., London, Bingley, 1976, p. 81.

⁴ *Ibid.*, p. 89.

at the very beginning of the system. The length of the base was confined to single Roman caps and the combination of two capital letters were not used. But these classes were extended by means of decimal extensions to the numeric numbers, and also through tables.

As the numeric base consists of 1 to 9999, a limit might be reached at some point in due course of time—though this has not happened as yet, perhaps because notation has been expanded with the assistance of decimal or Cutter numbers.

The sequence and coordination of main classes in LC basically follows the concepts of the late nineteenth century educational and scientific consensus, as dealt in major treatises concerned with the main classes of that period. However, the outline of Cutter's *Expansive classification* was adopted as a basis for the order of LC, using a few minor adjustments.

Collocation of related classes has been achieved quite better than DDC. Hospitality in array is far better than provided in chain.

34 Sequence within Classes

In most instances, individual LC classes are able to achieve a helpful order by using appropriate characteristics for the division of subjects. In deciding the order of application of characteristics, LC's basic pattern is based on the literary warrant. It attempts to achieve a helpful sequence of various groups of books, rather than groups of subjects. In other words, it avoids a purely theoretical point of view. That is why the scheme does not seek to strictly follow the scientific order of subjects.

35 Divisions within Classes

Examination of divisions within classes shows that these are as exhaustive as to be found in other major general classification schemes. However, compared with fascicules of UDC (unabridged edition), certain classes in the schedules of Q (Science) and T (Technology) are not detailed to that extent. But it may be pointed out that classes belonging to the humanities in general and to literature in particular, are certainly more detailed than those found in other schemes.

36 Notation

LC uses mixed notation, consisting of Roman capitals and Indo-Arabic numerals. In few instances lower case Roman alphabets and dates are used. A dot is also used as an indicator digit. Notation,

thus, is simple enough. It does not use decimal fraction notation, and is also non-faceted.

37 *Common Isolates*

The internal form of arrangement within the classes, subclasses and subjects was provided by Charles Martel to the individual subject specialists involved in the preparation of individual classes of LC. These seven points are:

"(1) general form divisions, such as periodicals, societies, collections, dictionaries, etc; (2) theory, philosophy; (3) history; (4) treatises, general works; (5) law relation, state relations; (6) study and teaching; (7) special subjects and subdivision of subjects progressing from the more general to specific and as far as possible following the principles of literary warrant."⁵

The above points occur throughout the schedules of LC, but the exact sequence differs. These are provided in individual subjects, where required.

In addition to the above seven points, there are uses of subdivisions by time throughout the schedules. However, these are not used consistently. These time periods have been developed from the literary warrants belonging to various disciplines. Each time period has been developed appropriate to the concerned discipline.

Geographical isolates have also been used throughout LC, in two ways: (a) logical order, an order based on the preferred category of an American user, and (b) order using alphabetical device.

The geographical isolates have been enumerated at these points in schedules considered most useful for the literary warrant of the individual area. Often, especially in the social sciences, subject division is carried out under the country (the subdividing of a subject first by country, and followed by the use of specific subdivisions appropriate to the country, which leads to a better citation order).

A consistent application of geographical isolates has been used in certain tables, which are called *floating tables*. These occur primarily in class H.

38 *Mnemonics*

The scheme does not use scheduled or seminal mnemonics. However, some double letters have been used to denote the application of literal mnemonics. For example, this has been carried out in class A, M,

⁵ *Ibid.*, p. 85.

T and so on.

391 *Phase Relations*

Phase relations have been provided in LC, though by means of specific enumeration. For instance, the bias phase, influencing phase and tool phase have been provided. There are often covered under the misleading heading "General special," referring to special aspects, relations of a general subject. The comparison phase is also covered under the "general special" heading. However, with regard to phase relation, specific instructions are not provided for the choice in comparison or conjunctive phase relation. No specific instructions have also been given for constructing a particular level or kind of phase relation.

EXAMPLE

ND PAINTING

History

49 Early works (to 1800)

50 General works

53 General special

e.g. Comparisons of ancient and modern painting

N FINE ARTS

General works

7420 Early works

7425 Treatises

7428 General special

e.g. Comparison of ancient and modern art

392 *Devices*

There are a number of internal synthetic devices within the notation to facilitate the construction of class numbers. This is especially true about social sciences and the humanities. However, the scheme is basically an enumerative one.

393 *Index*

There is no general or combined index to LC, which is a weakness of the scheme. However, two general indexes were issued in 1974 by the Canadian Library Association and the US Historical Documents Institute. At present, there are separate indexes to 21 of the 29 individual schedules. This means that there are no indexes for certain schedules. The indexes are of varying fullness, and also do not follow a consistent pattern. Some of these are not able to bring together

"distributed relatives" clearly, and certain terms are surprisingly omitted. J.P. Immroth⁶ has suggested that chain indexing to LC schedules should be employed to prepare a general index to LC.

394 Call Numbers

EXAMPLES

Z695.M36 Cataloguing by A. Manheimetr

ND53.S43 Comparison of ancient and modern paintings by
B. Sears

TS 1095.J3 E7 Paper making and Trade-Japan A. Erwin

395 Future

The future of LC is bright due to the following reasons:

It has a permanent organization for perpetuating the system. LC call numbers are provided on the printed cards, on the proof slips of printed cards and on MARC tapes from USA and England.

Individual schedules are published regularly. *Additions and changes* to LC is published on a quarterly basis.

396 Conclusion

LC is based on literary warrant. However, much of it is based on the literary warrant of the late nineteenth and early twentieth century. The scheme is revised continuously, taking current literary warrant into consideration. Thus, we may regard LC as basically a book classification. But schemes such as UDC and DDC, which are rooted in philosophical systems, are based on analysis of ideas.

Most of the libraries using LC have simply adopted it as a method of shelf classification for subject location, and a marking and parking device. In other words, we might say that the potentiality of this scheme has not been put to full use. For instance, LC possesses a very fine as well as the largest general vocabulary among general classification schemes. Therefore, LC could be put into a variety of uses. J.P. Immroth feels that the chain procedure could be applied to LC for the preparation of a classified catalogue.

4 COLON CLASSIFICATION (1933)

41 Introduction

Shiyali Ramamrita Ranganathan, the author of *Colon classification*,

6 *Ibid.*, p. 96.

began his career as a teacher of mathematics. However, in 1924, he was appointed Librarian of the University of Madras. He went to England in 1924 to study library science at the University of London School of Librarianship. Dissatisfied with the existing schemes of library classification, his experience led him "to think that a change was necessary in the basic principles on which schemes of classification are founded. The first principle to hit upon was the synthetic or Meccano principle. This suggestion came when the author saw for the first time a demonstration with a Meccano set in one of his early visits to Selfridge's shop. But notation proved a stumbling-block. One night an idea struck him. The class numbers were all merely ordinal numbers, not cardinal numbers. New ordinal numbers might be invented, though they would have no cardinal value. This immediately led to the corollary that the invention of an ordinal number lying between zero and unity—a greater zero so to speak—was all that was required to meet the situation. A single dot the simplest symbol, having been put to another use in the DC, the double dot or colon was taken to represent the new zero. This was late in 1924." Thus *Colon classification* was forged in 1924.

While in London, Ranganathan designed a layout for the new scheme and constructed the schedules of a few subjects for different facets as samples. He experimented on synthesized numbers. He discussed them with W.C. Berwick Sayers, who encouraged the formulation of the new scheme, but warned him about the difficulties involved of such a venture.

During his return voyage in June 1925, Ranganathan spent two weeks providing class numbers to 30,000 titles of the printed catalogue of the Madras University Library. He also classified books in the ship's library.

In about a year, he found the colon device to be extremely useful. He prescribed tentative rules for its application. With the help of a few subject specialists, the schedules were completed in 1927. On the basis of these tentative rules, most of the volumes in the Madras University Library collection were classified and arranged on the open shelf. The reaction of the users was observed from 1928-31. Accordingly, changes were made in the schedules. In 1932, the scheme was ready to be printed. Thus, in 1933, the first edition of *Colon classification* was released.

Till now, six editions (including the reprinting of the 6th edition, published in 1963) of CC have been published. A number of schedules for the classification of subjects going with basic subjects as a part of 7th edition, have been published. These schedules have appeared from time to time in *Library Science with a Slant to Documentation*.

42 Three Versions

Three versions of *Colon classification* have been recognized. CC1, CC2 and CC3 belong to Version 1. This version was severely rigid, though fully faceted. CC4, CC5 and CC6 (including the reprint of the 6th edition, with annexure, published in 1963), belong to Version 2 of CC. This version was a great improvement over the first one, but some rigidity remained with regard to levels of facet within a round. However, CC7 (Version 3 of CC) is considered a freely faceted scheme for library classification. It is certainly an advanced version.

Ranganathan brought out six editions between 1933 and 1960. The seventh is on the way. Unlike Dewey, he did not accept the idea of the integrity of a number, but preferred to introduce major changes from time to time. For this very reason, some libraries in India have not adopted this scheme.

421 CCI (1933)

In the first edition of *Colon classification*, schedules were provided for different facets in each basic class. The colon was used as a notational device for synthesis. The use of the symbol “:” was an important part of the scheme. Therefore, the scheme was named *Colon classification*.

CCI had the following features:

- (a) It provided schedules for different facets in each basic class.
- (b) It provided special schedules for common subdivisions, geographical divisions, chronological divisions and language divisions.
- (c) It provided rules for the construction of class numbers by means of combining the numbers taken from different facets within a given basic class. The: (colon) was used to combine numbers.
- (d) It used mixed notation, consisting of capital letters, small letters, Arabic numerals and the colon. Use of mixed notation allowed for a wide base.
- (e) It used decimal fraction notation, as well as octave notation for the purpose of hospitality in array.

(f) It used eight special devices: the colon device, geographical device, chronological device, favoured category device, classic device, alphabetic device, subject device and bias number device.

(g) It gave a new procedure for constructing the book number, so that the books having the same class number could be individualized, and

(h) It used the concept of phases.

422 CC2 (1939)

The 1st edition of CC was evaluated on the basis of the theory developed by Ranganathan. Also, attempts were made to remove, in the 2nd edition, the faults discovered in CCI. This edition incorporated a number of improvements. It used, for the first time, the concept of fundamental categories (personality, matter, energy, space and time) to serve as the basis of classification.

423 CC3 (1950)

This edition provided a facet formula for each basic class in terms of fundamental categories.

424 CC4 (1952)

Different indicator digits for different facets going with different fundamental categories were made use of, as illustrated below:

- , (comma) for personality
- ; (semi-colon) for matter
- : (colon) for energy
- . (dot) for space
- (dot) for time

The above change was based on the concept of optional facets. The introduction of the above indicator digits led to a reconstruction of the scheme.

This edition also introduced the concepts of rounds and levels. The concept of fundamental categories was used in a concrete manner.

425 CC5 (1957)

It introduced substantial changes in the rules and in various schedules.

The following schedules were revised:

- (i) Management and labour
- (ii) Agriculture
- (iii) Fine arts

- (iv) Geographical isolates for India
- (v) Law

426 CC6 (1960)

Substantial changes were made in the various schedules. The following scheduled were revised:

- (i) Second level time and space isolates
- (ii) Education
- (iii) Nuclear physics and nuclear engineering
- (iv) Common energy isolates

An attempt was made, in this edition, to avoid the use of Greek letters.

The sixth edition was reprinted in 1963, with some important amendments. The major change was the introduction of an indicator digit—the inverted comma (') instead of the dot (.) for the time facet.

43 CC7

The schedule of basic subjects being used for the 7th edition of *Colon classification* has been given by A. Neelameghan, M.A. Gopinath and S. Seetharama⁸. A selection from the same is given below:

- a Generalia
- u Area study
- w Generalia person study
- 01 Information science
- 1 Universe of subjects
- 2 Library science
- 3 Book science
- 4 Journalism
- 5 Exhibition technique
- 6 Museology
- 7 Systems research, Systemology
- 8 Management science
- A *Z Science (natural and social)
- A Natural sciences
- B *Z Mathematical and physical sciences
- B *ZZ Mathematical sciences
- B Mathematics
- C *Z Physical sciences
- C Physics

⁸A. Neelameghan etc, *Colon classification, edition 7; schedule of basic subjects*, Library Science, 10, 1973, paper p.

D *Z	Engineering and technology
D	Engineering
E *Z	Chemical sciences
E	Chemistry
F	Chemical technology
G *Z	Biological sciences
G	Biology
H *Z	Earth sciences
H	Geology
I *Z	Plant sciences
I	Botany
J *Z	Agriculture and forestry
J	Agriculture
K *Z	Animal sciences
K	Zoology
L *Z	Medical sciences
L	Medicine
M	Useful arts
MZ	Mysticism and spiritual experience
N *Z	Fine arts and literature
N	Fine arts
O *Z	Language and literature
O	Literature
P	Linguistics
Q *Z	Religion and philosophy
Q	Religion
R	Philosophy
S *Z	Behavioural sciences
S	Psychology
T *Z	Social science
U	Geography
V *Z	History and political science
V	History
W	Political science
X	Economics (Macro-economics)
Y	Sociology
Z	Law

CC is a serial system. Therefore, applied sciences have been placed after fundamental sciences, on which they are dependent. Mysticism and spiritual experience deal with knowledge achieved through intuition. Therefore, this subject has been placed at the centre. First, we

proceed from abstraction to concreteness. After the centre, we move from naturalness to artificiality: for instance, physics is less concrete than chemistry. Political science is more artificial than history. Law is considered very artificial. Therefore, it has been placed at the last position.

CC7 provides a small schedule of basic classes. The isolates going with each facet in different basic classes are given (sometimes, one is expected to get the isolate number through a device). In addition, common isolates are also listed. Thus the class numbers are not readily provided, but have to be constructed. In other words, the schedules in CC7 (as also in the previous editions) consist of certain standard unit-schedules, corresponding to standard pieces in a mecano set. By combining these standard pieces, one can construct a variety of objects. Similarly, by combining the standard unit schedules through various permutations and combinations, one can construct the class numbers for different specific subjects. The indicator digits serve as nuts and bolts. CC7 is a freely faceted analytico-synthetic scheme, because the sequence of component ideas in a compound subject can be analysed on the basis of a set of guiding principles, and not merely determined with the help of a pre-determined facet formula.

431 Theory of Classification

Ranganathan was able to formulate a dynamic theory of library classification. He applied his theory to CC. CC7 finds an application of the dynamic theory. This has enabled CC7 to become a freely faceted analytico-synthetic scheme for classification.

432 Analytico-synthetic Classification

Ranganathan developed the idea of facet analysis. Further, he showed that analysis and synthesis are applicable in every basic class. He demonstrated this in CC. All editions of CC have been analytico-synthetic schemes. An analytico-synthetic scheme is one in which a compound subject is, in the first step, analysed into facets on the idea plane. This is followed by transformation in the verbal plane and the translation of focal terms into focal numbers at the notational plane. Later, synthesis takes place at the notational plane. CC1 was the first scheme which could be called a completely analytico-synthetic classification scheme. In it, each basic class was analysed into its facets and the colon was used as a notational device for synthesis.

433 Notational System

The notational system of CC7, used for assigning numbers to basic subjects, consists of:

- (a) 23 Roman small letters (a. . . z excluding i, l, o);
 - (b) 10 Indo-Arabic numerals (0. . . 9);
 - (c) 26 Roman capital letters (A. . . Z);
 - (d) Bracketed numbers; and
 - (e) indicator digits, hyphen (-) and asterisk (*)
- Z, 0 (zero) or 9 are used to represent empty digits.

T, V, X and Z are used as emptying digits. However, when these occur as an initial digit, then they are deemed semantically rich digits. U, W and Y have been postulated as empty-emptying digits.

The notational system used by CC7 to assign numbers to isolates and speciators consists of the following:

- (a) Ten Indo-Arabic numerals (0. . . 9)
- (b) Twenty-six Roman capital letters (A. . . Z)
- (c) Twenty-three Roman small letters (a. . . z excluding i, l, o)
- (d) Bracketed numbers; and
- (e) Indicator digits * "← & ' . : ; , — + → (

The digits z, 0 (zero), 9 and Z have been used as empty digits. The *Z is used whenever an agglomeration of enumerated isolates is required. Digits * "← have been assigned anteriorising values.

434 Devices

CC uses a large number of devices to reduce the length of schedules, and also to achieve consistency in laying down schedules. It also provides a great deal of autonomy to a classifier. A list of the devices used in CC6 is given below:

- Alphabetical device
- Classic device
- Chronological device
- Decimal fraction device
- Enumeration device
- Facet device
- Gap device
- Geographical device
- Group notation device
- Mixed notation device
- Phase device
- Sector device
- Subject device

Superimposition device

The above devices have been explained in Chapter 14.

435 Three Planes

One of the fundamental contributions of Ranganathan to the methodology of classification is the distinction he makes between the work at the idea plane, at the verbal plane (terminology level), and at the notational plane. Ranganathan was of the view that each plane should develop to its very best. He considered the work at the idea plane to be paramount, and emphasized on the duty of other planes to carry out findings of the idea plane. This approach helped in the development of depth classification and its design on a sound basis.

436 Fundamental Categories

The concept of fundamental categories and their application in the designing of a scheme for library classification, is an important contribution made by Ranganathan. According to him, "There are five and only five fundamental categories—viz., time, space, energy, matter, and personality" (*Prolegomena*, p. 399). Further, "Each isolate facet of a compound subject can be deemed to be a manifestation of one and only one of the five fundamental categories" (*Prolegomena*, p. 403). The design of CC is based on the concept of fundamental categories. This has led to successful results. For details see Chapter 16.

When arranged in the order of decreasing concreteness, we get the order of fundamental categories as PMEST. Each basic class in CC is given a facet formula in terms of [P] [M] [E] [S] [T]. The citation order obtained thus in various basic classes is extremely helpful.

437 Empty and Emptying Digits

The empty digit device employed by Ranganathan provides an unlimited addition of numbers to represent coordinate ideas. An empty digit does not have a semantic value, but possesses ordinal value. An empty digit is employed as a sectorising digit.

The emptying digit was postulated by Ranganathan in 1963. It is a digit which deprives the preceding digit of its semantic value in a digit group, but retains the ordinal value allotted to it. It helps in interpolation between two consecutive ordinal numbers, if there is no gap available between them. This has proved to be an important breakthrough. Suppose we wish to interpolate a basic class at the

coordinate level between L and M. Then, X can be used as an emptying digit. LX would be a coordinate class and would lie between L and M. In a hierarchical notation, the concept of the emptying digit has proved to be extremely valuable.

438 Mnemonics

CC employs various kinds of mnemonics, such as verbal mnemonics, scheduled mnemonics, systematic mnemonics and seminal mnemonics. The concept of seminal mnemonics is peculiar to CC. It is an interesting as well as extremely useful one. According to Ranganathan, "A scheme for classification should use one and the same digit to denote seminally equivalent concept in whatever subject they may occur" (*Prolegomena*, p. 304). It is possible to have the same concept represented by the same number in all places of occurrence, but with different terms denoting it in different places. The identity of this concept is recognizable at great depth, beyond the reach of natural language: for example function in political science, physiology in biological science and activities in sociology. Ranganathan made use of this concept a great deal and rather successfully, in his CC. The concept also provides help to a classifier in the expansion of a schedule without waiting for the classificationist to provide for new subjects.

44 Use

CC is being used in about 2500 libraries India. Only a few libraries outside the country have adopted it. Many of the critics of this scheme consider it a theoretical scheme useful as an ideal model, but not fit for practical use. This is not a correct view. CC uses a variety of species of digits; therefore, it appears to have adopted a complex notational system. This is the price one has to pay for designing a scheme which should be able to withstand the onslaught of the universe of subjects in an effective manner. A library having adequate provision for reference service and the proper use of guides can overcome, to a large extent, the problems arising due to the complexities of the notational system in the shelf arrangement, or in the arrangement of entries in a classified part of a library catalogue. In a documentation list the use of a depth classification version of CC does not create problems due to complexities of the notational system. Some people have criticized CC for making frequent changes. However, changes cannot be avoided if a scheme is expected to keep pace with the many developments in the universe of subjects.

The seventh edition of CC, however, has taken too much time to appear. This has certainly given a setback to the adoption of the scheme by new libraries

45 Conclusion

The universe of subjects has become dynamic. In order to meet, effectively and productively, the onslaught of the ever-growing universe of subjects, a scheme for library classification needs to be developed so that it can conveniently accommodate new developments without unduly disturbing the basic structure of the scheme. The freely-faceted analytico-synthetic scheme for classification has the capacity to meet such a challenge.

CC7 has been developed as a freely-faceted analytico-synthetic scheme for classification. A set of normative principles has been formulated to guide the development of CC7. These principles have been described mainly in the 3rd edition of *Prolegomena to library classification*. Besides, a methodology for the design of a scheme for classification has been prepared, which provides a scientific basis towards the formulation of a scheme for classification. In the light of the above, it can be said that CC7 is very well fitted to meet the challenge of an ever-expanding universe of subjects.

CC7 is a freely faceted scheme based on the sound theory of library classification. CC7 provides a good example of the application of scientific method in classification. In future, it will become possible to revise the schedules for basic subjects so as to deal with the latest developments without disturbing the helpful sequence to a large extent. The notational system of CC7 allows a new basic subject or a new compound subject to be placed in a most helpful position among the existing subjects.

CC is versatile scheme for classification. Essentially, it has been developed to serve as a scheme for shelf arrangement. A large number of depth schedules representing the depth classification version of CC for compound subjects have also been produced to serve the requirements for information retrieval. These schedules have been utilized by special libraries/documentation centres/information centres to provide information services.

Although fewer libraries have adopted the CC scheme as compared to DDC and UDC, it has yet been one of most influential schemes ever formulated. The ideas forming the basis of CC have had an important influence on the theory of library classification.

CC employs a scientific approach, being based on objectively applicable normative principles. It is strong in the areas of special interest to Indian libraries. Therefore, it is of special interest to Indian librarians.

5 THE BIBLIOGRAPHIC CLASSIFICATION (1940)

51 Introduction

Henry Evelyn Bliss is the author of *Bibliographic classification*. The scheme was first conceived in 1908. An outline of the scheme was published in the *Library Journal* in 1910. A condensed version (in extended outline) was published in 1935 in *System of bibliographic classification*. Later, it appeared in its full form between 1940 and 1953, under the title *Bibliographic classification, extended by auxiliary schedules for composite specification and notation*. The second edition⁹ is planned in 19 volumes. Eight volumes have already appeared. The 2nd edition has been prepared by J. Mills and Vanda Broughton, with the assistance of Valerie Lang. As the new edition is being brought out in parts, like LC, any user of the scheme has an option either to purchase the whole set or those classes required by him. *The Abridged Bliss classification* (1967) is available for school libraries.

The Bliss Classification Association (founded in 1967) is responsible for the promotion and development of BC. It brings out *Bliss Classification Bulletin*, which provides additions, amendments and so on. It also serves as a forum for the discussion of problems relating to BC.

52 BCI

Bliss did recognize the need for certain forms of synthesis (composite specification), but he was opposed to the ideas of complete analysis and synthesis as proposed by Ranganathan. Unfortunately, he did not appreciate fully the usefulness of facet analysis for a classification scheme. BCI is an almost faceted scheme. It provides several auxiliary schedules, but does not contain much of facet analysis. Some provision for phase analysis is also available.

521 Outline of Classes

1-9 Anterior numeral classes (for special collections of various

⁹Henry Evelyn Bliss, *Bliss bibliographic classification*, 2nd edn., by J. Mills and Vanda Broughton, with the assistance of Valerie Lang, London, Butterworths, 1977—, vi—.

kinds, e.g., 6 periodicals)

- A Philosophy and general science
- B Physics (including special physical technology, for example, the radio)
- C Chemistry (including mineralogy, chemical technology)
- D Astronomy, geology, geography (general and physical)
- E Biology (including palaeontology, biogeography)
- F Botany (including bacteriology)
- G Zoology (including zoogeography and economic zoology)
- H Anthropology (general and physical), (including medicine, hygiene, physical training and recreation)
- I Psychology (including psychiatry)
- J Education
- K Social sciences
- L-O Social-political history
- P Religion, theology, ethics
- Q Applied social sciences, social welfare
- R Political science
- S Law
- T Economics
- U Arts in general, useful arts (including less scientific technologies)
- V Aesthetic, arts, recreative arts and pastimes
- W-Y Philology: language and literature
- Z Bibliography, bibliology, libraries

Bliss based his outline on disciplines, which reflected the specialization of work and study of the society at that time. The most important principle used in achieving the order is that of "gradation by speciality." According to this, a general subject should precede a specialized subject.

522 Principles

BC1 is based on theoretical principles. These principles have been explained by Bliss in his *Organization of knowledge*, and have also been described in the introduction to the scheme.

The leading principle used in BC1 is scientific and educational consensus. In other words, we should seek a consensus of expert opinion in all areas. This refers to how the subject is studied and practised. Bliss believed that it is through the process of science and education that knowledge is ultimately affected. He was of the view that the more closely a scheme reflects the consensus the more stable

it is likely to be. Other major principles used by Bliss were:

(a) to collocate related subjects and subordinate each special topic to the appropriate general one.

(b) to provide for alternatives in those situations where consensus (or majority point of view) is difficult to achieve. Bliss provided many alternative locations for subjects, and also alternative arrangements within subjects. This shows that he recognized the fact that consensus was not possible in many cases, and could also not prove to be of permanent application.

523 Notation

BCI uses the decimal fraction notation.

It uses mixed notation, consisting of 26 Roman caps, 26 Roman smalls and nine Arabic numerals [excluding 0 (zero)]. It also uses punctuation marks (such as —, .'), mathematical symbols [such as (%)] and improvised digits (such as & *). (The % and & signs were withdrawn later). Its notation is largely non-hierarchical. Bliss was obsessed with achieving the possible shortest class numbers and did succeed in this respect.

524 Terminology

BCI uses precise and brief terminology to a large extent. Sometimes, scope notes have been provided to indicate the sense according to which the headings have been allocated. Terminology is considered suitable for chain procedure.

525 Mnemonics

Few scheduled mnemonics have been provided. But seminal mnemonics have not been used.

Bliss did consider verbal mnemonics important enough. There are many examples of this to be found in the scheme.

EXAMPLES :

AL	Logic
C	Chemistry
CTB	Chemical technology
DG	Geology
UE	Engineering (useful arts)
QH	Housing (social welfare)

526 Local Variation

The scheme has made provision for local variation; for instance,

ethics has been provided at three places.

527 Book Number

There is a meagre provision for book numbers. But no attempt has been made to individualize the call number of a book.

53 BC2

Jack Mills and his colleagues have revised *Bibliographic classification* attempting to integrate theoretical work carried out by British Classification Research Group as far as could be possible without departing totally from the original structure.

The 2nd edition of *Bibliographic classification* is going to be a completely revised edition. The revision seems to be far-reaching and quite impressive. As a result of this, its users will hesitate to accept the new edition in its totality. There is every likelihood that some new, special and academic libraries may adopt the scheme.

The first volume consists of an introduction and auxiliary schedules. The auxiliary schedules consist of common form subdivisions, common subject subdivisions, and common subdivisions of persons, places, languages, ethnic groups and periods. These have been worked out in considerable detail. This volume also provides three outlines of BC2.

The outline of classes is given below:

- | | |
|-----|--|
| 2 | Generalia |
| 4 | Phenomena |
| 7 | Knowledge, information, communication, data processing, documentation & book trade etc. |
| A | Philosophy, Logic, mathematics, statistics, systemology |
| B | Physics (with alternative for some technologies) |
| C | Chemistry (with alternative for some technologies) |
| D | Astronomy & Space sciences, Earth sciences |
| E/G | Biology (Including Microbiology, Botany, Zoology) (with alternative for some technologies) |
| H | Anthropology, Human biology & Health sciences |
| I | Psychology & psychiatry |
| J | Education |
| K | Society (including sociology, social anthropology, customs & Folklore) |
| L/O | History & description |
| P | Religion, The Occult, morals and ethics |

Q	Social welfare
R/S	Political science, Law
T	Management and economics
U/V	Technology
W	Recreative arts, Fine arts, Music
X/Z	Philology, language & literature

The overall sequence of main classes and general collection of sub-classes has been retained from BC1. But there are internal relocations due to the reconstruction of classes according to facets. There are a number of major relocations in certain classes.

BC2 is largely the contribution of J Mills. The following volumes have been published so far:

- Introduction and auxiliary schedules;
- Class H Anthropology, human biology, health sciences
- Class I Psychology and psychiatry
- Class J Education
- Class K Society
- Class P Religion, the occult, morals and ethics
- Class Q Social welfare
- Class T Management and economics

From the few volumes which have appeared so far, one can come to certain generalizations. BC2 has made full use of the modern theory of library classification. An attempt has been made to follow the original principles laid down by Bliss. An effort has also been made to carefully maintain the original features of BC1. However, the following are the distinctive features of BC2:

(a) The details and order of a number of special schemes for classification of proved value have been incorporated into BC2 with suitable notational changes.

(b) Facet analysis has been applied rigorously and consistently. To some extent, the first edition did not apply facet analysis too clearly.

(c) Consideration has been given constantly to literary warrant.

(d) There is greater dependence on non-hierarchical class marks. Retroactive principle was first elaborated by Eric Coates. This has been applied in BC2 to mechanize the faceted structure of the scheme. Retroactive notation has been used frequently to achieve notational synthesis.

(e) The notation is brief and consists entirely of capital letters and Arabic numbers. The hyphen (-) is recommended as a device for separating the constituent facet terms for preparing multiple entries in

a classified catalogue, similar to the use of the colon (:) in UDC. The comma (,) is recommended for use of alphabetizing class-marks for names of persons. This will be used rarely.

(f) Provides a great deal of flexibility, by means of options to meet the special need of collections.

(g) Provides up-to-date and comprehensive vocabulary.

(h) A space has to be left after every third character of a class-mark.

54 Examples

JMK HJU	Remedial teaching of reading in a primary school
QO9 HI	Crime and psychology
3B2 H	Pictorial dictionary

55 Conclusion

BC1 is considered suitable for the classification of macro documents. BC2 is claimed to be suitable for shelf arrangement as well as for information retrieval. As only a few volumes of BC2 have been published, it is, therefore, not possible to say anything very definitely in this regard.

The new edition has attempted to incorporate the latest ideas in the field of classification. There is very likelihood that it would be a great improvement over the previous edition. However, there are a number of shortcomings in this edition. The instructions for its application are quite detailed. Some instructions, especially those for the synthesis of classes, are quite complicated and at times rather confusing. The print is too small, as a result of which the work is strenuous to read.

The future of BC2 would depend upon how it is received by the profession, and on its ability to win new users of the scheme. According to Mills, 90 libraries were using BC1 at one time. This is certainly a small number. The fact remains that due to its enormous cost, and the time involved in reclassification of a collection, libraries already using a given scheme are not likely to adopt it. Some new libraries, especially special and academic ones, may be tempted to adopt it.

The progress of BC2 will be watched with interest by the profession. At this stage it is too early to say whether or not BC2 will come up to the expectations. Only time will tell.

6 BROAD SYSTEM OF ORDERING

6.1 Background

UNESCO and International Council of Scientific Unions (ICSU) set up in 1967 a Central Committee to study the feasibility of a world science information system. This Central Committee included a working group on indexing and classification. This group suggested the idea of switching language for a world science information system (later called¹⁰ UNISIST). The working group asked Aslib Research Department to make a comparative study of the then existing universal classification schemes to determine whether or not any one of these could be used as a switching language. The report prepared under the direction of B.C. Vickery did not find any of these schemes satisfactory for the purpose. But UDC was considered to be the least defective in this context.

The Committee formed in 1967, produced a report in 1971 entitled *UNISIST Study report on the feasibility of a world science information system*¹¹. The report mentioned that different scientific information systems will continue to make use of different indexing languages. However, it brought out the need for a communication indexing language to link up different systems. The concept of Broad System of Ordering (BSO) can be traced to this report.

FID/CCC panel was formed in 1971. At the FID Conference held in Budapest in 1972, it was resolved to increase the size of the FID/CCC panel to serve as a working Group called FID/SRC for the purpose of preparing a Subject-field Reference Code, which could serve as a Broad System of Ordering (BSO) needed for UNISIST.

The basic idea was to prepare an independent "roof classification" to control the transfer of large amounts of information between constituent information centres, systems and services using different indexing languages, special classification schemes, thesauri and so on. In other words, the aim was to prepare a broad classification to serve as a switching language between different information systems. A broad classification was intended to serve as a switching mechanism to link different classification schemes, indexing languages and thesauri in the process of information transfer between information centres in a net-work. This broad classification could also be used

¹⁰Aslib Research Department, *Classification in science information*, 1969.

¹¹UNESCO and International Council of Scientific Unions, *UNISIST study report on the feasibility of world science information system*, Paris, Unesco, 1971.

for referring to the contents of the existing information systems.

FID/SRC working group was found to be too large. Therefore, in 1974, a three member FID/BSO Panel was set up. E.J. Coates, G.A. Lloyd and D. Simandl were appointed as its members from among the FID/SRC members, to prepare and complete a single (merged) BSO for UNISIST. First draft of BSO was produced in 1975. First revised draft came out in 1976. Again in August 1977, second revised version appeared. Field test was carried out to establish quantitatively the extent to which testers in different countries agreed in classifying a sample set of data taken from directory material. The third revision incorporated the findings of the test.

The third revision and first published edition of BSO¹², prepared by FID in cooperation with and with the financial assistance of Unesco, came out in 1978 under the title *BSO-Broad system of ordering*. BSO is a general classification scheme for information transfer and switching. The *BSO manual*¹³ appeared in 1979. It gives an extended treatment of the scheme. It describes the stages through which the original concept went through, along with the theoretical basis of the scheme. It discusses in depth the issues/problems concerning the practical applications of BSO, giving a specimen file of 750 directory entries of specialized organizations and secondary information services.

62 Scope

In a network consisting of two centres using two different classification schemes (A and B), two equivalent tables (A to B and B to A) are required for information transfer. In case there are three information centres using three different classification schemes (A, B and C), then the number of equivalent tables required would increase to six. With the increase in information centres, the number of equivalent tables would increase greatly. Therefore, it would become economical, if we adopt a switching language (a mediating language, or a communication language). A classification scheme is selected instead of an indexing language or thesaurus due to certain advantages.

BSO has been prepared within the frame-work of the UNISIST programme. It is a broad classification aimed to serve as a switching language to link different classification schemes, indexing languages

¹²Eric Coates et al, *Broad system of ordering (BSO): Schedule and index*, 3rd revision, the Hague, FID, 1978.

¹³Eric Coates et al, *the BSO manual, the development, rationale, and use of the Broad System of Ordering*, The Hague, FID, 1979.

and thesauri in the process of information transfer. The information transfer may take place between information centres, documentation centres/libraries in a network.

BSO is basically discipline-oriented, but also provides comprehensively for mission-oriented or multi-disciplinary subjects of concern to organized sources of information. A class for human needs covering food, clothing and shelter along with leisure has also been provided. This is in addition to usual subjects like arts, crafts and technology. The BSO code is basically meant for organized information sources, but not for the classification of documents.

BSO is a classification scheme consisting of about 4,000 English terms ranging over the whole field of knowledge. The scheme has been developed as a joint project of FID and UNESCO since 1973.

63 Criteria for inclusion of a Subject

The following criteria have been used for the inclusion of a subject in BSO:

The existence of periodicals, data collections, and abstracting services and organizations in the subject of concern.

However, human needs is considered as an exception to the criteria listed above.

64 Purpose

The basic idea behind BSO was to prepare an independent "roof classification" to control the transfer of large amounts of information between constituent centres, systems and services using different indexing languages, special classifications, thesauri and so on. In other words, it was intended to prepare a broad classification to serve as a switching language between different information systems. Thus a broad classification was aimed to serve as a switching mechanism to link different classification schemes, indexing languages and thesauri in the process of information transfer between information centres, documentation centres and libraries in a network. This could also be used for referring to the contents of the existing information systems.

65 Arrangements

In BSO, subjects are arranged at three levels, namely, subject areas, subject fields and subject-field divisions.

The subject areas are given below:

100 Knowledge generally

- 200 Science and technology (together)
- 300 Life Sciences
- 460 Education
- 470 Human needs
- 500 Humanities, cultural and social sciences
- 600 Technology
- 910 Language, linguistics and literature
- 940 Arts
- 970 Religion and atheism

The subject areas consists of the following three separate elements:

- (a) Area 100
- (b) Area 200 to 588
- (c) Area 600 to 992

(a) consists of knowledge generally. It includes a series of methodological sciences and techniques applicable to different fields of knowledge.

(b) consists of fundamental and physical sciences; life sciences; human and social sciences.

(c) consists of technology and the arts, representing technological, linguistic, artistic or spiritual products of human activities.

The subject areas follow an ascending order of complexity (or of integrative levels of the entities associated with each).

66 Notation

The notation consists of numerals in millesimal and centesimal integer arrays. ISO 3166 alpha-2 (two letters) coding has been used for names of countries. A/Z are used sometimes for ordering of eponymous listing. It uses two punctuation symbols namely comma (,) and hyphen (-).

The two combination signs have been made use of. Dash (—) is used for external combination and comma (,) for internal combination. The latter usage is certainly clumsy.

The notation follows a three, two, two digit pattern. The subject areas and subject-fields consists of three digit numbers (millesimal divisions). Thus numbers for main subject-fields (base numbers) are three digit.

Gaps have been provided at many places for future expansion. At many points, notation follows non-hierarchical structure. The use of non-hierarchical structure has resulted in the shortening of class numbers.

Notation used in the scheme has been adopted to serve human uses. Notation used is not in any way meant to primarily serve machine handling.

67 Combinatory Facilities

Combinatory facilities have been provided to construct class numbers for composite subjects.

Internal combination: Internal combination is used when both the elements to be combined belong to the same subject field. Here citation order is reverse of order of isolates listed in the schedule.

Examples:

363, 64, 0, 63, 42

Food crop protection

Note: Here 363, 64 represents food crops and 363, 42 stands for crop protection. In the schedule 363, 64 comes later than 363, 42. Therefore, the 363, 64 has been cited first. In the synthesis, 0, (comma zero comma) has been used as an indicator digit. The digit 3 has been dropped from 363.

575, 32, 0, 73, 50 Child welfare in disaster relief

Note: Here 575, 32 represents child welfare and 573, 50 stands for disaster relief and aid.

External combination: External combination is applicable when elements to be combined belong to different subject fields.

Example:

610-210 Engineering physics

550-163 Application of operation research in public administration

Note: 610 represents scientific basis of technology and 210 stands for physics. In the number, the first element to be cited should be 'application area, mission, purpose, product'. The second element should be 'the aspect, approach, problem, action, agent or methodology directed to the application area, mission, etc.' This application of the combination rule will most often result in a 'retro-combined notation.' In other words the first element of the notation will be taken from a later position in the schedule than the concerned second element.

68 Multi-or-Non-Disciplinary Point of View

Under area 088, provision has been provided for coding of material and phenomena from a multi-or-non-disciplinary point of view.

Examples:

- 088 Phenomena and entities from a multi-or-non-disciplinary point of view.
- 088, 345, 62 Fish (all aspects including zoological one).
- 345, 62 Fish in zoology

691 Common Facets

Time and place facets have been listed as common facets. These are coded with —01 and —02 for time and place facets respectively. These are applicable to different subject fields except 510 'History', 520 (Area Studies), 544 to 546 political history and politics of individual states and grouping states. Schedule for time facet has been provided for separately.

Names of places are provided through alphabetical device using ISO 3166 codes. This lists the sovereign states but there is no provision for states of India, USA, USSR etc.

692 Optional Facet

An optional facet has been provided for designating types of information sources in terms other than those indicating the relevant subject fields. Such a provision falls outside the scope of classification of subjects. BSO 1977, did not have this provision.

693 Sequence of Facets

The sequence of facets prescribed for the construction of a class number is given below:

- (a) Tools or equipment for operations;
- (b) Operations (i.e. purposive activities by people);
- (c) Processes, interactions;
- (d) Parts, sub-systems of objects of study, or of products;
- (e) Objects of study or products, or total systems,

694 Conclusion

The proposals were originally put forward for a broad classification meant to serve as a switching language for the information retrieval and information transfer towards UNISIST Programme. The scheme is the outcome of these proposals and was developed from 1973 onwards.

BSO is fully faceted. It consists of 4000 terms. Provision has been made for synthesis, so that class numbers for a large number of composite subjects can be constructed. In spite of its weaknesses, this

scheme is a remarkable achievement.

BSO has been prepared by FID in cooperation with and financial assistance from Unesco. Unesco is committed to the development of UNISIST. BSO has been designed to serve as a broad classification for the purpose. Therefore, Unesco should provide enthusiastic support to it, otherwise BSO does not have much hope for its survival. BSO will not be used on a large scale unless adequate provision is made for its maintenance and up-dating.

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Chapter 4

SPECIES OF SCHEMES FOR CLASSIFICATION OF SUBJECTS

0 INTRODUCTION

Today, a large variety of schemes are available for the classification of subjects. It would be useful to categorize these on the basis of their characteristics. We have travelled a long way from the days of enumerative schemes of library classification to freely faceted schemes for library classification. The freely faceted scheme for classification has become a reality.

Till now, the following six species¹ of schemes have been developed for the classification of subjects:

- (i) Purely enumerative scheme
- (ii) Almost enumerative scheme
- (iii) Almost faceted scheme
- (iv) Fully but rigidly faceted scheme
- (v) Almost freely faceted scheme
- (vi) Freely faceted scheme

1 PURELY ENUMERATIVE SCHEME

"An enumerative scheme for classification consists essentially of a single schedule enumerating all subjects—of the past, the present, and the anticipatable future" (*Prolegomena*, p. 95).

1.1 Disadvantages

An enumerative scheme for classification would have the following disadvantages:

¹S.R. Ranganathan, "Colon Classification edition 7 (1971): A preview," *Library Science with a Slant to Documentation*, 6, 1969, pp. 204-5.

The schedule of such a scheme would be a long one.

The scheme would find it difficult to accommodate new subjects in a filiiary position with respect to existing subjects.

The class number prepared from an enumerative scheme would often consist of succession of semantically rich digits, which are not broken into meaningful facets.

12 Examples

Library of Congress classification and *Rider's international classification* are good examples of the enumerative schemes of classification.

LC runs into 31 volume. The schedules are too long and it is somewhat difficult for a classifier to prepare a class number, because he will have to handle such a large number of volumes. LC does not provide even common isolates separately, which have been built into the class numbers differently in different subjects. Although LC provides gaps in the notation at a large scale, it has still found it difficult to deal with the onslaught of knowledge.

RIC has been intentionally designed as an enumerative classification. It provides one omnibus schedule of enumerated subjects, most of which are compound subjects. Even the schedule of geographical isolates has not been provided separately. The geographical isolates have been included as an integral part of the tables of the scheme.

The schedules are short, enumerating 18,000 subjects. However, the same class number is used for several subjects, causing confusion. There is no provision for newly emerging subjects. Therefore, RIC has hardly any resilience.

2 ALMOST-ENUMERATIVE SCHEME

"An almost-enumerative scheme for classification consist of a large schedule enumerating most of the subjects of the past, the present, and the anticipatable future, and in addition a few schedules of common isolates" (*Prolegomena*, p. 97).

21 Advantages

Such a scheme would enumerate basic subjects and compound subjects. As a few schedules of common isolates are provided, it will be possible to construct class numbers of a few more compound subjects.

22 *Disadvantages*

An almost enumerative scheme would have the following disadvantages:

The schedule of subjects would enumerate basic subjects as well as compound subjects. As a result, the schedule of subjects would be lengthy. Although, due to the provision of a few schedules of common isolates, it will be possible to construct class numbers for a few compound subjects, the scheme will not be able to meet the onslaught of knowledge due to a limited provision for the construction of class numbers. New subjects which have not been enumerated, and also for which the class numbers cannot be constructed by combining enumerated subjects and common isolates, would also prove an additional problem.

Most class numbers would usually consist of a succession of semantically rich digits which may not have been separated into meaningful facets by means of semantically poor digits. Thus, most class numbers would be monolithic.

23 *Examples*

J.D. Brown's *Subject classification* and *Dewey decimal classification* are examples of almost-enumerative classification.

Subject classification consists of two schedules—the main schedule and a categorical table. The main schedule lists subjects, most of which are compound subjects. The categorical table contains enumerated isolates. In addition to compound subjects listed in the main schedule, additional compound subjects can be formed by combining the subjects listed in the main schedule with isolates given in the categorical table. However, the list of isolates provided in the categorical table is too short to be able to overcome the onslaught of subjects.

Dewey decimal classification (DDC) (18th edition; 1971) provides independent schedules of common time, space and form isolates, as well as a long omnibus schedule of enumerated subjects. Most of the enumerated subjects are compound subjects. There is a limited degree of resilience. Provision of common isolates, which can be attached to the class number taken from the main tables along with the "Add to..." device, have enabled DDC18 to withstand, to some extent, the pressure of newly emerging subjects. The same can be said about DDC 19.

3 ALMOST-FACETED SCHEME

"An almost-faceted scheme for classification consists of a large schedule enumerating most of the subjects of the past, the present, and the anticipatable future, and in addition a few schedules of common isolates and also some schedules of special isolates" (*Prolegomena*, p. 102).

31 Advantages

Such a scheme will enumerate basic subjects, and also many compound subjects. Due to the provision of a few schedules of common isolates and also some schedules of special isolates, it will be possible to construct class numbers of more compound subjects.

The class numbers formed with the aid of common isolates and/or special isolates will contain indicator digits of a species different from the semantically rich digits used in the schedules enumerating the subjects, as well as those listing common isolates and special isolates. Thus, the class numbers formed with the aid of common isolates and/or special isolates will be polythetic.

32 Disadvantages

As in the almost-faceted scheme for classification, most of the subjects of the past, present and anticipatable future would be enumerated; therefore, class numbers for different subjects would generally be long.

33 Examples

Universal decimal classification and *Bibliographic classification* are examples of almost-faceted classification.

UDC provides four independent schedules of common isolates, consisting of form, place, time and point of view common auxiliaries. Distinctive indicator digits have been provided for attaching these to main UDC numbers. Language isolates, race and nationality isolates are not common isolates. In addition, schedules of special isolates for use in compound subjects, going with certain enumerated basic and compound subjects, have also been given. However, special isolates are not available in all possible cases. UDC also provides long schedules of enumerated subjects, most of which happen to be compound subjects. The scheme has recommended the use of the colon (:), which allows for the use of some of the enumer-

ated subjects as facets in the formation of compound subjects. In addition, the colon has been employed to form complex subjects.

4 FULLY BUT RIGIDLY-FACETED SCHEME

"In a rigidly-faceted scheme for classification, the facets and their sequence are pre-determined for all the subjects, going with a basic class" (*Prolegomena*, p. 107). This means that a facet formula is provided for each basic class. This amounts to predetermining the special isolate facets, which should be used compulsorily in compound subjects going along with the basic class. This brings in rigidity.

41 Examples

Colon classification edition 1 to edition 3 (1st edition, 1933; 2nd edition, 1939 and 3rd edition, 1950) represent examples of rigidly-faceted schemes for classification. CC edition 1 to CC edition 3 is referred to as CC Version 1.

42 Disadvantages

Cluttering of indicator digits. The facet formula provided for each basic class is rigid to the extent that in classifying any compound subject going with a basic class, one must find a place for each one of the facets prescribed by the facet formula for the concerned basic class. The problem does not arise if the compound subject being classified does not present any of the "end-facets" in the formula. However, it is a problem, when any intermediate facet is missing. In such a case it becomes essential to interpolate indicator digits even when the facet or the facets are missing.

In the third edition of CC, the facet formula for engineering is as given below:

D Engineering [Work]; [Secondary work]: [Part]: [Engineering problem]

The class number for "Electrical Engineering" is D66. Here the end-facets are missing and these can be omitted in the class number.

The class number for "Design in Electrical Engineering" would be D66: :4. Here, three consecutive colons have appeared, which cannot be omitted because the fourth facet is present, though the second and third facets are absent.

We can see that the cluttering of indicator digits gives a clumsy

look. The law of parsimony insists that indicator digits should be avoided in such a situation.

Addition of new facets. It is to be noted that new compound subjects would bring up additional facets not provided for in the then existing facet formulae for basic subjects. As facet formulae are predetermined and rigid, it would be difficult to interpolate and extrapolate additional facets in these. In the early 25 years of CC, few compound subjects requiring additional facets appeared, but now such instances are on the increase.

5 ALMOST-FREELY FACETED SCHEME

In a rigidly-faceted scheme of classification, "the facets and their sequence are predetermined for all subjects going with a basic class" (*Prolegomena*, p. 107). This leads to a great deal of rigidity. A scheme becomes almost-freely faceted "because the use of different indicator digits for diverse kinds of facets and the concept of rounds and levels removed the severe rigidity in the number and the sequence of facets that can occur in a compound subject. However, some rigidity lurked in respect of levels of facet within a round."² Therefore, we can see that such a scheme does have some rigidity, because of which it cannot be freely faceted in full measure. As a result, it cannot be referred to as freely faceted classification.

51 Examples

Edition 4 (1952), edition 5 (1957), edition 6 (1960) and edition 6 with annexure (1963) of CC are regarded as *Colon classification* Version 2. These are almost-freely faceted schemes for classification.

6 FREELY FACETED SCHEME

As mentioned earlier, a great deal of rigidity occurring in Version 1 of *Colon classification* was removed in the second version. However, some rigidity remained with respect to levels of facets within a round, because of which it was not freely faceted in full measure. With the aid of sector notation, the rigidity with regard to the number of levels of facets and of their sequence in a round (this kind of rigidity

²*Ibid.*, p. 205.

existed in the almost-freely faceted scheme) has almost been removed. Besides, some of the facets which were recognized earlier as levels have been designated as sub-facets in a facet belonging to one and the same level. Another change in concept has been that facets are now considered to belong to compound subjects and not to basic subjects. The basic subject has no facets; it is a basic facet itself. This is an important idea. Therefore, the predetermination of the facets for all the compound subjects likely to go with any basic subject is out of the question. This is a very logical solution of the problem. Therefore, we can see that rigidity has been removed to a large extent. Any scheme which follows the above approach can be considered a freely faceted scheme for classification.

In freely faceted classification, the same pattern of facet sequence is followed in all subjects. A compound subject has the freedom to use any number of facets as may be found necessary. The sequence of facets is determined with the help of postulates and principles for facet sequence. The sequence obtained follows the absolute syntax of isolate ideas, because it has been found that such a sequence is preferred by a majority of thinkers. The sequence of facets is determined at the idea plane and implemented at the notational plane.

Thus a freely faceted scheme is not subject to a predetermined facet formula for compound subject going with a basic subject. Each compound subject determines its own facets (that is facet ideas, facet terms, facet numbers) and class numbers. It also determines its own facet sequence. This means there is nothing rigid about the number as well as the sequence of facets. Everything is free. Such a scheme is guided by canons, postulates and principles, and can, therefore, claim to be called a freely faceted scheme for classification.

61 Example

The dynamic theory as well as the techniques of library classification have been developed to the extent that the notational system used in CC is quite capable of placing any new main subject, a non-main basic subject (whether simple or compound) in a helpful place in the sequence. The same is true for any new compound subject.

Version 3 of CC is under preparation. A few schedules of CC7 have already appeared. It is likely to incorporate all the findings of the dynamic theory of library classification which is being developed consciously. It is believed that the new version of CC will tend to become a freely faceted, analytico-synthetic scheme for classification. It is hoped that "during the next decade the development in CC will

be approximate to the ideal of a freely faceted model of classification."²

62 Advantages

It has been found that a freely faceted classification, based on explicitly stated postulates and guiding principles, is the most suitable scheme for adaptation in the design and development of depth schedules for the co-extensive classification of micro-subjects.

The design of the structure of freely faceted classification would sustain for a longer period. However, additional foci would have to be added and some of the existing foci revised from time to time. At times a new schedule of isolate facets would have to be added for a new compound subject. This is thus a continuing work, which would have to be carried out by a classificationist or classifier-cum-classificationist, guided by explicitly stated laws, canons and principles.

A freely faceted scheme possesses, thus, greater resilience than other species of classification for subjects. Between the two schemes giving a more or less similar structure to the class number for the same specific subject, the freely faceted scheme would be in a position to give a smaller class number.

7 ANALYTICO-SYNTHETIC SCHEME

"Analytico-synthetic scheme" is a generic term used "to denote any scheme in which a compound subject is first analysed into its facets in the idea plane and later synthesised in the verbal plane and in the notational plane respectively."⁴

An analytico-synthetic classification scheme involves analysis of a subject into its facets in the idea plane. Transformation takes place in the verbal plane. Translation is done from verbal to the notational plane. Synthesis of the facet numbers into class numbers is carried out in the notational plane. Different editions of *Colon classification* are fully analytico-synthetic schemes. UDC is analytico-synthetic to a small extent. A faceted classification scheme is based on facet analysis. A faceted classification is not analytico-synthetic unless it is a guided one.

²Arthur Maltby, ed. *Classification in the 1970 ; a second look*, London, Clive Bingley, 1976, p. 65.

⁴S.R. Ranganathan, "Colon classification, edition 7 (1971): a preview," *op. cit.*, p. 205.

8 CONCLUSION

The history of library classification shows that schemes for classification have evolved from the pure enumerative to the freely faceted one to meet the challenge of the growing universe of subjects. Today, there is increasing realization that if a scheme for classification has to meet successfully the onslaught of the universe of subjects, it must be based on a dynamic theory of library classification. Only then can it keep pace with the demands made by newly emerging subjects. A freely faceted scheme for classification is one scheme which can provide an answer. Version 3 of CC, under preparation, is likely to approximate to the ideal of a freely faceted scheme for classification.

FURTHER READINGS

S.R. RANGANATHAN, *Prolegomena to library classification*, 3rd ed., Bombay, Asia Publishing House, 1967, chap. CT-CY.

S.R. RANGANATHAN, "Colon classification, edition 7 (1971): a preview," *Library Science*, 6, 1969, pp. 204-6.

Chapter 5

EVOLUTION OF THEORY OF LIBRARY CLASSIFICATION

1 WHAT IS A THEORY

A theory refers to an organized body of principles. These principles provide guidance to practitioners of the concerned subject. Any theory, like any subject, goes through a process of growth and development. Therefore, a theory might be an elementary one or an advanced one, depending upon its stage of growth.

2 IMPORTANCE OF THEORY

The theory of a subject:

- (i) Helps the subject to be accepted as a discipline in its own right.
- (ii) Serves as the very foundation of a subject and also provides it a scientific basis.
- (iii) Enables the systematic study of a subject, leading to its growth and development.
- (iv) Helps the practitioners of the subject (classifiers) to solve day-to-day problems faced by them. This becomes possible due to the availability of guiding principles.
- (v) Adds to the prestige and status of a subject.

From the above, we can see the importance of a theory for the proper growth and development of a subject itself. This is equally true with regard to library classification.

3 NEED FOR THEORY OF LIBRARY CLASSIFICATION

Looking into the history of library classification, we find that the

number of subjects was limited, and broad classification served the purpose. The designer of a scheme required general experience, some flair (natural aptitude) and a certain amount of sixth sense. However, with the passage of time, the number of subjects became too large. The need began to be felt for a classification of minute subjects in a co-extensive manner. This brought about the necessity for a theory of library classification.

4 EVOLUTION OF THEORY

Any theory of a subject undergoes a process of evolution. The same goes for the theory of library classification. According to R.S. Parkhi¹, the theory of library classification has gone through two stages of evolution. In Stage 1, we were able to achieve a descriptive theory distilled out of past practices in design work. In Stage 2, classificationists were able to formulate a dynamic theory for guiding design work.

5 DESCRIPTIVE THEORY

The descriptive theory was the first stage in the evolution of the theory of library classification. It served its purpose well because it was able to meet the requirements of the universe of subjects as it existed at the time. Developments in the universe of subjects were slow and far between.

51 *What*

The theories of library classification, which existed till the early fifties, (before 1955), are referred to as the descriptive theories of library classification because they more or less described the practices in use in different schemes of classification existing at that time.

52 *Theory versus Practice*

During the period of descriptive theory, theory followed practice. Thus theory had little power to influence practice. It was manipulated to fit into practice. This was a period when improvements and refinements took place slowly, over a long period of time.

¹R.S. Parkhi, *Library classification ; evolution of a dynamic theory*, Delhi, Vikas, 1972, Chaps. F and J.

53 Design of Classification Schemes

During the period of descriptive theory, schemes were largely designed with the flair or natural aptitude of the classificationists. The classificationists received occasional help from intuition (the power of mind by which it immediately perceives the truth of things, without reasoning or analysis).

This period lacked to a large extent guidance from a theory of library classification. And it is certain that each classificationist was guided by some implicit (or implied) theory of classification.

54 Lack of Scientific Approach

Thus there was lack of scientific approach, as a result of which there was no objectivity in approach. Often guess work was used which served the purpose.

55 *Examples of Descriptive Theories Produced from 1898 to 1937*
James Duff Brown, *Manual of library classification and shelf arrangement*, London, Library Supply Company, 1898.

—, *Library classification and cataloguing*, London, Grafton, 1912.
Ernest Cushing Richardson, *Classification, theoretical and practical*, New York, Scribner, 1901, (Edition 2; 1912) (Edition 3; 1930).

E. Wyndham Hulme, "Principles of book classification," *Library Association Record*, vol. 13-14, 1911-12.

W.C. Berwick Sayers, *Canons of classification*, London, Grafton, 1915.

—, *Grammar of classification* (Edition 2; 1915) (Edition 4; 1935).

—, *Introduction to library classification*, London, Grafton, 1918 (Edition 2; 1922) (Edition 3; 1929) (Edition 4; 1935) (Edition 5; 1938) (Edition 6; 1943) (Edition 7; 1946) (Edition 8; 1950) (Edition 9; 1954).

—, *Manual of library classification*, London, Grafton, 1926 (Edition 2; 1944) (Edition 3; 1955) (Edition 4; 1967) (Edition 5; 1975).

H.E. Bliss, *Organization of knowledge and the system of sciences*, New York, Holt, 1929.

—, *Organization of knowledge in libraries and the subject approach to books*, New York, H.W. Wilson, 1933. (Edition 2; 1939).

H.E. Bliss, *System of bibliographic classification*, New York, H.W. Wilson, 1935.

S.R. Ranganathan, *Prolegomena to library classification*, Madras, Madras Library Association, 1937.

Comments: (i) In 1898, James Duff Brown put forth a number of principles of classification, forming a theory of classification. He is considered as the first person to have enunciated a theory of library classification. The theory appeared in his *Manual of library classification and shelf arrangement*. The same was incorporated in his *Library classification and cataloguing*. His theory finds an application in his scheme entitled *Subject classification for the arrangement of libraries and the organization of information*.

(ii) E.C. Richardson is regarded as the first person to have made the first conscious and systematic attempt to set down a theory of library classification. His theory consisted of three "laws or principles of classification" meant to guide the work of designing a scheme. These were described in his first edition of *Classification, theoretical and practical*,² which was published in 1901. It may be added that at the Hartford Theological Seminary, Richardson developed a scheme for its collection, which is still being used. For the Princeton University Library he developed the Richardson classification system, which still forms a basis for shelf arrangement—though, for certain documents, a modified form of *Library of Congress classification* is being used.

(iii) Hulme's *Principles of book classification* represents a series of articles which appeared in *Library Association Record*. The same was also reprinted as a pamphlet in the AAL series. He tried to bring about a theory of library classification based on an assumption that the classification of books and knowledge have different purposes. Therefore, he advocated that they should also be different in method. He provided a valuable lead to later theories, but did not bring about any scheme of library classification.

(iv) Sayers is referred to as the first grammarian of library classification. He is responsible for interpreting and systematizing the ideas of other theoreticians. Sayers did not formulate any scheme of library classification.

(v) The three titles by Bliss, listed earlier, provide a comprehensive treatise on classification. He stated his principles of classification in various forms in his writings, and succeeded in providing a comprehensive theory of classification. His contribution to theory of library classification is truly remarkable.

(vi) Ranganathan started developing his theory from 1924 on-

²Ernest Cushing Richardson, *Classification, theoretical and practical*, New York, Scribner, 1901.

wards. In his first edition of *Prolegomena to library classification* (1937), he provided an integrated theory, mainly descriptive, of the practices prevalent at that time. Though persons like Brown, Richardson, Hulme, Sayers and Bliss had made a good contribution to the theory of library classification, Ranganathan succeeded to a greater extent. He went ahead of them by extending the principles they had put forward. He also provided the largest list of principles (named "canons" by him), and succeeded in evolving an excellent terminology of his own—in as early as 1937.

(vii) An examination of the above-mentioned theories shows that the normative principles provided in them, including those by Ranganathan, often lacked objectivity and were also not well defined. Some of these normative principles are mere opinions, which cannot be considered as normative principles. Very often, these happened to be disjointed general statements. The authors responsible for certain descriptive theories have used different terms without defining them properly. This can lead to homonyms. Richardson used the word "law" or "principle". Hulme adopted the word "principle." Sayers preferred "canon." Bliss used "principle." Ranganathan made use of words like "canon" and "law". It was only in the third edition of *Prolegomena to library classification* (1967) that he defined the kinds of normative principles at different levels. It may be added that these descriptive theories were, in part, dynamic. For instance, the law of evolution and the historical law enunciated by Richardson belong to a dynamic theory of library classification.

55 Examples of Leading General Schemes Produced from 1876 to 1936

The leading general schemes are:

Dewey decimal classification (1876) by Melvil Dewey

Expansive classification (1893) by C.A. Cutter

Universal decimal classification (1899)

Library of Congress classification (1901)

Subject classification (1906) by J.D. Brown.

Colon classification (1933) by S.R. Ranganathan

Bibliographic classification (1935) by H.E. Bliss

Note: The year within parenthesis indicates the year of publication of the first edition. *Universal decimal classification* was published under the title *Classification bibliographique decimale*, in 35 parts, from 1899 to 1905.

The descriptive theories of library classification described earlier

were derived out of past practices adopted in the designing of the above-mentioned seven schemes of library classification. These schemes were, to a large extent, designed depending on the flair of an individual classificationist. However, each of these classificationists must have been guided implicitly by some kind of theory. A study of the schemes shows that each follows a different approach. It seems that a comparative study of the methodology adopted in them must have led to the derivation of theories of library classification.

6 DYNAMIC THEORY

Dynamic theory is regarded as Stage 2 in the development of a theory of classification. The beginning of Stage 2 in the evolution of a theory of library classification should be considered as an important landmark. This has led to tremendous developments in the field of library classification.

The question arises as to why there has been a delay in changing over from the descriptive theory to the dynamic theory. The adoption of technical terminology is of extreme importance in a subject like library classification, but the library profession has been slow to accept changes and additions in technical terminology. This has been one of the reasons for the delay in changing over. It is essential that specialists in this area should adopt a scientific style of writing.

61 *What*

A dynamic theory is one which is able to provide a sound methodology for the designing of a scheme for library classification. Such a theory enables one to organize new subjects and already-known subjects in their proper places in a scheme, without disturbing the helpful sequence.

62 *Initial Factors*

On 25th June 1948, Dr Jean Anker, the Librarian of the National Science Library of Denmark, met Ranganathan. He requested Ranganathan to write a book on the philosophy of library classification. According to Parkhi, "It was at that meeting that, consciously or unconsciously, the seed for a dynamic theory of library classification was sown, as it were, into the mind of Ranganathan."³ Ranga-

³R.S. Parkhi, *op. cit.*, pp. 91-2.

than received impetus from the resolution passed by the Royal Society as its conference held in 1950, which called for scientific investigation into library classification, so that it could keep pace with developments in the universe of subjects. An informal research team of librarians was formed at Delhi, which met regularly at Ranganathan's house from October 1948 onwards, to discuss problems in library classification. In 1950, Ranganathan spent eight months in USA. There he was requested to develop *Colon classification* as a language for communication. This led to the publication of *Classification and communication* in 1951. This further led to a dynamic theory. In 1951, at the suggestion of Ranganathan the informal research team was converted into a formal organization called the Library Research Circle (Delhi). The circle made steady progress, and published its results in the *Annals* of the Indian Library Association, forming part of *Abgila*.

63 Need

In the development of a theory, a stage is reached when the need arises for bringing in frequent improvements in practices followed in the concerned discipline. This may become necessary so that greater efficiency and a higher level of production can be achieved. This is possible if theory starts developing ahead of practice. In other words, theory should lead practice. It is at this stage of development in a theory that the theory gives up its role of merely describing practice. When this happens, theory takes up the dynamic role of providing guidelines in the form of guiding principles, which help in the development of practices on a continuous basis. In the development of a theory of library classification, such a stage was reached in the early 1950s.

64 First Book on Dynamic Theory

According to Parkhi, the second edition of *Prolegomena to library classification* (published in 1957) is "perhaps the first known book on the subject"⁴ describing dynamic theory. This work covers the description of a dynamic theory of library classification developed till 1955. An advanced version of the dynamic theory was published in 1967, in the form of a third edition of *Prolegomena to library classification*. An examination of the third edition shows that the dynamic theory of library classification has become "truly dynamic." The

⁴*Ibid.*, p. 94.

developments have been fast, to the extent that the third edition became out of date soon after it appeared. This shows the dynamic nature of the present theory of library classification. A still more advanced version of the dynamic theory is being developed at the Documentation Research and Training Centre (DRTC, Bangalore).

65 Achievement of a Dynamic Theory of Library Classification

The dynamic theory has led to many achievements. This will become apparent from the description given in the next few pages.

651 Theory Versus Practice

Theory has started influencing practice. Theory is also beginning to keep ahead of practice. This will enable designers of schemes for classification to produce schemes for library classification, which are in a better position to meet the onslaught of knowledge.

652 Methodology for Designing of Schemes for Classification

The dynamic theory has provided a methodology for the designing of schemes for library classification. This methodology has enabled classificationists and classifiers to organize new subjects, as well as already known subjects, in their proper places in the helpful sequence. This methodology is based on the scientific method. Attempts are being made to make the design more and more amenable to the scientific method.

653 Scientific Method

There is a demarcation of work of design into three planes (idea plane, verbal plane and notational plane). It has also been accepted that the idea plane is paramount and the finding of the idea plane should be put into practice at the notational plane.

A large number of postulates, principles and canons have been worked out in the field of library classification. These are consistent with the normative principles of library science. Thus, guiding principles are available for the designing and practice of classification. Earlier, guess-work was used for the designing and practice of library classification. New guiding principles have reduced the element of flair in this regard. These principles have brought objectivity in the work of a classificationist as well as a classifier, and made their work systematic. Work is still going on to improve the guiding principles.

From the above, it follows that the cycle of scientific method has been formed in library classification. Thus, designing, application and the teaching of library classification can be based on scientific method.

Therefore, this subject can be studied theoretically, with the help of normative principles and facts based on an experience which can help in its further advancement.

654 Constant Developments

The present-day theory of library classification is truly dynamic because it is being constantly improved so that it is able to meet the exacting demands made by the growing universe of subjects. The developments are taking place at a fast pace.

The first edition of Ranganathan's *Prolegomena to library classification* appeared in 1937. The second edition came out after a gap of 20 years in 1957. The third one appeared in 1967, a gap of 10 years only. This edition became out of date in some respects as soon as it came out, and there is an urgent need for revision now. This goes to show that developments are taking place faster than the revisions being carried out.

DRTC, set up in 1962, has made an important contribution to the dynamic theory of library classification. These developments are reported mainly in *Library Science with Slant to Documentation* and *Proceedings of DRTC Annual Seminar*.

7 CONCLUSION

The theory of library classification, being developed in India, has been found to be truly dynamic. It is a versatile one, found helpful in designing a scheme for library classification. It is equally helpful in practical classification.

The theory of library classification developed by the Indian school of thought, is mainly the work of S.R. Ranganathan. There is enough evidence that this theory is beginning to be recognized even outside the country. The author of this work has every hope that this theory would be carried forward by Indian librarians, especially the DRTC research team.

FURTHER READING

R.S. PARKHI, *Library classification; evolution of dynamic theory*, Delhi, Vikas, 1972, Chaps. F and J.

Chapter 6

LAW OF LIBRARY SCIENCE AND BASIC LAW

0 INTRODUCTION

The normative principles of classification have been recognized for a long time, and have proved to be highly useful. These have provided a scientific basis to the field of classification. The classificationists and classifiers have been making their use to a varying extent. These principles can serve the following purposes:

(i) They can serve as the basis of a classification scheme. As such, the schedules of a scheme should be compiled by a classificationist, keeping in view the spirit of these principles;

(ii) Critical study of a given scheme of classification can be carried out with the help of these principles;

(iii) The principles can be very helpful for the purpose of comparing schedules of different schemes of classification;

(iv) A given number can be interpreted on a scientific basis with their assistance; and

(v) Principles can provide guidance to a classifier in the day-to-day work of classification, such as creating a number for a new subject.

Ranganathan adopted a convention regarding the use of words like laws, canons and principles. These are all normative principles, used in a particular context. He has postulated these for work in different levels, as given below:

<i>Level</i>	<i>Name of Normative Principles</i>
Basic process of thinking	Basic Laws
Library Science	Fundamental Laws
Classification	Canons
Helpful sequence in array	Principles

Work of classifying

Postulates, and principles
for facet sequence

The term "basic law" is used at the level of a basic process of thinking. "Fundamental law" is applied at the level of library science as a discipline. "Canon" is used in the context of divisions of the first order of the discipline of library science, such as classification, cataloguing, book selection and so on. The term "principle" is applied in the context of divisions of the second or later order of library science, such as helpful sequence in array and facet sequence.

Ranganathan has recognized the following basic laws:

Laws of interpretation

Law of impartiality

Law of symmetry

Law of parsimony

Law of local variation

Law of osmosis

1 LAWS OF LIBRARY SCIENCE

Ranganathan's *Five laws of library science*¹ was published in 1931. Five laws of library science, and their implications, have been described in this work. These laws provide a scientific approach to library science. The spirit of these laws pervades in the writings of Ranganathan. These laws have been accepted as the basis of library science.

The laws of library science (*Prolegomena*, pp. 115-22) are specific normative principles, applicable to any problem in the fields of library science, library practice and library service. These are called the Fundamental Laws of Library Science which contain in a hidden (or latent) form, all the library practices of the past and present, and those likely to be evolved in future.

The canons and principles of classification are all an implication of the laws of library science. In the case of a conflict between canons and/or principles, an appeal is made to the five laws of library science to resolve the conflict. Thus, the five laws serve as a higher court. If there is a conflict between the canons of classification and the basic laws, then a compromise can be achieved with the aid of the laws of

¹S.R. Ranganathan, *Five laws of library science*, Madras, Madras Library Association, 1931 (the second edition was published in 1957).

library science.

The first law says: "Books are for use." The word "book" should be interpreted to stand for "document". The first law would feel satisfied if a right book and a right reader can be brought together. Take the example of the arrangement of books on shelves. These can be arranged in a variety of ways—authorwise, subjectwise and so on. The author arrangement would be useful to those users who want a book by a particular author. Similarly, the subject arrangement would be helpful to those who make a subject approach. Our experience shows that more users request for books by a particular subject than for books by a particular author. Therefore, if books are arranged according to subject, more users would find it helpful. This will lead to a greater use of books and hence satisfy the first law of library science.

The second law says: "Every reader his book." Here, the emphasis is on the reader. Our experience shows that more users request for books on a particular subject than for those by an author. Keeping in view the subject approach, it would be helpful in all the books on a given subject were brought together. This would add to their usefulness if within the subject, books were further arranged languagewise. Let the books for each language in a subject be arranged, according to their year of publication (latest books lying at the end of the group). All this would help in getting every reader his book, thereby satisfying the second law.

Most of the users are not able to pinpoint the specific subject of their interest. They are wont to name a broader or narrower subject. When a user goes to the shelves containing books, he should find the complete area of interest spread before him in a logical manner, so that he can become vaguely conscious of what he wants. The books on a topic should be found together. Books on different topics should be arranged according to their degree of filiation. This means that the arrangement on the shelf should "display the full field of a reader's interest, unexpressed as well as expressed. When he looks along the shelves of the library, he should find there what he was only vaguely conscious of wanting; indeed, it is only then that he will be able to realize exactly what it is that he wants" (*Prolegomena*, p. 120). This will lead to satisfaction—a deeper function performed by the arrangement of books. This will enable every reader to get his book.

The third law prescribes: "Every book its reader." The emphasis is on the book. Books should be arranged so that every book finds a

reader. At least the probability for getting a reader should be very high. If the books are arranged so that the subjects get arranged according to the degree of mutual relationship, then each book would have a high probability of getting its reader. This will meet the demands of third law. Incidentally, this will also satisfy the second law.

The fourth law says: "Save the time of the reader." A user must be assumed to be a busy person, and his time must be saved. The arrangement of books according to the degree of mutual relationship of subjects would lead to saving his time. In addition, if within each subject, books are arranged by language, and within language by their year of publication, then it would lead to more saving of time. It should be understood that an alphabetical arrangement of subjects will be unhelpful and time-consuming.

According to the fifth law: "A library is a growing organism." The library will grow in terms of documents, reader and staff. The arrangement should be such that it should facilitate the service of books irrespective of the size of the library or its rate of growth in terms of documents, readers and staff. The arrangement of books, suggested in the earlier paras would lead to a greater use of books, irrespective of the size of the library or its rate of growth. This satisfies the fifth law.

2 LAWS OF INTERPRETATION

Ranganathan refers to 1,008 principles of interpretation, listed in the *Nyaya kosa*. These principles are applicable in interpreting legal texts. The canons, principles, postulates and rules of classification taken together can be considered a legal document. Therefore, we should interpret various sections just like a legal text. In case of a conflict, the conflict should be resolved with the aid of the laws of interpretation. If necessary, the rules, principles and canons should also be modified (in the light of experience) to solve the conflicts.

It has been suggested by Ranganathan that *Colon classification* should be scrutinized from the angle of these laws. This will help in determining many of its weaknesses. CC could be revised to overcome these weaknesses. Similarly, the laws of interpretation can be applied in the study of other schemes also.

3 LAW OF IMPARTIALITY

The law (*Prolegomena*, p. 125) directs that between two or more claimants (e.g., for the first position among two facets of a subject or the choice to be made among the needs of different categories of users) preference should be made only on sufficient grounds, and not arbitrarily.

EXAMPLES:

(i) The law of impartiality insists that the sequence of facets in different subjects should not be determined in an arbitrary manner in each subject. The sequence should be based on some guiding principles of a general nature, equally applicable to all subjects. That is why Ranganathan has suggested the application of a wall-picture principle for facet sequence.

(ii) From the first edition, *Colon classification* has been using the digit "9" as an empty or sectorizing digit. It was only later that empty digits (z, Z) from other species of digits, such as Roman smalls and Roman caps, were employed. This has given satisfaction to the law of impartiality, as a similar thing has been done for different species of digits—that is, one digit was reserved as an empty digit in different species of digits.

(iii) In CC, from 1952 to 1963, different distinctive indicator digits were employed for personality, matter and energy facets. However, the same indicator digit was used for the space and time facets, which violated the spirit behind the law. It was in 1963 that Ranganathan decided to use distinctive symbols for space and time facets. This gave satisfaction to the law.

4 LAW OF SYMMETRY

The law prescribes (*Prolegomena*, p. 126), that of two entities or situations which admit of being regarded as symmetrical counterparts of each other, if one entity or situation is given weight in any particular context, the other entity or situation should also be given a corresponding weight.

EXAMPLES:

(i) In CC, Ranganathan allocated greater ordinal value to Roman caps than Indo-Arabic numerals. Later Roman small letters were used to represent posteriorizing common isolates. These were

given lesser ordinal value than Indo-Arabic numerals, which led to the satisfaction of the law of symmetry.

(ii) Ranganathan adopted digits 9, z and Z as empty digits for the extrapolation of isolates in an array. The law of symmetry suggested for a provision to interpolate isolates. The concept of emptying digits has enabled the interpolation of isolates in an array. This has given satisfaction to the law.

(iii) The provision of zones has provided for extrapolation at the end of an array. The law of symmetry also emphasized the making of a provision for extrapolation at the beginning of an array. This became possible due to the use of digit '0' (zero) as an empty digit.

5 LAW OF PARSIMONY

The law (*Prolegomena*, p. 127) directs that between two or more possible alternatives bearing on a particular phenomenon, the one leading to overall economy of man power, material, money and time, considered together with proper weightage, is to be preferred.

Overall economy in library classification can be achieved by making the class number as short as possible. The use of mixed notation, such as Roman caps and Arabic numerals, provided these are familiar to the users of a particular library can be helpful in reducing the load on the memory of those using class numbers. A faceted scheme consists of a set of schedules instead of a single schedule for all subjects in enumerative classification. Our experience shows that the length of schedules gets reduced in the first one, thereby satisfying the law of parsimony.

EXAMPLES:

Colon Classification employs various devices to shorten the length of the schedule of an array (such as chronological device, geographical device, subject device and so on). *Dewey decimal classification* and *Universal decimal classification* use the geographical device and the subject device to achieve the same results.

In case a collection is to be reclassified; the law of parsimony would suggest that only that part of the collection be classified which is known to be in much use, and also those documents which are returned by the users after being taken out by them from the collection.

In CC, the telescoping of array has been applied (as, for example,

in botany). Telescoping of two consecutive arrays generally leads to the saving of one digit in the class number for the class of a later order. This has been done to satisfy the law of parsimony.

The law of parsimony should be applied carefully. Its application is restricted only to alternatives bearing on a particular phenomenon. In no case should it overlook the demands of the laws of library science, or the canons of classification.

6 LAW OF LOCAL VARIATION

The law of local variation says "that in any discipline and technique there should be provision for the users of them to secure, for strictly local use, results alternative to those for general use" (*Prolegomena*, p. 129). Therefore, the law directs towards the formation of special collections of documents separate from the general collection.

In case there are alternative schemes provided as part of a published scheme for classification, then a user of the scheme can choose one of the alternatives and apply it permanently. However, such a scheme would not prove to be sound for a national bibliography or for international documentation. But provisions for a local collection to be given the first position in the sequence, and also for shorter class numbers for documents belonging to local collection, can be very useful. Such a scheme can be beneficial for a given library as well as for international documentation.

The word "local" should be interpreted broadly to refer to a geographical area, irrespective of the size—such as European interests, interests of developing countries, Indian interests, Rajasthani interests and so on. One can go on to interests peculiar to a village or of a particular library. However, special interests are largely confined to the national level, except for local collections in local libraries.

EXAMPLES FROM DDC 18:

In DDC 18, under 292-299, there is an instruction which says that "if it is desired to give local emphasis and a shorter number to a specific religion, place it first by use of a letter or other symbol, e.g., Hinduism 2HO (preceding 220), or 29H (preceding 291 or 292)" (DDC 18, v. 2, p. 588).

Under 230-280 it reads: (If it is desired to give local emphasis and more and shorter numbers to a specific religion, e.g., Buddhism,

it is optional to class it here and its sources in 220; in that case class Bible and Christianity in 298)" (DDC 18, v. 2, p. 540). Under 810, it reads: "(If it is desired to give local emphasis and a shorter number to a specific literature, e.g., Afrikaans literature, it is optional to class it here; in that case class American literature in English in 820)" (DDC 18, v. 2, p. 1497).

A note similar to the above is also available at 081–089.

EXAMPLES FROM CC:

In space isolates, digit 2 represents mother country. This leads to a shortening of the class numbers, as well as provides priority to documents concerned with the mother country. Digit 3 has been reserved for a favoured country. This digit is used to represent the locality (it may be a state, town or village etc.) of special interest, on which the library may want to set up a local collection. In the absence of a local collection, digit 3 is used to represent the favoured country (the country about which there are more documents in the library than other foreign countries).

The above usages of digits 2 and 3 will allow for local variation in most of the subjects, because space isolates occur in most of the subjects, as common isolates. It will considerably shorten the class numbers and also give priority to local collection on the shelf.

In CC6, the scheme allows for the use of the digit dash (—) for the favoured language of the library in the language facet of a class number (CC6, p. 1.54). This shortens the notation and documents belonging to the favoured language get priority over documents belonging to other languages.

In CC6, R6 represents Indian philosophy and R7 stands for Greek philosophy. These places have been allotted to two systems because there is a considerable amount of literature on these. "But it is open to libraries, whose collections are different, to use 'R6' and 'R7' for such philosophical systems as are represented most in their collections" (CC6, p. 1.111). This allows for favoured treatment to philosophical systems of local interest.

In CC6, the dash (—) has been used as the favoured focus number, it is used to denote the language isolates (for example, the English language isolate) in the basic class literature. This is used for a library specializing in a given language (for example, the English language).

A library may specialize in a given subject (such as microbiology). It would also process books on other subjects. In CC, it is possible

to give priority to the documents on the subject of specialization (called favoured host class). This is done by replacing the class number for favoured host class by the digit 0 (zero). 0 (zero) is given an ordinal value less than a. This would enable the documents dealing with the subject of specialization and its sub-divisions to obtain priority in the arrangement on a shelf.

EXAMPLES FROM BC:

In BC1, Y has been reserved for the favoured language. In BC2, at a number of places, local variation is possible. In education, it is possible to cite a country earlier than in the preferred order.

BC1 and BC2 go beyond the requirements for local variation prescribed by the principle. BC has provided alternatives.

BC1 has provided alternatives as given below:

Alternative facet formula for basic classes are provided. For example, in class JS, two alternative class numbers have been given for "Faculty of ophthalmology in the New York Medical Centre." The number may be preferred on the basis of local requirement. Alternative class numbers are provided by omitting facets. For example, under class numbers YHR, this treatment has been given to "Novels of the Bronte sisters."

Alternative numbers for certain main classes have been provided. For library science, these are 2 JV Z. For Religion, these are AJ K P Z.

Similar alternative class numbers have been provided in BC2 also.

In BC2, curriculum is denoted by two numbers—JK and JY.

Religion is denoted by two numbers—P and Z.

7 LAW OF OSMOSIS

The principle (*Prolegomena*, pp. 136-9) says that owing to the canon of context, a change in the catalogue code or the scheme of classification becomes essential; then, from a particular date, the following work should be carried out:

A (i) Catalogue and classify all newly accessioned material according to new code and new scheme;

(ii) Re-catalogue and re-classify that old collection which is known to be in much use;

(iii) Re-catalogue and re-classify, on return by readers, any book taken out by a reader from the old collection.

(B) Maintain two catalogues (old catalogue and new catalogue) and sequences on the shelf.

(C) Attention of readers should be directed by the reference librarian to the two sequences on a shelf and to two catalogues.

If a library decides to re-catalogue and re-classify the entire collection, then in most cases the cost would be enormous. Often, the necessary finance is made available for the purpose at the cost of active service of book funds. As the cost of re-cataloguing and re-classification can be very high, most of the libraries avoid it. However, the approach suggested by Ranganathan reduces the cost and makes it possible for most of the libraries to go in for re-cataloguing and re-classification, if found essential due to the direction from the canon of context.

The approach not only reduces the cost but is a practicable one, without affecting the service of the library—thus satisfying the canon of context and the law of parsimony. The basis of the method is that the old documents, which are used rarely, need not be re-classified and re-catalogued. In the beginning, there would be a great deal of extra work to be done. Therefore, extra staff would be required in initial stage. But later on, the quantum of extra work would be reduced and become less and less. The active collection would be smaller, as also its catalogue. The users would find it more convenient and helpful to use an active collection.

If the principle is followed, then the change-over will involve the least cost, man-power and time. This will also satisfy the law of parsimony. Service to users would be hampered to the least extent.

The success of the application of the law of osmosis would certainly depend upon the effectiveness of management. If the method is not implemented properly, it will lead to confusion, and affect the services. The principle is rather sound but it must be implemented with due care and proper planning.

FURTHER READING

S. R. RANGANATHAN, *Prolegomena to library classification*, 3rd ed., Bombay, Asia Publishing House, 1967, part D.

Chapter 7

CANONS FOR IDEA PLANE

0 INTRODUCTION

Ranganathan recognized three planes of work, namely, idea plane, verbal plane and notational plane. The design and application of classification schemes involves work in these three planes. Accordingly, Ranganathan formulated a separate set of canons for work at the idea, verbal and notational planes.

Canons for work at the idea plane. A scheme for classification assumes the prior concept of a scheme of classes. A scheme of classes involves five inherent concepts, as given below:

- (a) Characteristics;
- (b) Succession of characteristics;
- (c) Array of classes;
- (d) Chain of classes; and
- (e) Filiatory sequence.

All the above concepts belong essentially to the idea plane. Corresponding with these concepts, there are five sets of canons, as given below:

- (a) Canons for characteristics;
- (b) Canons for succession of characteristics;
- (c) Canons for array;
- (d) Canons for chain; and
- (e) Canons for filiation sequence.

Canons for work at the verbal plane. In addition to the five inherent concepts (above), the following two aids are necessary for working with a scheme of classes. These are (a) a set of names to denote the classes; and (b) a set of ordinal numbers to represent the classes. A scheme of classes must obviously be given names. This leads to an additional concept of terminology. The terminology of a scheme for classification is "the system of terms in a language, denoting or naming the classes of the schemes, the language being a natural one

or the jargon of a profession or trade" (*Prolegomena*, p. 72). Corresponding to terminology, we get the following canons for work at the verbal plane:

- (a) Canon of context;
- (b) Canon of enumeration;
- (c) Canon of currency; and
- (d) Canon of reticence.

Canons for work at the notational plane. In order to work with a scheme of classes, we need a set of ordinal numbers to represent classes. Each class has to be represented by an ordinal number, because we are required to mechanize the restoration of a class to its old unique position after it has been taken out of place. The idea behind mechanizing is "to eliminate the need to remember or consider the exact connotation or denotation of the classes in their mutual relation" (*Prolegomena*, p. 72). The need for a set of ordinal numbers to represent classes leads to a concept of notation.

The concept of notation leads to the notational system of a scheme for classification. A notational system is "the system of ordinal numbers representing the classes of the scheme or their components" (*Prolegomena*, p. 72).

When a scheme of classes is fitted with terminology and notation, we get a scheme for classification.

The notational system used for its classification should satisfy a certain set of canons called basic canons for notation. It should also satisfy the canons for mnemonics. An additional set of canons is required for the notational system of an ever-growing universe.

Basic canons for notation:

- (A) (a) Canon of synonym; and
- (b) Canon of homonym.
- (B) Five pairs of canons:
 - (a) Canon of relativity and canon of uniformity;
 - (b) Canon of hierarchy and canon of non-hierarchy;
 - (c) Canon of mixed notation and canon of pure notation;
 - (d) Canon of faceted notation and canon of non-faceted notation; and
 - (e) Canon of co-extensiveness and canon of under-extensiveness;

Ranganathan favoured the first canon in each of the above five pairs of canons.

Canons for mnemonics:

- (a) General canon of mnemonics;

- (b) Canon of alphabetical mnemonics;
- (c) Canon of scheduled mnemonics;
- (d) Canon of systematic mnemonics; and
- (e) Canon of seminal mnemonics;

Canons for growing universe:

- (a) Canon of extrapolation in array;
- (b) Canon interpolation in array;
- (c) Canon of extrapolation in chain; and
- (d) Canon of interpolation in chain.

Canons for book classification. Book classification deals with the classification of documents (i.e., books, periodical publications, micro-films, gramophone records and so on, having the same subject as their ultimate class. The ultimate class of the subject of a document is the class of the smallest extension, in the preferred scheme for classification in which the document can be placed (*Prolegomena*, p. 503). The problem is that documents having the same ultimate class cannot be differentiated among themselves. As such, documents cannot be arranged in a definite sequence because no further subdivision of the subject can be achieved. Therefore, the documents belonging to the same ultimate class will have to be subdivided on the basis of appropriate characteristics, other than that of subject. The name of the author or the year of publication can be used as a basis for the same. The aim should be to get a helpful sequence.

The following canons for book classification have been enumerated by Ranganathan:

- (a) Canon of book number;
- (b) Canon of collection number; and
- (c) Canon of distinctiveness.

1. CANONS FOR CHARACTERISTICS

Ranganathan recognized the following canons for characteristics:

- (i) Canon of differentiation;
- (ii) Canon of relevance;
- (iii) Canon of ascertainability; and
- (iv) Canon of permanence.

The above canons are commonsense canons. Each characteristic in an associated scheme of characteristics used in a library classification scheme should follow these canons. They are applicable to a universe of entities, a universe of basic subjects, a universe of isolate ideas, a

universe of compound isolates and a universe of complex subjects.

11 Canon of Differentiation

According to the canon of differentiation, "A characteristic used as the basis for the classification of a universe should differentiate some of its entities—that is, it should give rise at least to two classes or ranked isolates" (*Prolegomena*, p. 145).

In the universe of tables, the characteristic "height" differentiates but the characteristic "possession of table top" does not. In the universe of human beings, the characteristic "height" helps us to differentiate between them but the characteristic "possession" of head does not.

12 Canon of Relevance

The canon of relevance says, "A characteristic used as the basis for the classification of a universe should be relevant to the purpose of the classification" (*Prolegomena*, p. 146).

Let us consider the universe of girls. Suppose the purpose of classification is to divide them into graded groups for sports. Then characteristics such as colour, handwriting, wealth, colour of eyes, colour of hair and so on are irrelevant characteristics. But characteristics such as height, physical strength and age are relevant characteristics.

Let us consider the universe of books. In case a binder desires to classify, then the relevant characteristics would be the style of stitching, the types of boards used, covering materials and such. However, if a librarian wants to classify, then subject, language, author, year of publication etc., would become relevant characteristics.

The number of relevant characteristics can be large. Therefore, one would be required to make a choice. Choice should be such that the resulting scheme becomes the most helpful one. There are no *a priori* rules available for the purpose. One has to depend upon one's flair and intuition. One is able to achieve those, to a certain extent, with the help of knowledge and experience.

13 Canon of Ascertainability

The canon of ascertainability directs that "a characteristic used as the basis for the classification of a universe should be definite and ascertainable" (*Prolegomena*, p. 148).

For the classification of a universe of entities, a number of relevant characteristics may be considered for use. However, some of them

may be ascertainable, others unascertainable. The above canon insists that we should prefer definite and ascertainable characteristics. If the date of death is chosen as the characteristic to divide a group of living people, then it may not be possible to ascertain the definite dates of death. In the universe of dramatists, if the year of birth is ascertainable, it may be used to serve as the basis of classification.

14 Canon of Permanence

This canon (*Prolegomena*, p. 149) directs that a characteristic used as a basis for the classification of a universe should continue to be unchanged so long as there is no change in the purpose of classification.

Let us suppose that a scheme for classification divides periodicals into classes, such as those published by learned societies and others. The periodicals undergo frequent changes regarding the body publishing them. As a result, the kind of division mentioned above is not going to be a permanent one. A given periodical might, at one time, belong to the first group, it may later have to be shifted to the second group. This kind of classification in a library will lead to problems. Therefore, if such a characteristic is adopted, it will have to be given up, sooner or later.

In the classification of territories in a continent or a country, schemes of classification adopt political and administrative divisions as a basis. But we know that the classes based on political and administrative characteristics change their coverage from time to time. In other words, here the characteristics chosen as a basis for the classification of territories does not give a satisfactory result. What is the alternative? We may classify the territories by using physiographical features as a characteristic. This will lead to classes such as desert, forest, island, river, valley and so on. These classes are normally permanent in nature but the literary warrant on them is very small, as compared with classes obtained on the basis of political and administrative characteristics. Therefore, the canon of relevance would insist on the latter approach, violating the canon of permanence.

2 CANONS FOR SUCCESSION OF CHARACTERISTICS

According to Ranganathan, the succession of characteristics in the associated scheme of characteristics should satisfy the following three

canons:

- (i) Canon of concomitance;
- (ii) Canon of relevant succession; and
- (iii) Canon of consistent succession.

The above canons are commonsense canons. Each classification scheme should follow these canons. These canons are applicable to any universe of entities, universe of basic subjects, universe of isolate ideas, universe of compound subjects, and the universe of complex subjects.

21 Canon of Concomitance

According to the canon of concomitance, "no two characteristics in the associated scheme of characteristics should be concomitant—that is, they should not give rise to the same array of subjects or of isolate ideas" (*Prolegomena*, p. 153).

In classifying the universe of boys, we may use height and physical strength as characteristics in succession, but age and the year of birth should not be used in succession because both will lead to the same array. Therefore, two characteristics to be used in succession must give rise to two different sets of arrays.

22 Canon of Relevant Succession

According to the canon of relevant succession, "The succession of the characteristics in the associated scheme of characteristics should be relevant to the purpose of the classification" (*Prolegomena*, p. 154).

221 DDC

In main class literature, DDC has chosen, in succession, the following characteristics:

Language, form and period.

The above sequence is considered the most relevant for the purpose of classifying books because it provides the most helpful sequence of books on the shelf.

222 CC6

In CC6, the following four characteristics are used in succession in basic class literature:

Language, form, author, and work.

The above sequence is considered the most relevant for the purpose of classifying books in literature, because it provides the most helpful sequence on the shelf.

23 Canon of Consistent Succession

According to the canon of consistent succession, "the succession of the characteristics in the associated scheme of characteristics should be consistently adhered to, so long as there is no change in the purpose of the classification" (*Prolegomena*, p. 156).

Normally, the succession of characteristics decided once should be followed consistently, or things would get too chaotic. However, if the purpose of classification has changed, the succession of characteristics should also be changed to suit new requirements.

3 CANONS FOR ARRAY

According to Ranganathan, each array of classes in a scheme for classification should satisfy the following four canons:

- (i) Canon of exhaustiveness;
- (ii) Canon of exclusiveness;
- (iii) Canon of helpful sequence; and
- (iv) Canon of consistent sequence.

The above canons are applicable to classification of the universe of entities, the universe of basic subjects, the universe of isolate ideas, the universe of compound subjects and the universe of complex subjects.

31 Canon of Exhaustiveness

This canon (*Prolegomena*, p. 158) states that the classes in an array of classes, and the ranked isolates in an array of ranked isolates should be totally exhaustive of their respective common immediate universes.

311 BCI

In BCI, the canon has been satisfied in two ways. Either the classes are enumerated, or some classes are enumerated and others are covered under the residual class. For example, for special kinds of libraries are enumerated, followed by a residual class referred to as "other special kinds of libraries."

A similar approach has been adopted in varying degree, by other schemes of classification.

312 CC

CC makes provisions for enumerating any number of classes in an

array, so that the immediate universe is totally exhausted. In case new classes arise in the immediate universe, CC allows for their interpolation or extrapolation in the proper places through various notational techniques.

In CC6, in "NQ Painting," foci in [M] have been enumerated from 1 to 8, listing various surfaces, and 9 represents "other surfaces." Digit "9" stands for the residual class added at the end of the array, so as to make it totally exhaustive. However, classes do not get individualized under it. This approach was adopted by Ranganathan due to a rigidity of the notational plane, because of the availability of only a limited number of places to accommodate the classes in a given array. This device has been inherited historically. However CC6 normally avoids its use. For instance, under foci in [P] in "2 Library Science," other business libraries are obtained by means of the subject device. This makes the array totally exhaustive, and classes under it also get individualized.

313 DDC

In the 14th edition, DDC used the "other device" in the array, listing the functions of local government, so as to totally exhaust it.

However, in the 17th edition, under '352' the rigidity in the notational system caused by the "other device" was overcome partly by using the sector notation, where classes represented by 1, 2, 3, 4, 5, 6, 7, 8, 9, 92, 93, 94, 95, 96, 98 were all regarded as coordinate (97 has been left as a gap). The same approach has been continued in DDC 18.

314 LC

In general, divisions within classes are quite exhaustive, compared to other major schemes. However, compared with the unabridged edition of UDC, schedules for Q (Science) and T (Technology) are less exhaustive. But classes belonging to the humanities in general and to literature in particular are certainly more exhaustive than those in other classification schemes.

315 RIC

RIC also uses the "other device" in a few places. It has enumerated 27 religions, followed by "other religions," which is the residual class.

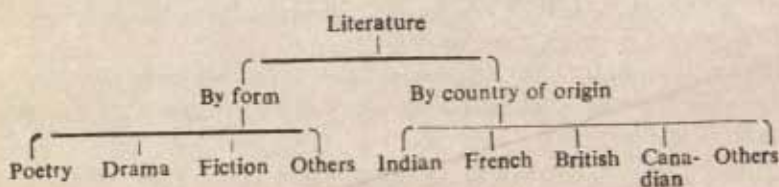
32 Canon of Exclusiveness

This canon (*Prolegomena*, p. 160) directs that the classes in an array

of classes and the ranked isolates in an array of ranked isolates should be mutually exclusive

From the above, it becomes clear that no entity belonging to an immediate universe should belong to more than one class of the array. Therefore, no two classes belonging to an array should overlap or have an entity in common. This is possible only when the classes of an array are derived from its immediate universe on the basis of one and only one characteristic.

Let us take up the subject of literature; we may divide it by means of two characteristics, such as "by form" and "by country." We shall then get the following arrays:



We get two arrays consisting of classes—poetry, drama, fiction, other forms; Indian literature, French literature, British literature, Canadian literature, and the literature of other countries. We find that poetry will occur in both arrays. This will violate the canon. The same can be said about other forms.

Most individual classes in LC are mutually exclusive—to the extent possible—within the framework of the scheme. However, some examples of cross-classification are available in the scheme. The different schemes of classification make an attempt to follow the canon.

33 Canon of Helpful Sequence

330 Introduction

According to the canon of helpful sequence, "The sequence of the classes in an array of classes, and of the ranked isolates in an array of ranked isolates, should be helpful to the purpose of those for whom it is intended" (*Prolegomena*, p. 163). This canon should be followed in each array as well as any coalesced array. A coalesced array has been defined as an "array formed by putting in succession in a single array the various arrays formed at any stage in the progressive classification, the succession of the array being such that the classes fall in filiationary sequence" (*Prolegomena*, p. 161).

What is a helpful sequence? Even within a small field, there can be various helpful sequences. What may be found to be the most helpful sequence to one category of users may turn out to be less than helpful to another category. Under these circumstances, the practical solution is to take care of the majority point of view.

Most users are not able to pinpoint the specific subject of their interest. They are wont to name a broader or narrower subject. As such, a helpful sequence should display subjects so that a user approaching the sequence from a broader or narrower angle is led, by the sequence itself, to the specific subject. The sequence will present before the users the full field of their interest spread before them in a logical manner. This will help them become vaguely conscious of their wants. This kind of approach can be satisfied by means of a pupa arrangement.

Let us examine the linear arrangement of subjects of varying degree of interest to a user at a particular point of time. Ranganathan refers to the focal point of his main interest as an umbral region. According to him, the user would "like to have fanned out on either side of the umbral region the subjects, having successively a decreasing bearing on the umbral subject. The two regions—on either side of the umbral region—may be called his penumbral regions; and the subjects in them penumbral subjects. The penumbral regions will ultimately thin out into the alien regions on either side" (*Prolegomena*, pp. 383-84). As the user examines the total region, his eyes will successively pass through the alien, the penumbral, the umbral, and again the penumbral and alien subjects. This arrangement is referred to as the pupa arrangement. The user is likely to achieve optimum satisfaction from such a sequence, which would also conform with the five laws of library science.

Bliss is of the view that the order of the subjects agreed upon by specialists and workers in their areas can be helpful in determining the most useful sequence. According to him, in order to cater to others, alternative locations and alternative schedules may be provided. In case the interests have changed, the schedules may have to be revised. In order to achieve a helpful sequence (helpful to the majority of users) in array, we can use the principles of a helpful sequence. These are described in the next few pages.

The following are the guiding principles available for the implementation of the canon of helpful sequence:

- (i) (a) Principle of later-in-time;
- (b) Principle of earlier-in-time;

- (ii) (a) Principle of later-in-evolution;
(b) Principle of earlier-in-evolution;
- (iii) Principle of spatial contiguity;
- (iv) (a) Principle of increasing quantity;
(b) Principle of decreasing quantity;
- (v) (a) Principle of increasing complexity, or principle of decreasing simplicity;
(b) Principle of decreasing complexity, or principle of increasing simplicity;
- (vi) Principle of traditional or canonical sequence;
- (vii) (a) Principle of decreasing literary warrant;
(a) Principle of increasing literary warrant;
- (viii) Principle of alphabetical sequence.

The above principles lead to the following sequences:

- (i) Time sequence;
- (ii) Evolutionary sequence;
- (iii) Spatial sequence;
- (iv) Quantitative measures sequence;
- (v) Complexity sequence;
- (vi) Traditional or Canonical sequence;
- (vii) Literary-warrant sequence; and
- (viii) Alphabetical sequence.

In addition to the above-mentioned guiding principles, Neelameghan¹ has mentioned the following additional principles:

- (i) (a) Principle of increasing concreteness (or pure discipline applied discipline sequence), or principle of decreasing abstractness (or applied discipline-pure discipline sequence);
(b) Principle of decreasing concreteness, or principle of increasing abstractness;
- (ii) (a) Principle of decreasing extension, or principle of increasing intension;
(b) Principle of increasing extension, or principle of decreasing intension;
- (iii) (a) Principle of developmental sequence; and
(b) Principle of reverse of developmental sequence;
- (iv) (a) Principle of increasing artificiality, or principle of decreasing naturalness; and
(b) Principle of decreasing artificiality or principle of increas-

¹A. Neelameghan, "Basic subjects and their arrangement: A summary," *Library Science*, 10, 1973, pp. 211-14.

- ing naturalness and
- (v) (a) Wall-picture principle;
 - (b) Act-and-action-actor-tool principle;
 - (c) Whole-organ principle and
 - (d) Cow-calf principle.

The additional principles lead to the following sequences:

- (i) Concreteness-abstractness sequence;
- (ii) Extension-intension sequence;
- (iii) Developmental sequence;
- (iv) Naturalness-artificiality sequence; and
- (v) Dependency sequence.

Many of the principles given above have been mentioned as pairs of opposites. Usually, the one mentioned first in the pair is used in practice. But there are few instances where the latter (opposite principle) one may lead to a more helpful sequence. The choice of a principle would depend upon the question of helpfulness. It may be noted that all the guiding principles (except the principle of alphabetical sequence) lead to systematic mnemonics. The principle of alphabetic sequence would result in alphabetical mnemonics.

In the next few pages, an attempt will be made to explain the application of these guiding principles by means of examples. (The examples are taken mainly from *Prolegomena*).

331 Time Sequence

According to the principle of later-in-time, "if the subjects in an array of subjects or the isolates in an array of isolates have originated in different times, they should be arranged in a parallel progressive time sequence, except when any other overwhelming consideration rules it out" (*Prolegomena*, p. 184). Between principle of later-in-time and principle of earlier-in-time, preference is usually given to the first one.

In CC, the chronological device automatically satisfies the principle of later-in-time.

EXAMPLES:

Subject	DDC (18th edition)	UDC	LC	CC (6th edition)	BCI	RIC
Stratigraphy	551.7	551.7	QE724/760	H5	DI-DJ	QT
Archeozoic	551.712	551.71	QE724	H51	DII	QTB

Primary	551.72- 551.75	551.73	QE725	H52	DIM	QTC
Secondary	551.76- 551.77	551.76	QE731	H53	DJA	QTJ
Tertiary	551.78	551.78	QE735	H54	DJN	QTN
Quaternary	551.79	551.79	QE741	H55	DJT	QTR

The above example shows that the principle of later-in-time is satisfied by the six schemes in the subject of stratigraphy.

<i>Subject</i>	<i>DDC (18th edition)</i>	<i>UDC</i>	<i>CC (6th edition)</i>	<i>BCI</i>	<i>RIC</i>
Religion	200	2	Q	P	C
Vedic	294.1	294.11	Q1	PIA	CWA
Post-Vedic	294.5	294.2	Q2	—	—
Jainism	294.4	294.35	Q3	PIV	CWN
Buddhism	294.3	294.3	Q4	PL	CX
Judaism	296	296	Q5	PL	CT
Christianity	280/289	22/28	Q6	PM/PV	CE/CS
Islam	297	297	Q7	PK	CU

CC fully satisfies the principle of later-in-time. BCI has placed Islam before Judaism. DDC, UDC and RIC have placed Christianity first, rendering favoured treatment. DDC, RIC and UDC have violated the principle with regard to religions of Indian origin.

332 Evolutionary Sequence

The principle of later-in-evolution directs that "if the subjects in an array of subjects or the isolates in an array of isolates belong to different stages of evolution, they should be arranged parallel to the evolutionary sequence, except when any other overwhelming consideration rules it out" (*Prolegomena*, p. 185). Between the principle of later-in-evolution and principle of earlier-in-evolution, preference is usually given to the former principle.

The later-in-time or earlier-in-time sequence is applied when events have occurred at different times and there may be no relationship.

But in the evolutionary sequence, events evolve one from the other (the one being dependent on the other).

<i>Subject</i>	<i>DDC (18th edition)</i>	<i>UDC</i>	<i>LC</i>	<i>CC (6th edition)</i>	<i>BCI</i>	<i>RIC</i>
Botany	581	58	QK	I	F	TJ
Thallophyta	589	582.22	QK564/635	12	FLA	TJK
Bryophyta	588	582.32	QK534/563	13	FMB	TJG
Pteridophyta	587	582.35	QK520/532	14	FMJ	TJB
Gymnosperm	585	582.42	QK495.G9	16	FNA	TFJ
Monocotyledon	584	582.52	QK643.M7	17	FT	TI
Dicotyledon	583	582.61	QK642.D7	18	FOE	TG/TH

DDC, UDC and CC satisfy the principle of later-in-evolution completely. Other schemes nearly conform to the principle.

<i>Subject</i>	<i>DDC (18th edition)</i>	<i>UDC</i>	<i>LC</i>	<i>CC (6th edition)</i>	<i>BCI</i>	<i>RIC</i>
Zoology	591	59	QL	K	G	TM
Protozoa	593.1	593.1	QL336 etc.	K2	GLB	TOB
Porefera	593.4	593.4	QL371 etc.	K3	GLU	TOK
Coelenterata	593.5	593.5/8	QL375 etc.	K4	GM	TOL
Echinodermata	593.9	593.9	QL381 etc.	K5	GT	TOQ
Vermes	595.1	—	QL386 etc.	K6	GN	TQ
Mollusca	594	594.1/.5	QL401 etc.	K7	GS	TP
Arthropoda	595.2	595.2	QL403 etc.	K8	GP	—
Prochordata	596	596	QL610 etc.	K91	GUA	TQT
Pisces	597	597	QL619 etc.	K92	GVI	TSA
Amphibia	597.6	597.6	QL668 etc.	K93	GWA	TSP
Reptilia	598.1	598.1	QL666 etc.	K94	GWL	TST
Aves	598.2	598.2	QL671 etc.	K96	GX	TT
Mammalia	599	599	QL700 etc.	K97	TY	TU

In the above table, all schemes of classification nearly conform to the principle, thus satisfying the canon.

<i>Subject</i>	<i>DDC (18th edition)</i>	<i>UDC</i>	<i>LC</i>	<i>CC (6th edition)</i>	<i>BCI</i>	<i>RIC</i>
Medicine	610	61	R	L	HM	U
Embryo	612.64	611.013	RG600 etc.	L9B	EE	UDR
Child	618.92	616-053.2	RJ	L9C	HU	UOU
Adolescent	—	—	—	L9D	—	—
Old	618.97	616-053.9	RC952/954	L9E	HPPR	UOR

BCI and RIC have violated the principle of later-in-evolution.

<i>Subject</i>	<i>DDC (18th edition)</i>	<i>UDC</i>	<i>LC</i>	<i>CC (6th edition)</i>	<i>BCI</i>	<i>RIC</i>
Political Science	320	32	JC	W	R	M
Anarchy	321.07	335.8	—	W1	—	—
Primitive	321.12	321.2	JC(369)/(392)	W2	RBF	MAK
Feudal	321.3	321.3	JC101	W3	RBM	MAL
Monarchy	321.6	321.61	JC374/393	W4	RBG	MAS
Oligarchy	321.5	321.5	JC419	W5	RBL	MAM
Democracy	321.8	321.7	JC421/458	W6	RBC	MAW

333 *Spatial Sequence*

CC has made an attempt to follow the principle of spatial contiguity. According to it, "If the subjects in array of subjects or the isolates in array of isolates occur contiguously in space—roughly—along a unidirectional line or a radial line, or a circle—they should be arranged on a parallel spatial sequence, except when any other overwhelming consideration rules it out" (*Prolegomena*, p. 187).

The above principle is a bundle of principles, as listed below:

- (a) Entities along a vertical line :
 - (i) Principle of bottom-upwards and
 - (ii) Principle of top-upwards;
- (b) Entities along a horizontal line:
 - (i) Principle of left-to-right;
 - (ii) Principle of right-to-left;

- (iii) Principle of back-to-front and
- (iv) Principle of front-to-back;
- (c) Entities along a circular line:
 - (i) Principle of clockwise direction and
 - (ii) Principle of anti-clockwise direction;
- (d) Entities along a radial line:
 - (i) Principle of periphery to centre and
 - (ii) Principle of centre to periphery;
- (e) Distance from a point:
 - (i) Principle of away-from-position or increasing distance and
 - (ii) Principle of decreasing distance, and
- (f) Geographical contiguity.

Note : (i) There are six groups of principles belonging to the principle of spatial contiguity. It will be noted that principles occur in antithetic pairs (for example the principle of clockwise direction and the principle of anti-clockwise direction). A choice will have to be made between a pair, one of which may be found applicable. The choice will depend upon the context. However, if in an antithetic pair both are equally helpful, either may be chosen. (In such a choice, the canon of consistent sequence should be respected.)

(ii) In the above list, the principles listed under (b) (iii), (b) (iv), (e) (ii) were added later; therefore, these are not listed in the *Prolegomena*.

EXAMPLES:

<i>Subject</i>	<i>DDC (18th edition)</i>	<i>LC</i>	<i>CC (6th edition)</i>	<i>CC7th edition)</i>	<i>BCI</i>	<i>RIC</i>
Architecture building	721	NA2835	NA2	NA 2	V	WC
Foundation	721.1	—	—	NA,2,1	—	WCN
Structural frame	—	NA2940	—	NA,2,2	VDC	WCO
Floor	721.6	NA2970	NA2,3	NA,2,3	—	WCS
Greenwall	—	—	NA2 41	NA,2,4	—	—
Room	—	—	—	NA,2,5	—	—
Roof	721.5	NA2900 etc.	NA2,6	NA2,6	VDF	WCQ

Any building is three-dimensional therefore, the spatial sequence of the parts of a building may be considered from bottom upwards. CC and BCI seem to satisfy the canon. It is not clear as to why LC, DDC, RIC have placed roof before floor.

<i>Subject</i>	<i>DDC (18th edition)</i>	<i>UDC</i>	<i>LC</i>	<i>CC (6th edition)</i>	<i>BCI</i>	<i>RIC</i>
Botany	581	510	QK	I	F	TD
Root	581.498	581.43	QK644	I,13	FCA	TDJ
Stem	581.495	581.44	QK646	I,14	FCF8	TDK
Leaf	581.497	581.45	QK649	I,15	FCL	TDL
Flower	—	581.45	QK653	I,16	FCP	TDH
Fruit	—	581.47	QK660	I,17	FCU	TDH
Seed	—	581.48	QK661	I,178	FCV	TDH

UDC, LC and CC have arranged the array of isolates along a vertical line, starting from bottom upwards.

334 Quantitative Measure Sequence

The principle of increasing quantity says that, "If the subjects in an array of subjects or the isolates in an array of isolates admit of quantitative distinction, they may be arranged according to their increasing quantity, if it is helpful" (*Prolegomena*, p. 192).

Similarly, the principle of decreasing quantity directs that, "If the subjects in an array of subjects or the isolates in an array of isolates admit of quantitative distinction, they may be arranged according to their decreasing quantity, if it is helpful" (*Prolegomena*, p. 192).

Between the two principles, that principle should be chosen which leads to a more helpful sequence.

<i>Subject</i>	<i>DDC (18th edn.)</i>	<i>UDC</i>	<i>CC (6th edition)</i>
Town planning	711.4	711.43	NB
Village	711.43	711.437	NB,1
Town	711.43	711.434	NB, 3
City	711.43	711.433	NB, 5
Metropolis	711.43	711.432	NB, 7

UDC follows the sequence of decreasing quantity. CC follows the sequence of increasing quantity.

CC (6th edition) arranges libraries in the decreasing quantity sequence, such as world library, national library, regional library, constituent state library, district library and city library, to take an example. In UDC, under tax and rate-supported libraries, we get libraries arranged by increasing quantity, such as municipal library, regional library and state library.

CC (6th edition) arranges the universe of Geometry on the basis of increasing quantity, the order being line, plane, three dimensions, four dimensions, five dimensions and n dimensions.

335 Complexity Sequence

According to the principle of increasing complexity, "If the subjects in an array of subjects or the isolates in an array of isolates show different degrees of complexity, they should be arranged parallel to the sequence of increasing complexity except when any other overwhelming consideration rules it out" (*Prolegomena*, p. 193). Similarly, we have the principle of decreasing complexity. Out of both one will be chosen, which would provide a more helpful sequence.

EXAMPLE:

Subject	DDC (18th edition)	UDC	LC	CC (6th edition)	CC (7th edn.	BCI	RIC
Psychology	150	159.9	BF	S	S	I	BJ
Perception	152.1	159.937	BF211 etc.	S:2	S:2	ICR	BKA
Consciousness	152.3	—	BF 311 etc.	S:3	S:3	ICA	BKK
Cognition	153	159.95	BF 365	S:4	S:4	IFR	BKJ
Emotion	152.4	159.942	BF 511 etc.	S:52	S:52	ID	BLJ
Conation	153.8	159.943	BF 698 etc.	S:6	S:6	IEV	BLF
Personality	153.9	—	BF 698	S:7	S:7	IG	BLN
Metapsychology	154	159.56	BF1001 etc.	S:8	S:8	ION	BQ

The above table shows that the schemes differ with regard to their understanding of increasing complexity.

In the basic subject of linguistics, CC (6th edition) arranges the elements in the order of increasing complexity, such as isolates sound, syllable, word, phrase, clause, sentence, piece of composition and reader.

In the basic subject of geography, CC (6th edition) arranges the subjects in the order of increasing complexity, such as mathematical geography, physical geography, anthro-po-geography, political geography and economic geography, thereby satisfying the canon.

336 Traditional or Canonical Sequence

According to the principle of the traditional or canonical sequence, "If the subjects in an array of subjects or the isolates in an array of isolates are traditionally referred to in a specific sequence, although no underlying principle is discoverable, it will be convenient to conform to this traditional sequence" (*Prolegomena*, p. 194).

EXAMPLES FROM CC:

The sequence of groups of primary basic subjects into the natural sciences group, the social sciences group and the humanities group.

The division of mathematics into arithmetic, algebra, analysis, other methods, trigonometry, geometry, mechanics and astronomy.

The division of forms of literature into poetry, drama, fiction and so on.

EXAMPLES FROM DDC:

Divisions of law, such as international law, constitutional law, criminal law, martial law, private law and church law.

337 Literary Warrant Sequence

The principle of literary warrant (*Prolegomena*, p. 196) directs that the subjects in an array of subjects or the isolates in an array of isolates may be arranged in the sequence of the decreasing quantity of the documents published or anticipated to be published on them, except when any other overwhelming consideration rules it out.

The term "literary warrant" was introduced by E. Wyndham Hulme.² The principle has to be applied carefully, and requires sound

²E. Wyndham Hulme, "Principles of book classification," *Lib. Assoc. Rec.* v, 13-14, 1911-12 (also printed as AAL reprint no. 1).

judgement. In a scheme prepared for a local library, the literary warrant would be interpreted in terms of the quantity of documents likely to be acquired by it. In an international scheme for classification, the above principle should be put into practice without any bias to the country where the scheme may have originated.

CC, DDC, RIC and UDC have applied the principle of literary warrant in the arrangement of crops under the subject of agriculture. CC conforms to the principle better than the other schemes. In DDC and UDC, rice has been placed right at the end, which can be considered as a violation of the principle (*see table 7.1*) (*Prolegomena*, p. 196).

338 Alphabetical Sequence

The principle of alphabetical sequence (*Prolegomena*, p. 197) directs that when no other sequence of the subjects in an array of subjects, or of the isolates in an array of isolates is more helpful, they may be arranged alphabetically, by their names current in international usage.

TABLE 7.1
AGRICULTURE

<i>Plant</i>	<i>CC6</i>	<i>DDC</i>	<i>RIC</i>	<i>UDC</i>
Seed as food	J38	633.1	VDO	633.1
Rice	J381	633.18	VDP	633.18
Wheat	J382	633.11	VDS	633.11
Oat	J383	633.13	VDQ	633.13
Rye	J384	633.14	VDR	633.14
Corn	J385	633.15	VDT	633.15
Barley	J386	633.16	VDU	633.16
Millet	J387	633.17	VDU	633.17

Experience shows that, generally speaking, the alphabetical sequence is not helpful. Therefore, this principle is applied only when no other sequence is considered to be more helpful. Under such a situation, the law of parsimony would also recommend an alphabetical sequence.

3391 Concreteness-abstractness Sequence

The principle of increasing concreteness or decreasing abstractness has been applied in CC to arrange primary basic subjects belonging to natural sciences. Compound basic subjects (specials, environment-ed, systems) here also have been arranged in the increasing concreteness sequence.

The opposite of the above principle is the principle of decreasing concreteness, or principle of increasing abstractness.

3392 Extension—Intension Sequence

The principle of decreasing extension (or principle of increasing intension) has been employed in CC7 to decide the sequence between a primary basic subject and the set of secondary basic subjects derived from it. The principle of increasing extension (or principle of decreasing intension) is the opposite one.

The subjects vary a great deal in their scope. Such a variation is denoted by the terms extension and intension of the subject.

A wide subject possesses great extension because it would extend over a broad area of knowledge. Experience shows that broader the subject, lesser we would know about the detailed contents of the subject and thus we might say that it would have little intension. For example, a subject like natural science would cover a wide variety of subjects extending over a wide area of knowledge but would tell us little about the subjects covered under it except that these are concerned with science of nature. Thus this subject has great extension but small intension. A subject like chemistry has great extension and small intension. However, compared with natural science, it has lesser extension (it covers narrower subject) but has greater intension (We can infer more about its contents, as we know that it deals with properties of substances, as well as of the laws of their combination and action of one upon another). Similarly, we can continue such an examination of subjects of later order.

3393 Development Sequence

The development sequence is used when there are different stages in the development of an entity. The principle of developmental sequence has been employed by CC in arranging specials compound basic subjects. The opposite principle is called the principle of reverse of developmental sequence.

3396 *Naturalness—Artificiality Sequence*

The principle of increasing artificiality (or principle of decreasing naturalness) has been applied in CC to arrange primary basic subjects in social sciences and the humanities. The opposite principle has been called the principle of decreasing artificiality (or principle of increasing naturalness).

3395 *Dependency Sequence*

The wall-picture principle, the act-and-action-actor-tool principle, the whole organ principle and the cow-calf principle help in determining the dependency sequence. However, it may be kept in mind that these principles are generally applied for determining the sequence among facets. It is only rarely that they are found to be helpful in determining the order of ideas in a coordinate array. One such application is towards finding out the sequence among special compound basic subjects. In this case, the principles are applied to determine the sequence of the relevant speciators.

3396 *Choice of Principle*

In order to arrange a universe of entities in a helpful sequence. It is important to first examine the attributes of entities. Choose that attribute as the basis for arrangement, which provides an arrangement of the entities to give maximum satisfaction to the majority of the users using the particular scheme. Next, choose a suitable principle out of the "principles for the helpful sequence", to get a consistent sequence. The basic laws of thought or general normative principles (such as the law of impartiality, the law of symmetry, the laws of interpretation, the law of local variation and the law of parsimony and so on) provide help in the choice of a right principle, keeping in view the relevant attributes.

34 *Canon of Consistent Sequence*

According to the canon of consistent sequence, "whatever similar classes or ranked isolates occur in different arrays, their sequence should be parallel in all such arrays, whatever insistence on such a parallelism does not run counter to other more important requirements" (*Prolegomena*, p. 164). In order to satisfy this canon, some schemes have adopted certain practices and devices.

The advantages that can be had with the application of this canon are: it leads to economy of time and mental effort and it minimizes the load on memory of a classifier, as well as a user.

The consistent sequence can be achieved in the following ways:

(i) The same schedule may be used to form an array in any subject, where required. This can be done with the aid of schedules of common isolates or other devices. This leads to an automatic conformity of the canon.

(ii) By means of the principles for helpful sequence, a parallel sequence can be obtained in different arrays. This leads to a consistent sequence.

341 *Devices*

DDC18 has made a provision for standard subdivisions, areas table and languages table. These lead to the repetition of a pattern. The instruction "add. . ." helps in achieving a consistent sequence. Under 016, it says "Add 001-999 to base number 016. e.g., bibliographies of astronomy 016.52." The provision for this kind of instruction is available in many places in the schedules.

UDC has made provision for tables of the common auxiliaries. Their application leads to the satisfaction of the canon. In addition, UDC uses devices to obtain a consistent sequence. For example, under 623-2 damage, injury and disease to field crops, it instructs "As 632." This means that the first number should be subdivided on the basis of the latter number.

LC usually violates the canon.

CC6 has made provision for common isolates, which lead to a consistent sequence. CC6 also uses a large number of devices which lead to a consistent sequence.

342 *Parallel Sequence*

The principles for helpful sequence help in obtaining the parallel sequence in different arrays. Out of different schemes, CC has made a conscious attempt to obtain a parallel sequence of isolates or subjects. Other schemes have also achieved a parallel sequence in different schedules, but this has often been done in an unconscious approach.

EXAMPLE FROM DDC 17:

Human anatomy

Eye

Ear

Olfactory organs

Gustatory organs

Human physiology

Eye and vision

Ear and hearing

Olfactory organs and olfaction

Gustatory organs and gustation

Tactile organs	Other sense organs and sensory functions
LC does not provide parallel sequence in different arrays.	
EXAMPLE FROM UDC:	
Systematic anatomy	Special physiology
Circulatory system	Blood and circulation
Respiratory system	Respiration
Alimentary system. Digestive system	Digestion and nutrition
Nervous system. Sense organs	Nervous system. Sense organs
EXAMPLES FROM CC6:	
Psychology	Education
Child	Pre-secondary
Pre-adolescent	Secondary
Adolescent	Adult
Post-adolescent	Literate
Sex	Sex
Male	Male
Female	Female
Medicine	Biology
Preliminaries	Preliminaries
Morphology	Morphology
Physiology	Physiology
Disease	Pathology
Public health and hygiene	Ecology

A few examples have been given above to illustrate the application of the canon. A large number of examples can be provided to show the indifference of some of the schemes to a consistent sequence in many places in their schedules. This is especially true of LC.

4 CANONS FOR CHAIN

According to Ranganathan, each chain of classes or of ranked isolates in a classification scheme should meet the requirements of the following canons:

- (i) Canon of decreasing extension; and
- (ii) Canon of modulation.

The above canons are applicable to the classification of entities, the universe of basic subjects, the universe of isolate ideas, the universe of compound subjects, and the universe of complex subjects.

41 Canon of Decreasing Extension

Canon of decreasing extension says, "While moving down a chain from its first link to its last, the extension of the classes or of the ranked isolates, as the case may be, should decrease and the intension should increase at each step" (*Prolegomena*, p. 174).

The words "extension" and "intension" need some explanation. Extension measures the number of entities or the range concerning a class or ranked isolate. Intension refers to the number of characteristics used to derive a class or a ranked isolate from the original universe. This measure (intension) corresponds to the order of the class of ranked isolate. In this sense, extension is a quantitative measure of a class or ranked isolate. Similarly, intension is a qualitative measure.

A basic class covers a wide field of study dealing with a large number of entities. Its range is called extension. The broader the class, the fewer would be the characteristics that can be predicated of it. But if the class is small in range, the number of characteristics that can be predicated of it would increase. This means that the greater the extension, the smaller the intension. Similarly, the lesser the extension, the greater is the intension. Library science has greater extension but small intension. Classification has lesser extension but greater intension.

EXAMPLE:

Serial Number	Chain	Comments
1	Literature English literature English drama Othello (a play by Shakespeare)	The four items represent a chain. As we go from the first to the fourth item, the number of entities in each ranked isolate keeps decreasing, but the number of characteristics used to derive it from the original universe of literature keeps increasing.
2	World Asia India Haryana Ambala district Ambala city	The six items represent a chain. As we move from the first to the last item, the area comprised in the ranked isolate keeps decreasing but its order keeps increasing.

It may be kept in mind that this canon is applicable to classes or the ranked isolates within the same chain. Therefore, the extensions of

classes or ranked isolates occurring in different chains can be compared.

42 Canon of Modulation

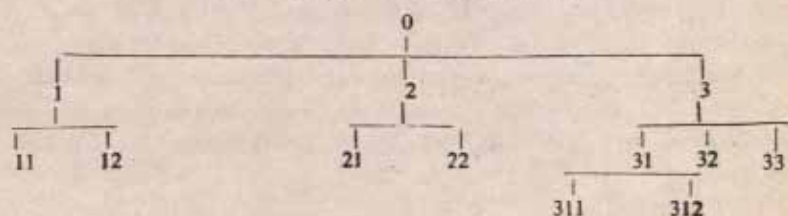
According to Ranganathan, "A chain of classes or of ranked isolates should comprise one class or one ranked isolate, as the case may be, of each and every order that lies between the orders of the first link and the last link of the chain" (*Prolegomena*, p. 176). The canon has also been defined in terms of the concept of resolving power. Accordingly, it says that "a chain of classes or of ranked isolates should be derived from the immediate universe with the use of the lowest resolving power at each stage of division." Here, resolving power refers to the "power of recognising the classes or the ranked isolates appropriate to the array of the first order of an immediate universe" (*Prolegomena*, p. 176).

LC follows the canon in most cases. As LC is not hierarchical, its steps are therefore proximate.

5 CANONS FOR FILIATORY SEQUENCE

Canons for filiation sequence refer to canons which meet the requirements of coordinate classes and subordinate classes. Thus, we have the canon for coordinate classes and the canon for subordinate classes.

51 Canon for Subordinate Classes



Let us denote "original universe" by classes 0 (array of order 0). Class 1, Class 2 and Class 3 belong to the array of Order 1, and Sub-classes 11, 12, 21, 22, 31, 32 and 33 belong to the array of Order 2. A coalesced array would consist of classes in the order of 1, 11, 12, 2, 21, 22, 3, 31, 311, 312, 32 and 33.

In a coalesced array, according to the canon of subordinate classes, if 31, 311 and so on are the sub-classes of 3, originating in one or other of the chains from Class 3, then Classes 31 and 311 should immediately follow Class 3.

52 Canon for Coordinate Classes

If, in a coalesced array, Classes 31, 32, and 33 had originated in one and the same array and had been consecutive in it, then these should not be separated from each other by any class other than Classes 311, 312 and so on, having 31 as their common immediate universe.

FURTHER READINGS

- A. NEELAMEGHAN, "Basic subjects and their arrangement: A summary," *Library Science*, 10, 1973, paper N.
 S.R. RANGANATHAN, *Prolegomena to library classification*, 3rd ed., Bombay, Asia Publishing House, 1967, part E,F.

Chapter 8

CANONS FOR VERBAL PLANE

0 INTRODUCTION

Terminology denotes a system of terms used to name the classes or ranked isolates in a scheme of classification.

Natural language is imperfect. There is a great deal of vagueness in the meaning of ordinary words used in everyday conversation. There is also the incidence of homonyms and synonyms. New terms appear from time to time. These may be used to express new ideas, or at times old ones. The meaning of a new term often keeps changing till the term is fully accepted in the concerned subject. In order to avoid this problem, a need is felt to establish a glossary of standard technical terms for each subject.

Classifiers are concerned with the application of schemes. Classificationists and revisers of schemes are another set of people, who are our concern here. Both categories of people must follow the canons for work at the verbal plane. Classifiers would find these useful in interpreting the terms in the schedule at the time of classifying documents. These canons must be followed by those engaged in the designing and construction of the schedules of a scheme.

Ranganathan formulated the following canons for work at the verbal plane:

Canon of context,

Canon of enumeration,

Canon of currency,

Canon of reticence,

1 CANON OF CONTEXT

According to the canon, "The denotation of a term in a scheme for classification should be determined in the light of the different classes

or ranked isolated of lower order (upper links) belonging to the same primary chain as the class or the ranked isolate denoted by the term in question" (*Prolegomena*, p. 208). The problem arises due to the occurrence of homonyms. A given term may denote different entities in popular and technical usage. A person learning the subject of classification should give due attention to this canon in the application of a scheme.

The terms disease, physiology, ecology, gold, foundation and so on can occur in different subjects. That is, each of these terms can occur in many subjects. In deciding the class number of a book, one should keep in view the context in which the term—say disease—has been used in the book. The context in the use of the term in the book should coincide with the context in which the same term has been used in the schedule chosen for assigning the class number.

The canon of context directs that a classificationist should not repeat any or all of the upper links, along with a lower link, in the designing of a schedule. This is illustrated by an example from CC6:

C5 Radiation
Foci in [P]

- | | |
|----|--------|
| 1 | Light |
| 12 | Red |
| 13 | Orange |
| 14 | Green |
| 15 | Blue |

In case the upper links are not repeated, will be able to achieve an economy in the schedules—thus satisfying the law of parsimony. CC satisfies this law generally. Schemes such as DDC and UDC have tried to follow the canon. DDC18 has applied the canon and thus succeeded in achieving improvement over the previous editions in this respect.

2 CANON OF ENUMERATION

The canon of enumeration says that, "The denotation of a term in a scheme for classification should be determined and should be left to be determined in the light of or through the sub-classes or ranked isolates (lower links) enumerated in the various chains having the class or ranked isolate, as the case may be, denoted by the term in question as their common link" (*Prolegomena*, p. 211).

As it is not possible to achieve an agreement regarding the deno-

tation of terms, a user of a scheme should determine the denotation of a given term in a scheme by means of reference to "each class or ranked isolate and the chains of sub-classes or ranked isolates shown in the scheme to be comprehended by it."

Therefore, it may be pointed out that the denotation of a term might vary from scheme to scheme, but the user of a scheme should try to use the canon of enumeration to determine the denotation. The schedules of two or more schemes can be examined in the light of the canon. This will indicate the weaknesses and strengths of the schedules.

3 CANON OF CURRENCY

The canon of currency directs that "the term used to denote a class or ranked isolate in a scheme for classification should be the one current among those specialising in the subject-field covered by the scheme" (*Prolegomena*, p. 214).

In the light of the canon, we may conclude that the terms used in a scheme being designed should be current ones. Whenever a term becomes obsolete, in a scheme already in use, it should be replaced by a current one. In order to achieve the second aspect, the schedules of a scheme should be revised constantly. In an enumerative scheme, compound subjects would be enumerated. On the other hand, in a freely faceted classification, fundamental constituent terms would be enumerated. The frequency of change in terms in fundamental constituent terms is less than in that of compound subjects. Therefore, the pressure of changing obsolete terms would be higher in enumerative schemes than in a freely faceted scheme (or even in any faceted scheme).

This canon also has impact on a library catalogue. The subject headings in a catalogue must be revised constantly, and also necessary references provided.

4 CANON OF RETICENCE

The canon of reticence directs that "the terms used to denote a class or a ranked isolate in a scheme for classification should not be critical—that is, express any opinion of the classificationist" (*Prolegomena*, p. 216).

In earlier editions DDC used the term "minor authors." A person may today be considered a minor author, but he may tomorrow be

recognized as a major author. The scheme would then have to change the terminology, and also reallocate the class number. Fortunately, DDC abandoned this term from 15th edition onwards.

FURTHER READINGS

- S.R. RANGATHAN, *Prolegomena to library classification*, 3rd ed., Bombay, Asia Publishing House, 1967, part G.
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Chapter 9

NOTATIONAL SYSTEM

1 NOTATION

11 Definition

E.C. Richardson defines notation as "a shorthand sign." This is a conventional definition, which is not adequate. Bliss has given another definition. According to him, "A notation is a symbol of marks or symbols in some order, denoting terms or members of a series or system of things." This is a general definition of notation. Ranganathan has defined the term in the context of classification. He says that notation is "a number forming a member of a notational system." Further, he adds that the notational system is a "system of ordinal numbers used to represent the classes in a scheme for classification" (*Prolegomena*, p. 232).

12 Importance

Notation is used in everyday life for the sake of convenience. It is used in different subjects for a variety of purposes. In an ordinary composition, punctuation marks (such as . : , ;) indicate the long or short pauses. In mathematics, figures and symbols indicate terms, quantity and measures. Similarly, in chemistry, symbols are used for a variety of purposes. They may be employed to indicate different chemicals, chemical reactions and so on.

In library classification, notation is essential for the classification of documents. Here notation serves as a symbol for terms. It is certainly important in the context of library classification, but not more important than the terms themselves.

A study of literature on library classification shows that since 1876, classificationists and classifiers have paid too much attention to notation. There have been too many controversies about notational systems of different schemes, to the extent that it would seem as if notation was the only area of study which mattered in the field of classification. Therefore, Bliss has rightly pointed out that "libra-

rains have been so accustomed to seeing notation come first in the schedules and on catalog-cards that they are prone to think of notation as the thing of first importance; but the truth is that the classification is the main thing, and that the notation, however real its service, does not make the classification though it may mar it."¹ Due to the above reasons, the basic questions concerning the theory of library classification were not paid enough attention, which thus impeded the growth and development of library classification.

13 Need

According to Ranganathan, notation is "a number forming a member of a notational system." We are interested in the universe of subjects, and we want to arrange it in a helpful filiationary sequence on the basis of a scheme of successive characteristics. There is also need to mechanize the arrangement. This can be achieved with the help of a notational system. However, alphabetical sequence is unhelpful for this purpose.

The alphabetical sequence is unhelpful for the following reasons:

- (i) It leads to an unhelpful sequence, resulting in the alphabetical scattering of documents on related subjects;
- (ii) The names of subjects are unstable;
- (iii) The names of subjects are not unique due to synonyms and homonyms; and
- (iv) The names of subjects are different in different languages. These give different sequences in different languages.

14 Species of Digits

The following species of digits that can be employed in a notational system:

- (i) Arabic numerals,
- (ii) Roman caps, Roman smalls,
Greek letters,
Sanskrit alphabets etc.
- (iii) Punctuation marks,
- (iv) Mathematical symbols.

DDC uses the following species of digits:

Arabic numerals, dot (Roman alphabets are allowed to be used, if desired).

¹H.E. Bliss, *Organization of knowledge in libraries and the subject approach to books*, 2d ed., New York, Wilson, 1939, pp. 47-48.

CC employs the following species of digits:

Arabic numerals

Roman caps and Roman smalls

Greek alphabets (these have been given up completely in CC I)

Punctuation marks

Mathematical symbols

Arrows

UDC uses the following species of digits:

Arabic numerals

Roman caps and Roman smalls

Punctuation marks

Mathematical symbols

15 Qualities

In his earlier writings, Ranganathan suggested that notation should have the following qualities:

Uniqueness, brevity and expressiveness.

By uniqueness is meant that a class number should represent one and only one meaning. This is essential because occurrence of synonyms and homonyms is harmful to a classificatory language. It is desirable that a class number should be as brief as possible.

By expressiveness, he meant that a class number should represent relevant and essential characteristics of the subject being classified. For instance, KZ311 (class number for cow, according to CC6) stands for the first favoured animal, whose primary product is food of primary use to human beings.

Later, Ranganathan (*Prolegomena*, pp. 228-31) enumerated the following qualities of notation:

Brevity of class number, speed of writing, pronouncibility (optional) block formation (dividing of a long class number into blocks of digits by means of a digit of different species, or by space), facet formation (indicator digit can be used to represent the character of the ideas of the succeeding facet or to merely serve as a signpost).

Ranganathan was not very rigid about the qualities of notation. Therefore, he added that "qualities necessary and desirable" would depend upon the temporary permanent use and kinds of users.

Brevity and simplicity (easy to read, pronounce, write and type) are important qualities. It is generally agreed that notation should be as short as feasible. Experience shows that a long notation is rather difficult to retain in mind. It may also lead to mistakes in writing or typing the call number. This might thus cause inefficiency in work.

Brevity is necessary for classification of books, but not for the work of documentation. The question of brevity is connected to the size of the base of a given scheme. The shorter the base, the longer the class numbers. Therefore, a broad base has a great advantage. Brevity is also related to the amount of details provided (attempt towards the co-extensiveness of a class number with the specific subject lengthens the class number), strict hierarchical structure of the scheme (an attempt to display the hierarchical pattern consistently lengthens the class number), and careless allocation of notation (adding to the length of the numbers). The allocation of notation should be done after careful thought, keeping in view the way the universe of subjects is likely to grow. Simplicity of notation is another important consideration. In a freely faceted analytico-synthetic scheme for classification, notation cannot possibly remain simple. In this regard, the use of retroactive notation is interesting, and appears to be useful. This leads to simple notation, an approach that has been tried on a large scale in BC2.

2 TYPES OF NOTATIONAL SYSTEMS

A notational system in which no class number contains more than one species of digits is called a pure notational system (*Prolegomena*, p. 235).

EXAMPLES:

341

ALM

cop

A notational system in which a class number may have two or more species of digits is called a mixed notational system (*Prolegomena*, p. 235).

EXAMPLES:

V, 44: 235

P, 111v

3 FACETED NOTATION

Multipartite notation (linear, horizontal, right-handed notation, with digits separating into blocks of three to six digits by space or by a

semantically poor digit, usually a dot), with the blocks of digits connected by meaningful indicator digits, analogous to punctuation marks, with each indicator digit indicating the interrelation between two component ideas of a subject, is called faceted notation. (This definition is based on Ranganathan's original definition). The number forming a block in a class number in a faceted notation is called a facet number (*Prolegomena*, p. 236).

EXAMPLE FROM CC7:

S, 25; 52; g 7. 73 'N6

There are six facets involved in the above example. The facet number "S" represents psychology, the basic facet; Facet number 25 represents adolescent girls; Facet number 52 stands for emotions; Facet number g7 for development; Facet number 73 represents USA; Facet number N6 represents 1960s. We can see that the indicator digits , ; : . and ' have been used to connect blocks of digits.

EXAMPLE FROM UDC:

622. 002 (540) "19"

There are four facets. Facet number 622 represents mining; 2 stands for production and technique problems; Facet number 540 represents India; Facet number 19 stands for the 20th century. In the above example .00 () " " have been employed as indicator digits, which have been used to connect blocks of digits.

781.1 represents one facet. Here, the dot (.) is a semantically poor digit (in other words, not meaningful).

4 NON-FACETED NOTATION

Non-faceted notation is an alternative name for unipartite notation. A unipartite notation consists of linear, horizontal, right-handed notation with all the digits written closely, so as to form one block (*Prolegomena*, p. 236).

EXAMPLES FROM LC:

GC271 Current in Atlantic

QC454 Raman Effect

NA2940 Structural frame in a building

The above examples show that the class numbers given above form one block each. But in a multipartite notation, the number is separated into blocks by means of space or a semantically poor (not mean-

ingful) digit.

5 SECTOR NOTATION

51 Empty Digit

An empty digit is "a digit with ordinal value but without semantic value" (*Prolegomena*, p. 238). Usually, the last digit of a species of digits can be postulated as an empty digit. In 0 1 2 3.....9, 9 can be taken as empty digit. In A B C D.....Z, Z can be postulated as an empty digit. Similarly, in a b c d. . . z, we may use z as an empty digit.

52 Empty Digit for Sectorising

An empty digit can be employed as a sectorizing digit and used to form sectors. This is how it has been used in CC.

Ranganathan postulated empty digits of Kind 1, Kind 2 and Kind 3.

Digits z 9 and Z have been postulated as empty digits of Kind 1. We can form 66 sectors with their help. This has been demonstrated in the next section.

Digit 0 (zero) has been adopted as an empty digit of Kind 2. This digit has been employed as the first digit of the zone (Z-0). This has led to the forming of 15 sectors (*see* next section).

Digits m y M and Y may be used as empty digits of Kind 3 to break the long sector (S-A) into two shorter sectors (S-A to L) and (S-N to X). By using these as sectorising digits, one can get an additional 80 sectors.

53 Sector Device

The number of ideas to be represented in a notational system is extremely large but the number of distinct digits which can be used by a classificationist even in a scheme employing mixed notation are rather small. As a result, devices have to be used to provide for infinite extrapolation in a given notational system. Sector device is one such device. It is "a device used for increasing the capacity of an array with the aid of an empty digit" (*Prolegomena*, p. 238). This device enables one to provide infinite extrapolation in a system. It becomes possible to add unlimited numbers to represent coordinate ideas. It is an extension of the "others" concept of DDC. It has been employed very successfully in CC.

54 Sector Notation Using Indo-Arabic Numerals

Let us consider the following sequence, made up of a pure base of Indo-Arabic numerals:

1 2 3 4 5 6 7 8 9 1 92 93 94 95 96 97 98 99 1 992...998, and so on.

Let us assume that 9 is an empty digit. In that case it would have an ordinal value, but no semantic value. In other words, 9 by itself has no meaning. But 91 is meaningful. Similarly, other numbers beginning with a single 9, double 9 or triple 9 and so on are meaningful numbers.

Let us also assume that 91 represents a class coordinate with the classes represented by digits from 1 to 8. Similarly, we may assume that numbers 92 93 94 95 and so on are all postulated to represent classes coordinate with classes represented by digits from 1 to 8.

On the basis of the above assumptions, we can say that the following numbers form a single array (as all these numbers represent coordinate classes):

1 2 3 4 5 6 7 8 9 1 92 93 94 95 96 97 98 99 1 992.....998 and so on. Here, we have lengthened the 1 to 8 array with the aid of the empty digit 9. Thus we have succeeded in increasing the capacity of an array with the help of an empty digit. The device used here to increase the capacity of an array is called the sector device. It may be added that numbers 91, 92, 93 and so on are considered as if each is a single digit.

The 1 to 8 range of the array is denoted by (S-1) and is read as sector (S-1). Similarly, we get sector (S-91) to represent the 91 to 98 range, and so on.

55 Sector Notation Using Roman Capitals

As above, we can form an array A B C . . . Y. This array can be extended with the aid of Z as an empty digit. Thus we can have an array consisting of A B . . . Y Z A ZB . . . ZY ZZA . . . ZZY, and so on. Here, the numbers Z A ZB . . . ZY ZZA and so on are all considered as if forming a single digit. This is the use of the sector device.

The range A to Y of the array is denoted by (S-A) and is read as sector (S-A). Similarly, we get sector (S-ZA) to represent the range Z A to ZY, and so on.

56 Sector Notation Using Roman Smalls

z, as an empty digit, can be used to obtain an extended array consisting of a b . . . y z a z b . . . z y z z a . . . z z y, and so on.

*57 Sector Notation Using Roman Smalls, Indo-Arabic
Numerals and Roman Caps*

In the earlier examples in each case, we have taken the pure base, consisting of a single species of digits. Let us take a mixed base, consisting of Roman smalls, Indo-Arabic numerals and Roman capitals. We may assume that 0, z, 9, Z are the empty digits. The third assumption is that the upper limit to the number of digits in a class number is 3.

The base will consist of a b c . . y (except i o l—small letters) 1 2 3 . . 8 A B C . . Y (except I O). This is a sequence based on their ascending value. 0 z 9 and Z are the empty digits.

The following combinations of empty digits can be prefixed to the base to give us different sectors:

(i)	0	00	0z	09	0Z
(ii)	z	zz	z9	zZ	z0
(iii)	9	99	9Z	90	9z
(iv)	Z	ZZ	Z0	Zz	Z9

The base will lead to the following sectors:

(S-a) (S-1) (S-A) 3 sectors

Prefixing of combinations of empty digits to the base will lead to the following sectors.

(i)	(S-0a)	(S-01)	(S-0A)	15 sectors
	(S-00a)	(S-001)	(S-00A)	
	(S-0za)	(S-0zl)	(S-0zA)	
	(S-09a)	(S-091)	(S-09A)	
	(S-0Za)	(S-0Z1)	(S-0ZA)	
(ii)	(S-za)	(S-z1)	(S-zA)	15 sectors
	(S-zza)	(S-zz1)	(S-zzA)	
	(S-z9a)	(S-z91)	(S-z9A)	
	(S-zZa)	(S-zZ1)	(S-zZA)	
	(S-z0a)	(S-z01)	(S-z0A)	
(iii)	(S-9a)	(S-91)	(S-9A)	15 sectors
	(S-99a)	(S-991)	(S-99A)	
	(S-9Za)	(S-9Z1)	(S-9ZA)	
	(S-90a)	(S-901)	(S-90A)	
	(S-9za)	(S-9zl)	(S-9zA)	
(iv)	(S-Za)	(S-Z1)	(S-ZA)	15 sectors
	(S-ZZa)	(S-ZZ1)	(S-ZZA)	

(S-Z0a)	(S-Z01)	(S-Z0A)
(S-Zza)	(S-Zz1)	(S-ZzA)
(S-Z9a)	(S-Z91)	(S-Z9A)

15 sectors

Total number of sectors = $3 + 15 + 15 + 15 + 15 = 63$. Capacity of 63 sectors = capacity of base + capacity of sectors in (i) (ii), (iii) and (iv) = $(22 + 8 + 23) + (22 + 8 + 23)20 = 1113$

In addition to the above 63 sectors, we can have 3 more sectors by using the packet notation. These sectors are (S-(a)) (S-(1)) (S-(A)). Obviously, their capacity will be $22 + 8 + 23 = 53$. Thus, the total capacity of 66 sectors = $1113 + 53 = 1166$.

Form the above we can conclude that with a base of 56 digits, including z, 9 and Z (23 Roman smalls, 9 Arabic numerals and 24 Roman caps), we are able to increase the capacity of array to 1113 (excluding the 3 sectors obtained by means of the packet notation). From 56, the capacity has increased to 1113 (nearly 19 times). This is a tremendous achievement though it has been got at the sacrifice of four digits (0, z, 9, Z), which have been made empty digits. These are used by themselves as class numbers or isolate numbers.

58 Concept of Zones

Communication is helped by the concept of zone in an array of isolate numbers. The concept of zone has arisen out of the concept of sectors. Sectors have been grouped into zones. The specialized use of the species of digits in an array has resulted in the formation of zones in an array. Use of sectors and zones leads to shortening of class numbers; avoidance of cluttering of indicator digits; avoidance of homonyms and; increase in hospitality in an array. Ranganathan, and others belonging to the Indian school of thought, have fully utilized the potentiality of this concept.

The following five zones have been recognized in an array, under the condition that only singlets, doublets and triplets are allowed to be used:

Number of zone	Range of zone	Symbol used to represent
1	Range of isolate numbers having a Roman small prefixed to it	(Z-a)
2	Range of isolate numbers having a 0 (zero) prefixed to it	(Z-0)

- | | | |
|---|--|-------------|
| 3 | Range of isolate numbers having an Indo-Arabic number other than 0 (zero) prefixed to it | (Z—1) |
| 4 | Range of isolate numbers having a Roman cap prefixed to it | (Z—A) |
| 5 | Range of isolate numbers having (starter) prefixed to it. This range is used in isolate numbers placed between ((starter) and (arrester)). | (Z—(. . .)) |

As indicated earlier, 0 (zero) z 9 and Z have been treated as empty digits and only singlets, doublets, and triplets are used. The digits such as l o (small letter) l (small letter) l O (cap letter) are also not used.

(Z-a) will represent the following sectors;

(S-a)	a.....y
(S-za)	za.....zy
(S-zza)	zza.....zzy
(S-zzl)	zzl.....zz8
(S-zzA)	zzA.....zzY
(S-z0a)	z0a.....z0y
(S-z0l)	z0l.....z08
(S-z0A)	z0A.....z0Y
(S-zl)	zl.....z8
(S-z9a)	z9a.....z9y
(S-z9l)	z9l.....z98
(S-z9A)	z9A.....z9Y
(S-zA)	zA.....zY
(S-zZa)	zZa.....zZY
(S-zZl)	zZl.....zZ8
(S-zZA)	zZA.....zZY

(Z-a) represents 16 sectors and has a capacity of 287.

(Z-0) will represent the following sectors:

(S-0a)	0a.....0y
(S-0za)	0za.....0zy
(S-0zl)	0zl.....0z8
(S-0zA)	0zA.....0zY
(S-00a)	00a.....00y
(S-00l)	00l.....008
(S-00A)	00A.....00Y
(S-0l)	0l.....08

(S-09a)	09a.....09y
(S-09I)	09I.....098
(S-09A)	09A.....09Y
(S-0A)	0A.....0Y
(S-0Za)	0Za.....0Zy
(S-0ZI)	0ZI.....0Z8
(S-0ZA)	0ZA.....0ZY

(Z-0) represents 15 sectors and has a capacity of 265.

(Z-1) will represent the following sectors:

(S-1)	1.....8
(S-9a)	9a.....9y
(S-9za)	9za.....9zy
(S-9zl)	9zl.....9z8
(S-9zA)	9zA.....0zY
(S-90a)	90a.....90y
(S-90I)	90I.....908
(S-90A)	90A.....90Y
(S-91)	91.....98
(S-99a)	99a.....99y
(S-99I)	99I.....998
(S-99A)	99A.....99Y
(S-9A)	9A.....9Y
(S-9Za)	9Za.....9Zy
(S-9ZI)	9ZI.....9Z8
(S-9ZA)	9ZA.....9ZY

(Z-Z1) represents 16 sectors and has a capacity of 273.

(Z-A) will represent the following sectors:

(S-A)	A.....Y
(S-Za)	Za.....Zy
(S-Zza)	Zza.....Zy
(S-Zzl)	Zzl.....Zz8
(S-ZzA)	ZzA.....ZzY
(S-Z0a)	Z0a.....Z0y
(S-Z0I)	Z0I.....Z08
(S-Z0A)	Z0A.....Z0Y
(S-Z1)	Z1.....Z8
(S-Z9a)	Z9a.....Z9y
(S-Z9I)	Z9I.....Z98
(S-Z9A)	Z9A.....Z9Y
(S-ZA)	ZA.....ZY
(S-ZZa)	ZZa.....ZZy

(S-ZZl) ZZl.....ZZg
 (S-ZZA) ZZA.....ZZY

(Z-A) represents 16 sectors and has a capacity of 288.

(Z-(...)) will represent the following sectors:

(S-(a)) (a).....(y)
 (S-(1)) (1).....(8)
 (S-(A)) (A).....(Y)

(Z-(...)) represent 3 sectors and has a capacity of 53.

From the above, we get the following:

<i>Zone</i>	<i>Numbes of sectors</i>	<i>Capacity</i>
(Z-a)	16	287
(Z-0)	15	265
(Z-1)	16	273
(Z-A)	16	288
(Z-(...))	3	53
	<hr/> 66 <hr/>	<hr/> 1166 <hr/>

5911 Allocation of Sectors and Zones

5911 Special Isolates

All the above 66 sectors in five zones are available for special isolates, except sector (S-a). This sector (S-a) excludes i o l z. That means the capacity in the array can be 1144. By using m y M and Y as sectorizing digits, an additional 156 sectors can be added to the array. In actual practice, one may very often not require these additional sectors.

The three sectors in (Z-(...)) are used in the enumeration device, excluding other uses (for example the subject device, style number, brand number and so on).

(S-A) can be utilized fully only for Array 1 in the schedules of main subjects and of isolates. But from Array 2 onwards, digits T to Z are used as emptying and empty-emptying digits. As a result, (S-A to S) is available and the capacity of Array 2 onwards has to be modified accordingly.

5912 Common Isolates

(S-a) has been reserved for the representation of common isolates.

5913 Basic Classes

(S-a) excluding i, l and o (Roman small letter)

(S-1)

(S-A)

(S-())

Each of the digits T, U, V, W, X, Y and Z is deemed as a semantically rich digit when it occurs alone or as a first digit in a number in which it might have been prefixed to a digit other than an empty or empty-emptying digit. The digits I and O (Roman capital letter) are used for primary basic subjects only.

Z, 0 (zero) or 9 are semantically empty digits.

T, V, X and Z are emptying digits.

U, W and Y are empty-emptying digits.

The asterisk (*) and hyphen (-) are postulated as indicator digits.

6 CAPACITY OF AN ARRAY IN A NOTATIONAL SYSTEM

An array is "the set of class numbers or isolate numbers used to represent the classes or the ranked isolates, as the case may be, in an array and taken in the sequence of the classes of the ranked isolates" (*Prolegomena*, p. 238). The capacity of an array consists of the maximum number of distinct class numbers or isolate numbers which can possibly be accommodated in a given array.

The capacity of an array with a pure base of Indo-Arabic numerals is 9 (excluding zero).

The capacity of an array with a pure base of Roman caps is 24 (excluding I and O Roman capital letter).

The capacity of an array with a pure base of small letters is 23 [excluding i, o (small letter), l].

The capacity of an array with a mixed base of Indo-Arabic numerals, caps and small letters is $9+24+23=56$.

Note : Only single digit numbers have been taken into account.

As already indicated, we can increase the capacity of array from 56 to 1113 by using 0 (zero), z, 9, Z as empty digits and making the upper limit to the number of digits in a class number in the array being 3. The capacity of the array can be increased to 1166, if the packet notation is also used.

7 CAPACITY OF NON-FACETED NOTATIONAL SYSTEM

"Capacity" refers to the maximum number of distinct class numbers

that can be accommodated in a notational system.

Non-faceted Notational System

(i) *Assumptions:*

Number of digits in a class number 3 (the same number of digits are used in each class number).
 Digits used—9 Arabic numerals

Capacity: $9 \times 9 \times 9 = 9^3$

(ii) *Assumptions:*

Number of digits in a class number 3 or less.
 Digits used—9 Arabic numerals

Capacity: $9 \times 9 \times 9 + 9 \times 9 + 9 = 9^3 + 9^2 + 9^1$

(iii) *Assumptions:*

Number of digits in a class number 6 (the same number of digits are used in each class number)
 Digits used—9 arabic numerals

Capacity: $9 \times 9 \times 9 \times 9 \times 9 \times 9 = 9^6$

(iv) *Assumptions:*

Number of digits in a class number 6 or less
 Digits used—9 arabic numerals

Capacity: $9^6 + 9^5 + 9^4 + 9^3 + 9^2 + 9$

8 CAPACITY OF FACETED NOTATIONAL SYSTEM

(i) *Assumptions:*

Number of facets-1
 Number of digits in a class number 3 or less
 Digits used—9 Arabic numerals

Capacity: $9^3 + 9^2 + 9^1$

(ii) *Assumptions:*

Number of facets—one as well as two
 Number of digits in a class number—6 or less
 Digits used—9 Arabic numerals
 Number of digits in a facet—3 or less
 Colon (:) is used as an indicator digit to connect facets

Explanation:

Capacity of the notational system would have to take into consideration class numbers of length varying from six digits to one

digit.

(a) Capacity of the system when length of the class number is 6 digits $= 1 \times 9^6$

There is just one combination to arrange 6 digits in two facets in the sense that each facet will have 3 digits as shown below:

000 : 000

(b) Capacity of the system when length of the class number is 5 digits $= 2 \times 9^5$

There are just two combinations to arrange 5 digits in two facets in the sense that first facet can have either 3 digits or 2 digits as shown below:

000 : 00

00 : 000

(c) Capacity of the system when length of the class number is 4 digits $= 3 \times 9^4$

There are just three combinations to arrange 4 digits in two facets in the sense that first facet can have 3 or 2 or 1 digit(s) as shown below:

000 : 0

00 : 00

0 : 000

(d) Capacity of the system where length of the class number is 3 digits $= 3 \times 9^3$

There are 3 combinations to arrange 3 digits in two facets in the sense that first facet can have 3 or 2 or 1 digit(s) as shown below:

000

00 : 0

0 : 00

(e) Capacity of the system when length of the class number is 2 digits $= 2 \times 9^2$

There are just 2 combinations to arrange 2 digits in two facets in the sense that first facet can have 2 or 1 digits as shown below:

00

0 : 0

(f) Capacity of the system when length of the class number is one digit $= 1 \times 9^1$

There is one combination to arrange 1 digit as shown below:

0

Thus total capacity of the notational system is given below:

$$9^6 + 2 \times 9^5 + 3 \times 9^4 + 3 \times 9^3 + 2 \times 9^2 + 1 \times 9^1$$

(iii) Assumptions:

Number of facets—3 (not less)

Number of digits in a class number—9 or less

Digits used—9 Arabic numerals

Number of digits in a Facet—3 or less

Colon (:) is used as an indicator digit to connect facets

Explanation:

Capacity of the notational system would have to take into consideration class numbers of length varying from 9 digits to one digit.

(a) Capacity of the system when length of the class number is 9 digits = 1×9^9

There is just one combination to arrange 9 digits in three facets in the sense that each facet must have 3 digits as shown below:

000 : 000 : 000

(b) Capacity of the system when length of the class number is 8 digits = 3×9^8

There are 3 possible combinations to arrange 8 digits in three facets in the sense that each facet may have 3 or 2 digits as shown below:

000 : 000 : 00

000 : 00 : 000

00 : 000 : 000

(c) Capacity of the system when length of the class number is 7 digits = 6×9^7

There are 6 possible combinations to arrange 7 digits in three facets in the sense that each facet can have 3 or 2 or 1 digit(s) as shown below:

000 : 000 : 0

000 : 0 : 000

000 : 00 : 00

00 : 00 : 000

00 : 000 : 00

0 : 000 : 000

(d) Capacity of the system when length of the class number is 6 digits = 7×9^6

There are 7 possible combinations to arrange 6 digits in three facets in the sense that any of the facet can have one or two or three digit(s) as shown below:

000 : 00 : 0
 000 : 0 : 00
 00 : 000 : 0
 00 : 0 : 000
 00 : 00 : 00
 0 : 000 : 00
 0 : 00 : 000

(e) Capacity of the system when length of the class number is 5
 digits = 6×9^5

There are 6 possible combinations to arrange 5 digits in the three facets in the sense that any of the facet can have one or two or three digits as shown below:

000 : 0 : 0
 00 : 00 : 0
 00 : 0 : 00
 0 : 00 : 00
 0 : 000 : 0
 0 : 0 : 000

(f) Capacity of the system when length of the class number is 4
 digits = 3×9^4

There are 3 possible combinations to arrange 4 digits in the three facets in the sense that any of the facet can have one or two digits as shown below:

00 : 0 : 0
 0 : 00 : 0
 0 : 0 : 00

(g) Capacity of the system when length of the number is 3
 digits = 1×9^3

There is one possible combination to arrange 3 digits in the 3 facets in the sense that any of the facet can have only one digit as shown below:

0 : 0 : 0

Thus total capacity of the notational system is given below:

$$9^9 + 3 \times 9^8 + 6 \times 9^7 + 7 \times 9^6 + 6 \times 9^5 + 3 \times 9^4 + 1 \times 9^3$$

91 GROUP NOTATIONAL SYSTEM

A group notational system is "a decimal notational system in which each number consists of two and only two rich numbers; or three and only three rich digits; and so on; and does not include an empty

digit. The numbers of a group system are deemed to form a single array" (*Prolegomena*, p. 249).

Indo-Arabic numerals:

11 12.....18 21 22.....28.....81 82.....88

The above is an example of a two-digited group notational system, consisting of 64 numbers (these are coordinate numbers belonging to an array).

111 112.....118

121 122.....128

.....

181 182.....188

211 212.....218

.....

281 282.....288

.....

881 882.....888

The above is an example of a three digited group notational system, consisting of 512 numbers (these are coordinate numbers belonging to an array).

Roman Capitals (excluding I and O):

AA AB.....AY BA BB.....BY.....YA YB.....YY

The above is an example of a two-digited group notational system, consisting of 529 numbers. These numbers are coordinate numbers belonging to an array.

Indo-Arabic numerals and Roman capitals

A1 A2.....A8 AA AB.....AY B1 B2.....B8 BA BB.....BY.....
Y1 Y2.....Y8 YA YB.....YY.

These are 961 numbers belonging to an array of coordinate numbers.

Note: In the above numbers, empty digits 9 and Z have not been used.

By means of calculations, Ranganathan (*Prolegomena*, pp. 252-53) arrived at the following conclusions:

<i>Notation to be used</i>	<i>Number of numbers to be accommodated in an array</i>
Sector notation (Arabic numerals)	<24
Group notation (Arabic numerals)	>24
Sector or group notation (Arabic numerals)	24
Sector notation (Roman capitals)	<69
Group notation (Roman Capitals)	<69
Sector or group notation (Roman capitals)	69

Sector notation (Indo-Arabic numerals and Roman capitals)	< 124
Group notation (Indo-Arabic numerals and Roman capitals)	> 124
Sector or group notation (Indo-Arabic and Roman capitals)	124

The above table shows the basis for choosing either the sector notation or group notation to represent the numbers to be accommodated in an array.

CC6 uses group notation in a few places, such as in the schedule of inorganic substances in chemistry and in the schedule of cultivars in agriculture. But sector notation has been used a great deal.

92 TELESCOPING OF FACETS

Let us consider a subject having schedules belonging to different levels of the same fundamental category in the same round. The fundamental category could be personality, energy, matter, etc. The schedules of all these levels can be presented at the notational plane as if they all form a single schedule. Then at the notational plane, the schedules would appear like a single facet. However, at the idea plane, the schedules would all belong to different levels of facets. This means that "schedules belonging to different facets in the idea plane appear to be telescoped into a single schedule in the notational plane."² This is called telescoping of facets.

EXAMPLE FROM THE SCHEDULE OF DIESEL ENGINE:³

D9 L22 Diesel Engine

Foci in [1P]

Organ of remove 2

zh2 Casing

ad1 Liner

zg1 Camshaft

Telescoping point Earlier Level

Organ of remove 1

z2 Cylinder

z4 Combustion chamber

²S.R. Ranganathan, *Colon classification*, GSLs, Rutgers—the State University, 1965, p. 128.

³*Ibid.*, p. 127.

z8	Fuel injection equipment
6	Electrically started diesel engine
9m	Air-cooled diesel engine
(k)	Diesel Engine for ship

Comments: If in the above schedule the notes *telescoping point earlier level* were removed, then the schedule would appear like a single facet. However, from the idea plane, schedules would all belong to the different levels of facets.

According to Ranganathan, telescoping of facets has following advantages:

The different levels in the schedules are named relatively to one another. These need not be named as level 1, level 2, level 3 etc. As a result, a new subject belonging to a new level of facets can be interpolated without much problem.

In constructing a class number, if a subject does not present some intermediate levels, it does not matter. As sector notation has been employed by Ranganathan, there would be no need for cluttering of indicator digits. In fact telescoping of facets leads to shortening of class numbers in such cases.

Consider the class number given below:

D9L22, (k), zb2	Casing of diesel engine for ship
D9L22, zb2	Casing of diesel engine

In the above examples, the intermediate level (s) are missing but there is no problem.

93 HIERARCHICAL VERSUS NON-STRUCTURAL NOTATION

The notation, used for library classification schemes, has ordinal significance. That is, it conveys the order of subjects in the scheme. It may indicate the hierarchy or structure of the classification scheme (such a notation has therefore been referred to as a hierarchical notation), or may not reveal the hierarchy or structure of the scheme (such a notation is called a non-structural notation).

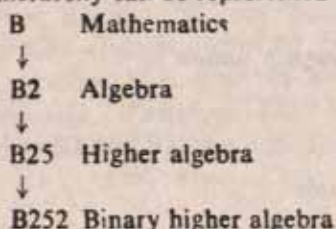
931 Hierarchical Notation

A hierarchical notation indicates the hierarchy of the scheme of classification. By means of its length and structure it is able to indicate the subjects which are coordinate ones. It also shows to which topic a particular sub-topic is subordinated. From the class number, one would be able to determine the order of the array to

which it should belong. DDC, UDC and CC are good examples of hierarchical notation.

If one comes across a class number 551.6 in DDC (which uses hierarchical notation), one would immediately conclude that 551.6 would represent a class, which would be a sub-division of 551. Similarly, 551 would be a subdivision of 550. In turn, 550 would be a subdivision of 500.

Similarly, in CC6, B252 is a subdivision of B25. B25 is a subdivision of B2. Again, B2 is a subdivision of B. Again, we can assume that B2, B3, B4, B5 and so on would represent coordinate classes. The hierarchy can be represented by a chain, as given below:



9311 Advantages

(i) Hierarchical notation reveals the hierarchical pattern. Therefore, in carrying out a subject search in a library catalogue or on the shelf, one can broaden or narrow down one's search.

(ii) Guiding of the shelves and classified catalogue can be done easily and effectively. In a hierarchical notation, one can apply the cannon of context, without necessarily repeating all the terms.

(iii) The chain procedure can be used to compile subject indexes.

(iv) It is considered easier to remember a class number based on hierarchical notation.

(v) If a classification with hierarchical notation is used in a computerized information retrieval system, the computer would find it feasible to narrow down or broaden the search for information.

9312 Disadvantages

In a strict hierarchical scheme, if many places are lying vacant in an array, they would not be utilized by classes/isolates from the next order array, even if one knows definitely that the places would not be filled up in future. As a result of uneconomic utilization of arrays, the length of the class numbers would be greater.

It is not always possible to achieve a strict hierarchical pattern in such a notation. In a faceted classification, the use of indicator digits

and mixed notation would add to such a problem.

A hierarchical notation leads to longer class numbers because there would be a wastage of symbols and places which would lie unused and vacant respectively. In order to avoid wastage, Ranganathan used the concept of telescoped array at a few places in his CC. This corresponds to the use of a non-structural notation. Till a few years back, it was not always possible to interpolate a new subject or topic in a helpful sequence. In CC6, B2 is Algebra and B3 is Analysis; if, a subject was to be introduced between the two, it was not ordinarily possible. But now, with the help of empty and emptying digits, it is possible to interpolate and extrapolate the subjects.

932 *Non-structural Notation*

Here is an example from BC2:

J	Education
JH	Teachers and teaching
JI	Teaching methods and aids
JJ	Methods

In the above example, the notation does not indicate hierarchical pattern. It is only the indentions, which show the hierarchical relations between the subjects. E.J. Coate's *British catalogue of music classification* is a good example of non-structural notation. LC, *Subject classification* and BC2 have used notation, which often makes no attempt to express the structure of the schemes.

9321 *Advantages*

(i) Application of the principle of literary warrant can be employed to allocate shorter class numbers (isolate numbers) for classes having a large number of documents. This allows for the proper allocation of class numbers.

(ii) The class numbers are shorter. This can be illustrated by an example:

<i>Hierarchical notation</i>	<i>Subject</i>	<i>Non-structural notation</i> (assumed)
B	Mathematics	B
B2	Algebra	B2
B25	Higher algebra	B3
B252	Binary higher algebra	B4
B252, 1	Linear binary higher algebra	B42

From the above it follows that in strict form of hierarchical notation, the length of the notation increases by one digit at each step of division. However, in the last step it has increased by two digits. In the non-structural notation, the notation indicates the order of the subjects, but not hierarchical relationships. At the notational plane higher algebra and binary higher algebra seem to be coordinate. But we know that at the idea plane, this is not so.

(iii) Each array can be manipulated to achieve a greater hospitality for the incorporation of new subjects at proper places in the helpful sequence, without disturbing the sequence.

In the assumed example, a new subject to be accommodated between B2 and B3 may be allocated a number B22 (B22 is not necessarily a subdivision of B2, but lies between B2 and (3). If we allot number B21, it would not be possible to interpolate between B2 and B21. Therefore, Digit 1 as a subdivision is best avoided. Between B2 and B22, we can introduce B212, but not B21. Thus, the sequence of numbers would be:

B
B2
B212
B22
B3
B4
B42

From the above, it appears that it has tremendous hospitality in array and chain. It is always possible to interpolate the infinite number of new subjects in the array in helpful places.

9322 Disadvantages

The guiding of the shelves and classified catalogue becomes more difficult. The chain procedure in the traditional approach becomes difficult to apply to such a scheme.

Experience shows that non-hierarchical notation deserves serious attention of classifiers and classificationists. The qualities of brevity and provision of hospitality in an array and chain are important assets of a non-hierarchical notation. A scheme using non-hierarchical notation violates the canon of hierarchy, but satisfies the law of parsimony.

933 Conclusion

Librarians are normally familiar with hierarchical notation; therefore,

they very often prefer schemes with such a notation. It needs to be established, on the basis of research, as to which approach is superior as a whole. BC2 is largely non-hierarchical. Its success could perhaps popularize the use of non-structural notation. But its success is doubtful because schemes using hierarchical notation are well entrenched. There is also no reason why hierarchical schemes should not go from strength to strength.

94 RETROACTIVE NOTATION

J. Mills is an enthusiast for retroactive notation. Some special schemes have already experimented with it. BC2 uses retroactive notation as a chief method to achieve synthesis.

In BC2, retroactive notation has been used to provide enough facility in constructing compound subjects. Again, this has been achieved without using any characters other than the numbers and letters. That is punctuation marks and mathematical symbols have been avoided.

From BC2, we may examine the following two schedules:

- | | | |
|-----|-----|--|
| (a) | J | Education |
| | JC | Administration of educational institutions |
| | JE | Educational psychology |
| | JIE | Audio-visual aids |
| | JK | Curriculum |
| | JKK | Reading |
| (b) | JM | Primary, elementary education (5-11) |
| | JMN | Preparatory schools |

In order to achieve compound subjects, numbers from (a) can be attached to (b). It may be noted that divisions from JMA to JMM have been left vacant to accommodate the compound subjects.

The number for compound subject will be constructed as below:

- | | | |
|-----|-------|--|
| (c) | JMC | Primary school administration |
| | JMK | Curriculum in primary school |
| | JMK H | Reading in the primary school curriculum |
| | JMI E | Audio-visual aids in Primary education |

In the above examples, no indicator digits have been used. This serves as application of retroactive notation. Here all the concepts preceding a given class (Here JM) may be added directly to that class, dropping the initial letter which is common to them all.

We may notice that all compound subjects obtained in (c) would file before JMN, which is the first enumerated subclass of JM. Because the schedule of education is an inverted one, all compound classes have been constructed by means of building backwards. Facet of the subject cited last in the schedule is given first, followed by facets preceding it, going backward. Therefore, the term "retroactive" has been employed.

95 MIXED NOTATION

According to W.C. Berwick Sayers, notation should be (a) brief, (b) simple, (c) flexible, and (d) mnemonic.

A scheme using mixed notation scores over the one employing pure notation except in the matter of simplicity. Mixed notation cannot be as simple as a pure notation. Brevity in notation is desirable. There is no doubt that use of mixed notation leads to brevity. Flexibility refers to adjustability and expansability. If the notation is flexible, then the scheme of classification will be in a better position to satisfy the canons of the growing universe at the notational plane. Psychology of memory favours mixed notation. Therefore, mixed notation has greater mnemonic value.

A classification scheme using mixed notation is in a better position to meet the onslaught of the universe of subjects. The number of subjects is so large that a scheme with the pure base consisting of Arabic numerals or Roman capitals or any other single species of digits is not able to meet the requirements as adequately as the one having a mixed base. In addition, if a classification scheme wants to avoid homonyms, then it must provide distinctive class numbers. Physiology of eye and psychology of memory would favour a mixed base. At one time, it was possible to formulate a scheme with a pure base, which was able to serve the requirements very well. But this is not true any more.

It is desirable that a scheme should use notation, which is hospitable to new topics to be incorporated in its array and chain. A scheme using mixed notation is in a better position in this regard.

Use of mixed base in CC provides greater hospitality in different arrays than DDC and UDC. Due to pure base in DDC and UDC, the hospitality in arrays is restricted. As a result, these schemes have to accommodate more than one subject in one place causing homonyms.

CC employs a mixed base, therefore the mixed base device allows for extrapolation and interpolation in array as well as in chain.

A facet device is meant to spread out pressure exerted due to onslaught of the universe of subjects on the notational system of a given scheme. It involves prefixing an indicator digit to an isolate number within a class number. Mixed notation allows great scope for allocation of digits to represent indicator digits required to implement facet device.

Due to the availability of indicator digits, CC 7 is also to provide for three levels of phase relations. Within each phase relation, six kinds of phase relations are provided.

Due to limited use of mixed notation, UDC is not able to take full advantage of mixed notation. It uses colon (:) as an indicator digit for phase relation without distinguishing between different levels and kinds of phase relations. In addition, colon (:) is also used to link different facets. In other words, due to lack of variety of indicator digits, UDC uses the same digit for a variety of purposes, which is not desirable. This brings in rigidity in notation.

Notation to be used should allow for synthesis. Mixed notation allows for synthesis. An analytico-synthetic scheme provides for synthesis. This is possible due to the use of mixed notation.

The length of a class number should be relative to the depth of the class represented by the number. Mixed notation has better capability to achieve this.

A scheme using mixed notation has a greater capability of achieving mnemonic structure in its class numbers.

The history of notational techniques is the breaking up of the rigidity of notation. The rigidity of notation has been reduced in stages. The breaking of rigidity of notation and use of indicator digits are deeply interrelated. It is due to the employment of a variety of indicator digits that it has become possible to overcome such a rigidity. This has also enabled a scheme such as CC7 to claim a status of a freely-faceted analytico-synthetic scheme for classification. It is due to the availability of mixed notation that a large variety of indicator digits could be employed for various purposes in CC7.

From above, we may conclude that mixed notation has many advantages except that it adds to the complexity of a notational system. It is because of this that CC is considered a complex scheme from the point of view of notational system.

FURTHER READINGS

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Chapter 10

CANONS FOR NOTATIONAL PLANE

0 INTRODUCTION

A notational system consists of ordinal numbers representing classes in a scheme for classification. The notational system used for classification of the universe of subjects should satisfy basic canons for notation. A notational system should also follow canons for mnemonics. These have been described in Chapter Eleven.

The basic canons for notation are given below:

- (A) (a) Canon of synonym; and
(b) Canon of homonym.
- (B) Five pairs of canons:
 - (a) Canon of relativity and canon of uniformity;
 - (b) Canon of hierarchy and canon of non-hierarchy;
 - (c) Canon of mixed notation and canon of pure notation;
 - (d) Canon of faceted notation and canon of non-faceted notation; and
 - (e) Canon of co-extensiveness and canon of under-extensiveness.

Ranganathan favoured the first canon in each of the above five pairs of canons.

The notational system for a growing universe should satisfy canons for hospitality in array and chain. These are:

- (a) Canon of extrapolation in array;
- (b) Canon of interpolation in array;
- (c) Canon of extrapolation in chain; and
- (d) Canon of interpolation in chain.

1 CANON OF SYNONYM

This canon says: "The class number of a subject in a system of class

numbers and isolate number of an isolate idea in a system of isolate numbers should be unique" (*Prolegomena*, p. 260). The canon, therefore, directs that each subject should be denoted by one and only one class number. In the same way, each isolate idea should be provided with a unique isolate number.

It is essential that classificatory language should be free from synonyms. Otherwise, it will cause difficulty to a classifier, as well as to the user of a library. Therefore, the canon of synonym should be regarded as a compulsory canon. Its application will lead to the avoidance of synonyms.

In earlier editions of DDC there were many synonymous class numbers, but from 17th edition on words this weakness has been overcome to a large extent. However, UDC provides synonymous class numbers intentionally.

EXAMPLE FROM UDC:

Statistics applied to education 31:37 or 37:31

Analysis of iron and steel 669.1:543 or 543:669.1

BC provides synonymous class numbers under alternative locations and alternative methods of treatment.

CC avoids the provision of synonymous class numbers. However, there is one violation of the canon under space isolates: "2" represents mother country of the library. A given library in India can use "2" or "44" for India. The rules allow for a choice, once and for all.

CC has attempted to provide a unique class number for each subject. In order to meet the alternative approaches of the reader, it has made provision for a collection number. As a result, books on a specific subject or kind of documents can be arranged in a particular sequence.

2 CANON OF HOMONYM

According to the canon of homonym, "the subject represented by a class number in a system of class numbers and the isolate idea represented by an isolate number in a system of isolate numbers, should be unique" (*Prolegomena*, p. 226). The implication of the canon is that each class number should represent one subject, and one only. This means that no class number is supposed to represent two or more subjects. In the same way, each isolate number should stand

for one, and only one, isolate idea.

In natural language there is no control over homonyms, but in classificatory language it is possible to avoid these. In case a scheme restricts the length of class numbers, homonyms will obviously occur. This happens quite often in *Rider's International classification*. In the matter of homonyms, the 17th, 18th and 19th editions of DDC have shown a great deal of improvement. It may be added here that a faceted scheme (for example UDC, CC, BC2) has a greater facility to avoid homonyms. However, a non-faceted scheme would quite often find it difficult to avoid the creation of homonyms.

3 CANON OF RELATIVITY VERSUS CANON OF UNIFORMITY

The canon of relativity says that "the number of digits (including digit-groups treated as a single digit) in a class number or in an isolate number should be the same as the order of the subject or the isolate idea, as the case may be, represented by it" (*Prolegomena*, p. 273).

The canon of relativity is followed by DDC, UDC and CC to a great extent. But schemes such as LC, SC and RIC violate the canon to a large extent. BC1 does not follow the canon from Order 3 onwards.

Practical experience shows that a scheme following this canon would have long class numbers for books on specialized subjects. Books on specialized subjects would be required by specialists, who would not mind long class numbers. It is different with a generalist reader. A scheme should provide shorter class numbers for broader subjects of interest to generalist readers. In this way, a scheme following the canon of relativity has certain advantages. However, this leads to underutilization of the capacity of a notational system. BC2 does not follow the canon but is able to achieve a greater utilization of the notational system; also, the class numbers are shorter than would be otherwise. In CC, the telescoping of an array allows for better utilization of capacity in an array but this leads to a violation of the canon.

The canon of uniformity says that "the number of digits in a class number or in an isolate number should be constant whatever be the order of the subject or the isolate, as the case may be, represented by it" (*Prolegomena*, p. 273). The concept of uniformity, in the context of the length of a class number, is the opposite of relativity.

In library classification, the canon of relativity gets preference over the canon of uniformity, because uniformity is neither desirable nor useful except from the point of machine retrieval. According to Ranganathan, "In machine retrieval, the class number of the classificatory language should be translated into the code number of the machine language. This translation itself has to be done with machinery. If it is cheaper to feed into the machinery class numbers with the same number of digits, following the canon of uniformity will be an advantage" (*Prolegomena*, p. 276). He further adds that if the scheme follows the canon of relativity, then dummy digits can be added at the end of the class numbers to achieve uniformity in the length of the class numbers.

4 CANON OF HIERARCHY VERSUS CANON OF NON-HIERARCHY

According to the canon of hierarchy, "In a class number or in an isolate number, there should be a digit to represent each of the characteristics used in constructing the class number or the isolate number, as the case may be" (*Prolegomena*, p. 277).

In a scheme following this canon, each of the characteristics used in constructing the class number or the isolate number will be represented by a digit in the class number. As a result, all the characteristics of the class will be denoted by the successive digits in a class number. In other words, this will lead to the satisfaction of the canon of relativity. It appears as if the canon of hierarchy is a corollary to the canon of relativity.

Occasionally, CC violates the canon of hierarchy. It has been done when the number of classes to be accommodated in a given array are definitely smaller than the number of places available in the same array. This helps in satisfying the law of parsimony, because this approach leads to saving one digit in a class number for the class of later array. The examples given below serve as an illustration:

EXAMPLE FROM CC7:

1 World

Tel (A2) into (A1) begins

4 Asia

5 Europe

6 Africa

7 America

8 Australia

Tel (A2) into (A1) ends

Note: Tel stands for telescoping. A1 and A2 represent the array of Order 1 and the array of Order 2 respectively.

Considered from the idea plane, "World" as a whole belongs to the class of Order 1. One can say definitely that no other class will appear at Order 1. Thus the digits after 1 can be utilized to accommodate the 5 continents of the world. The continents of the world belong to the class of Order 2, as viewed from the idea plane. If we look at the above table from the notational plane, all the classes representing world and the five continents appear to be classes belonging to the same order of array (that is, array of Order 1). This kind of organization of an array in the schedule of a scheme has been termed "telescoped array." A telescoped array is an "array of classes in a schedule of classification, made of coordinate and subordinate isolates, as viewed from the idea plane, but those class numbers appear to be coordinate, as viewed from the notational plane" (*Prolegomena*, p. 278).

Occasionally, DDC violates the canon of hierarchy. This has been done when the number of classes to be accommodated in a given array is smaller than the number of places available in the same array. As a result the length of the class numbers can be reduced substantially in certain cases. This is clear from the example given below:

EXAMPLE FROM DDC 18:

500 Pure science

574 Biology

581 Botany

591 Zoology

598 Aves (birds)

In the above example, 'Pure science' and 'Aves (Birds)' are represented by three digit numbers. This shows a high degree of economy. These remarks are equally applicable to UDC. The next three examples show how telescoping in array has been applied in DDC 18 and UDC.

EXAMPLES FROM DDC 18:

592 Invertebrates

Tel 1 (A2) into (A1) begins

593 Protozoa, and other simple animals

- 594 Mollusca & molluscoidea
- 595 Other invertebrates
 - Tel 1 (A2) into (A1) ends*
- 596 Chordaia (Vertebrates)
 - Tel 2 (A2) into (A1) begins*
- 597 Cold-blooded vertebrates Pisces (Fishes)
- 598 Aves (Birds)
- 599 Mammalia (Mammals)
 - Tel 2 (A2) into (A1) ends*
- 1 Areas, regions, places in general
- 3 Ancient world
 - Tel (A2) into (A1) begins*
- 4 Europe
- 5 Asia
- 6 Africa
- 7 North America
- 8 South America
- 94 Australia
 - Tel (A2) into (A1) ends*

EXAMPLE FROM UDC:

- 1 Place in general
- 3 Ancient world
 - Tel (A2) into (A1) begins*
- 4 Europe
- 5 Asia
- 6 Africa
- 7 North America
- 8 South America
- 94 Australia
 - Tel (A2) into (A1) ends*

From the above, it follows that telescoping in array is useful. But the arrays should be telescoped very carefully. This should be done only when one is fully sure that the vacant places in the earlier array will remain permanently fallow. This requires experience and knowledge about how the classes in the earlier array are going to develop.

According to the canon of non-hierarchy, "In a class number or in an isolate number, there need not be a digit to represent each of the characteristics used in constructing the class number or isolate number, as the case may be" (*Prolegomena*, p. 277). LC and BC

follow the canon of non-hierarchy in many places.

5 CANON OF MIXED NOTATION VERSUS CANON OF PURE NOTATION

The canon of mixed base says that "the base of the notational system of a scheme for classification should use two or more species of digits" (*Prolegomena*, p. 282).

The canon of pure base says that "the base of the notational system of a scheme for classification should use one and only one species of digits" (*Prolegomena*, p. 282).

The question before us is—which of the above two canons should be given preference? The number of subjects is so large that a scheme with even a pure base of Roman capitals is not able to meet the requirements as adequately as with the one having mixed base. In addition, if a classificatory scheme wants to avoid homonyms, it must provide distinctive class numbers. Physiology of eye and psychology of memory would favour a mixed base. Due to the above reasons, it is considered that a scheme which intends to meet the onslaught of the universe of subjects successfully, should use a mixed base consisting of Indo-Arabic numerals, Roman capitals and Roman smalls. At one time, it was possible to formulate a scheme with a pure base, which was able to serve the requirements very well. But this is not true any more.

EC, LC, SC, CC and BC have used the mixed base. CC has the longest base. It employs Arabic numerals, Roman caps and Roman smalls. DDC and UDC have a short base each.

6 CANON OF FACETED NOTATION VERSUS CANON OF NON-FACETED NOTATION

According to the canon of faceted notation "A faceted notational system should be used when the (1) length of the base of the notation is about 10 and the universe is likely to contain more than a million or more entities or subjects, and (2) length of the base is about 56 and the universe is likely to contain 1,000 million or more entities or subjects" (*Prolegomena*, p. 285).

According to the canon of non-faceted notation, "A non-faceted notational system may be adequate when the (1) length of the base

of the notation is about 10 and the universe is likely to contain not more than a million entities; and (2) the length of the base is about 56 and the universe is likely to contain not more than 1,000 million entities" (*Prolegomena*, p. 285).

It has been found that the capacity of a notational system in a faceted scheme is more than that in a non-faceted notational system. The number of subjects is extremely large, so that the non-faceted system is not able to cope with it. It has been experienced that as the number of subjects is very large, the average length of a class number will consist of more than 10 digits. Because of the length of the class number, it is important to keep in view the physiology of the eye and the psychology of the memory. This requires that a class number should be broken into blocks, which are distinctive and meaningful. In a faceted notational system, the indicator digits are often distinctive and meaningful.

7 CANON OF CO-EXTENSIVENESS VERSUS CANON OF UNDER-EXTENSIVENESS

The canon of co-extensiveness says: "In a class number, digits should be added successively so as to represent the measure of incidence of even the very last characteristics in the succession of characteristics, admitted by the universe classified and relevant to the purpose of the classification." Co-extensiveness with regard to the classification of documents refers to "the representation in a class number of the measure of incidence of each of the relevant characteristics of the subject embodied in the document classified" (*Prolegomena*, p. 287).

The canon of under-extensiveness says that "In a class number, it is not essential that the digits should be continued so as to represent the measure of incidence of the later characteristics in the succession of characteristics, admitted by the universe classified and relevant to the purpose of the classification" (*Prolegomena*, p. 287).

If the canon of co-extensiveness is satisfied, then it will also satisfy the canon of homonym. As we have already found, that it is essential to avoid homonyms, the canon of co-extensiveness must be followed.

In order to solve the question of broad versus close classification, it has been generally agreed that there is a need for close classification, schemes at two levels; one for macro-thought and the other for micro-thought. The Indian school of thought has produced close classification at two levels—one for macro-thought (CC) and other

for micro-thought (called depth schedules). The depth schedules are an extension of CC. Broad classification creates homonyms. This may lead to problems in certain situations. Broad classification can be useful in a small library. But in a library having a large or specialized collection, it would be essential to have close classification. The degree of close classification is increasing with the passage of time. Yesterday, what was regarded as close classification may today be considered as broad classification.

CC has made a great effort to achieve co-extensive class numbers for macro-thought. It has succeeded greatly due to the use of guiding principles, which have made it possible to evolve a method to construct co-extensive class numbers. UDC is also quite good in providing co-extensive class numbers. DDC19 has made a good effort in this regard.

8 CANON OF EXTRAPOLATION IN ARRAY

This canon says, "An array of class numbers or of isolate numbers should admit of any number of new coordinate numbers being added at the beginning and at the end of the array" (*Prolegomena*, p. 311). The canon can be satisfied by means of the gap device, including the use of other species of digits, and the sectorizing digits. DDC, UDC and CC employ sectorizing digits.

91 CANON OF INTERPOLATION IN ARRAY

This canon says: "An array of class numbers or of isolate numbers should admit of the interpolation of any number of new coordinate numbers at any point in the array" (*Prolegomena*, p. 314).

The canon has been satisfied by the following means:

- (a) Gap device;
- (b) Mixed base;
- (c) Introduction of new species of digits; and
- (d) Emptying digit.

All schemes use the gap device. But the emptying digit has been employed by CC only. This provides a remarkable solution for interpolation of a class number or an isolate number between two consecutive numbers.

92 CANON OF EXTRAPOLATION IN CHAIN

According to this canon, "A chain of class numbers or isolate numbers should admit of the extrapolation of any number of successive links at its end. In other words, the notational system should admit of the chain, ending with any number, being lengthened to any extent found necessary" (*Prolegomena*, p. 319).

It is essential for a scheme to provide hospitality in chain; otherwise, it will break down at some time. This canon helps in the implementation of the canon of decreasing extension for a growing universe. The efficiency of the scheme will depend, to a large extent, on the devices adopted to achieve satisfaction of this canon.

The devices employed for achieving extrapolation in chain are the gap device and the decimal fraction device.

The gap device has been used a great deal in LC. The decimal fraction device has been employed by DDC, UDC and CC, but LC has not used it.

93 CANON OF INTERPOLATION IN CHAIN

The canon of interpolation in chain directs that "A chain of class numbers or of isolate numbers should admit of the interpolation of any number of links between any two consecutive links in the chain" (*Prolegomena*, p. 322).

The above canon will not be applicable at those points in the chain where the step from one link to the next one in the chain does not satisfy the canon of modulation. As is known, the canon of modulation is normally satisfied by the standard schemes for classification. However, political and administrative areas in geographical isolates are constantly changing, thereby violating the canon of modulation.

At present, no suitable notational device is available for the interpolation of a missing link or a newly emerging link requiring interpolation in a chain. BNB used [1] extension notation for the purpose.

FURTHER READINGS

- S.R. RANGANATHAN, *Prolegomena to library classification*, 3rd ed., Bombay, Asia Publishing House, 1967, part I.

Chapter 11

MNEMONICS

The term "mnemonics" originated from a Greek word, which meant "to remember." All of us improvise some system of mnemonics at one time or the other. When one has to purchase many items from a market, one can make use of mnemonics. One may remember Topaz blades by t, bananas by b, salt by s. Sometimes, one may remember the name of a person by associating it with some object or quality.

1 MNEMONIC NOTATION

Modern classification notations possess a very general quality, referred to as mnemonics quality. This quality is of great value to a classifier, a reference librarian as well as a classificationist. By mnemonic notation we mean that "wherever a subject or form appears it has always the same notation throughout the classification."¹ The simple example is the application of common isolates in CC6. These can be attached to many classes of basic classes, 'a' denotes bibliography and it can be attached to many classes, as given below:

XaN5

YaN5

TaN5

NaN5

'a' in all the above examples stands for the concept "bibliography."

The following are the advantages of mnemonic notation:

- (i) It assists the memory of the classifier in preparing class numbers for documents.
- (ii) It reduces, to a great extent, the work of reference to classification schedules and indexes.

¹W.C. Berwick Sayers, *Manual of classification for librarians and bibliographers*, 3rd edn., Andre Deutsch, 1959, p. 67.

- (iii) It helps in reducing the size of the classification schedules, and
- (iv) It enables the achievement of a consistent sequence in similar arrays.

The notation used in modern classification schemes has a mnemonic quality. In order to take maximum advantage of mnemonic notation, Ranganathan prescribed a general canon of mnemonics. According to this canon, "the digit or digit-group used to represent a specific concept in a class number (or any of its constituents) should be the same in all class numbers having that concept represented in them, provided that insistence on such consistent representation does not violate more important requirements" (*Prolegomena*, p. 293).

There are some who have different views regarding mnemonics. According to Foskett, "The value of mnemonics is doubtful. The non-librarian user will not come across them sufficiently often to become aware that they are 'helping his memory', while the classifier using a particular scheme will have little difficulty in remembering large amounts of its notation, whether they are 'mnemonic' or not. On no account should the schedules of a classification scheme be modified in order to gain some dubious advantages of this."² There is no doubt that memorability is important in notation. The mnemonics may be of a limited value to a user, but these matter to a classifier, a reference librarian and a classificationist. It does provide a systematic approach to the designing of a classification scheme.

2 KINDS

Ranganathan recognized the following four kinds of mnemonics:

- Alphabetical mnemonics,
- Scheduled mnemonics,
- Systematic mnemonics, and
- Seminal mnemonics.

3 ALPHABETICAL MNEMONICS

Verbal mnemonics are used a great deal in everyday life. Forexample, A may stand for Atom, B for Ball, and C for Car. These are simple

²A.C. Foskett, *Subject approach to information*, London, Clive Bingley, 1971, 2nd edn., p., 136.

examples of verbal mnemonics. The application of alphabetical mnemonics for the construction of numbers in classification is called an alphabetical device. The alphabetical sequence, achieved by means of an alphabetical device, does not lead to a helpful sequence in most cases. However, there are situations when we may prefer the alphabetical arrangement. This may happen when an arrangement obtained on the basis of any other characteristics does not provide a more helpful arrangement than an alphabetical one. For example, different brands of motor cars having distinctive names, may be arranged alphabetically. The same can be applied in case of different strains of agricultural crops or cultivars. According to the canon of alphabetical mnemonics, "alphabetical mnemonics should be rejected without any hesitation, if a sequence more helpful to readers or more filiatory than alphabetical sequence exists. Alphabetical mnemonics should be preferred if the alphabetical sequence is as helpful as any other sequence and if an international nomenclature exists in the field to which it is applied" (*Prolegomena*, p. 295). The classificatory language, of ordinal numbers is intended to serve as an international language, so that it can be employed in international communication. A use of the alphabetical device with vernacular names will defeat the basic purpose. Therefore, the above canon lays emphasis on the use of the alphabetical device, if international nomenclature is available in the concerned area of study. However, there are examples where vernacular names are accepted for international nomenclature. These names are certainly acceptable, such as names of strains of cultivars in agriculture.

31 Application in Schemes of Classification

The alphabetical device is prescribed by most of the schemes of classification. The schemes usually attempt to follow the canon of alphabetical mnemonics in this respect.

DDC has provided options for an alphabetical arrangement at few places in the schedules and auxiliary tables.

EXAMPLES FROM DDC 18:

583 Dicotyledones

Arrange by orders as below, but if preferred, arrange alphabetically by families.

Note: options similar to the above have been provided under 598-81-88 and "areas" notation 74-79.

UDC uses the alphabetical device in a sparing manner. Authors in

literature, periodicals, biographies and so on are arranged alphabetically.

EXAMPLES FROM UDC:

Biography of Goethe 92 (Goethe) or 92 Goethe

Biography of Schiller 92 (Schiller) or 92 Schiller

LC prescribes the alphabetical device more often than other schemes. Very often, it uses English words as the basis. This has made LC less suitable for international use.

EXAMPLE FROM LC:

In class T technology, A6 apple; M2 Maize; W5 Wheat.

CC prescribes the alphabetical device less often than UDC. It has been recommended for use in only those cases where it provides a more helpful sequence than other methods. It is to be used "in respect of proper names, trade names, and certain technical nomenclature which are internationally current" (CC6, p. 1.33). Thus "if the exposition is confined only to generalia materials by and on a specific person, the digit z should be amplified by (AD) using the name of the person concerned for the purpose" (CC6, p. 1.62). Thus, zG represents Gandhiana. The isolate number for a population cluster or a locality is to be got by an alphabetical device (CC6, p. 22). Thus the class number for Education in Madras city would be T.4411. M. "A physical feature is to be individualized, when warranted, by AD" (CC6, p. 21). Therefore, the class number for the Fauna of the Vindhya mountains would be K:12. 44.g7V.

4 SCHEDULED MNEMONICS

According to the canon of scheduled mnemonics, "a scheme for classification should use one and the same digitor digit-group, as the case may be, to represent an isolate idea or an array isolate idea, in what ever, subject it may occur" (*Prolegomena*, p. 298).

A scheme which satisfies the above canon, will also satisfy the canon of consistence sequence as well as the law of parsimony.

The use of the devices and the schedules of common isolates automatically meet the requirements of the canon of scheduled mnemonics. A faceted classification with regard to the isolates in a facet also satisfies the canon.

41 DDC 19

(a) An area table allows a number to be expanded to indicate geographical significance. This makes it possible to repeat a standard pattern of arrangement by geographical area.

EXAMPLES:

348.73 Laws (statutes), regulations, cases of United States

917.3 Geography of United States

973 History of United States

(b) The numbers for languages allow for common repetition.

EXAMPLES:

032 English language encyclopaedias

420 English linguistics

820 English literature

033 Germanic language encyclopaedias

430 German linguistics

830 German literature

In the above examples, the pattern 2 is used for the English language, and 3 for the German language.

(c) In DDC, a provision has been made for standard subdivisions. This satisfies the canon of scheduled mnemonics.

EXAMPLES:

720.5 Periodical on architecture

605 Periodical on the applied sciences

631.505 Periodical on cultivation and harvesting

05, which stands for periodical, has been taken from the table for standard subdivisions.

407 Study and teaching of languages

614.07 Study and teaching of public health

630.7 Study and teaching of agriculture

07, which stands for study and teaching, has been taken from the table for standard subdivisions.

(d) DDC has adopted the use of parallel schedules at a number of places, and the instructions for use are given in the schedules concerned in the form of "Add as instructed under. . . ." This becomes possible due to parallel subject developments. In such cases, full development of the schedule is given at one place and the same can be utilized by analogy at other places.

EXAMPLES:

(i) Each book of the Bible has been provided the same development as the Bible as a whole.

222-224 specific parts of Old Testament

01-08 General principles

Add to 0 the number following 220 in 220.1-220.8, for example
Exegesis 066

(ii) Each language has been provided the same development. Under "420-490 specific languages," instruction reads, "under each language identified by *, add to designated base number "subdivisions of individual languages" notation 01-86 from table 4".

(iii) Agricultural crops listed in 633-635 are developed parallel to the schedules given under 631-51-631.58 and 632.1-632-9.

(iv) In some of the subjects, these are given the same development as the whole classification. Under 016, bibliographies and catalogs of specific disciplines and subjects, the instruction reads, "add 001-999" to base number 016. Similar instruction has also been provided under 026 Libraries devoted to specific disciplines and subjects.

42 UDC

(a) UDC uses a great deal of parallel schedules. This has been done by means of the instruction "As...."

<i>Class Number</i>	<i>Subject</i>	<i>Instruction</i>
341.71	Diplomatic agents in general	As 35.07/.08
561	Systematic palaeobotany	As 582
633-1	Farming and landwork, growing, etc.	As 631
82.89	Literature of individual languages. For example 820 English Literature (parallel to 420 English language); 830 German literature (parallel to 430 German language)	As 42/49

(b) In a number of places, UDC employs the last digit of a class number as a subdividing digit. This subdividing process leads to use of mnemonics.

EXAMPLE :

550.2 Geoastronomy	2 is the last digit of 52, representing astronomy
550.3 Geophysics	3 is the last digit of 53, representing physics
550.34 Seismology	4 is the last digit of 534, representing acoustics
550.37 Terrestrial electricity. Earth Currents	7 is the last digit of 537, representing electricity
550.38 Terrestrial magnetism. Geomagnetism	8 is the last digit of 538, representing magnetism
550.4 Geochemistry	4 is the last digit of 54, representing chemistry
550.7 Geobiology	7 is the last digit of 57, representing anthropological and biological sciences

(c) Use of the Colon (:) in UDC leads to mnemonics.

EXAMPLES:

Preparation of breakfast	641.5: 642.12
Preparation of evening meals	641.5: 642.16
Preparation of late evening meals	641.5: 642.17

(d) Use of special auxiliary divisions in UDC leads to mnemonics.

EXAMPLES:

Parasitic diseases of field crops	633-23
Fungus diseases of fields crops	633-24
Pest control of field crops	633-29
Aesthetics of dramatic music	782.01
Aesthetics of church music	783.01
Aesthetics of vocal music	784.01
Aesthetics of instrumental music	785.01

43 LC

LC does not employ the concept of mnemonics. Therefore, no scheduled mnemonics are used in this scheme. This has resulted in the unnecessary lengthening of schedules. Geographical divisions have been repeated in different classes with entirely different numbers.

44 CC6

CC uses a large number of devices to satisfy the canon of scheduled mnemonics, such as chronological device, geographical device, sub-

ject device, and so on.

The provision of the common isolates also meets the requirements of the canon of scheduled mnemonics.

CC, being a faceted scheme for classification, satisfies the canon with respect to the isolates in a facet.

CC has adopted the use of parallel schedules at a large number of places, the instructions for which are given in the schedules. The complete schedule is given at one place in one class context. But in other class contexts, where the same schedule is applicable, only a reference is provided. The complete schedule is provided in the class context where it may have originated, or where it may possess primary scope.

<i>Basic Class</i>	<i>Facet</i>	<i>Parallel Schedule</i>
L	[E] cum [2P]	522 Animals. To be subdivided as in "KZ Animal Husbandry"
MJ7	[E] cum [2P]	Same as in "M7 Textiles"
NA	[P3]	22 Library building. To be divided as the [P] of "2 Library Science"
S	[P]	8 social. To be subdivided as [P] of "Y Sociology"

45 BC2

BC2 uses common isolates and devices to obtain scheduled mnemonics. In a few cases it uses parallel schedules to conform to the canon of scheduled mnemonics.

46 RIC

RIC is an enumerative scheme. It does not provide scheduled of common isolates. Therefore, for each specific occasion, tailor-made "local lists" for geographical isolates have been provided. As a result, different digits have been used to denote the same geographical area in different class numbers.

5 SYSTEMATIC MNEMONICS

A scheme for classification should satisfy the canon of systematic mnemonics. According to this canon, "In a scheme for classification, the digits used to represent the array isolate ideas in an array should

run parallel to the sequence in which the principles for helpful sequence would arrange the array isolate ideas" (*Prolegomena*, p. 301).

In order to arrange array isolate ideas, it is essential to satisfy the canon of helpful sequence. In order to implement the canon of helpful sequence, principles for helpful sequence should be followed. The canon of systematic mnemonics directs that a helpful sequence obtained for array isolate ideas in array at the idea plane should be implemented at the notational plane by means of a parallel sequence.

The following are the guiding principles available for the implementation of the canon of helpful sequence:

- (i) (a) Principle of later-in-time
- (b) Principle of earlier-in-time
- (ii) (a) Principle of later-in-evolution
- (b) Principle of earlier-in-evolution
- (iii) Principle of spatial contiguity
- (iv) (a) Principle of increasing quantity
- (b) Principle of decreasing quantity
- (v) (a) Principle of increasing complexity
- (b) Principle of decreasing complexity
- (vi) Principle of traditional or canonical sequence
- (vii) (a) Principle of decreasing literary warrant
- (b) Principle of increasing literary warrant
- (viii) Principle of alphabetical sequence.

The above principles lead to the following sequences:

- (i) Time sequence;
- (ii) Evolutionary sequence;
- (iii) Spatial sequence;
- (iv) Quantitative measure sequence;
- (v) Complexity sequence;
- (vi) Traditional or canonical sequence;
- (vii) Literary-warrant sequence; and
- (viii) Alphabetical sequence.

The above list shows that all the guiding principles, except the principles of alphabetical sequence, lead to systematic mnemonics. The alphabetical sequence leads to alphabetical mnemonics.

The examples given below have been taken mainly from *Prolegomena*:

51 Time Sequence

<i>Subject</i>	<i>DDC (18th edn.)</i>	<i>UDC</i>	<i>LC</i>	<i>CC (6th edn.)</i>	<i>BCI</i>	<i>RIC</i>
Stratigraphy	551.7	551.7	QE724/760	H5	DI-DJ	QT
Archeozoic	551.712	551.71	QE724	H51	DII	QIB
Primary	551.72-551.75	551.73	QE725	H52	DIM	QIC
Secondary	551.76-551.77	551.76	QE731	H53	DJA	QTJ
Tertiary	551.78	551.78	QE735	H54	DJN	QTN
Quaternary	551.79	551.79	QE741	H55	DJT	QTR

The above example shows that the canon of systematic mnemonics is satisfied by the six schemes in the subject of stratigraphy.

<i>Subject</i>	<i>DDC (18th edn.)</i>	<i>UDC</i>	<i>CC (6th edn.)</i>	<i>BCI</i>	<i>RIC</i>
Religion	200	2	Q	P	C
Vedic	294.1	294.11	Q 1	PIA	CWA
Post-Vedic	294.5	294.2	Q 2	—	—
Jainism	294.4	294.35	Q 3	PIV	CWN
Buddhism	294.3	294.3	Q 4	PJ	CX
Judaism	296	296	Q 5	PL	CT
Christianity	280/289	22/28	Q 6	PM/PV	CE/CS
Islam	297	297	Q 7	PK	CU

CC fully satisfies the principles of later-in-time. BC has placed Islam before Judaism. DDC, UDC and RIC have placed Christianity first, giving a favoured treatment. DDC and UDC have violated the principle with regard to religions of Indian origin.

52 Evolutionary Sequence

<i>Subject</i>	<i>DDC (18th edn.)</i>	<i>UDC</i>	<i>LC</i>	<i>DC (6th edn.)</i>	<i>BCI</i>	<i>RIC</i>
Botany	581	58	QK	I	F	TJ
Thallophyta	589	582.22	QK564/635	I 2	FLA	TJK

Bryophyta	588	582.32	QK534/563	I 3	FMB	IJG
Pteridophyta	587	582.35	QK520/532	I 4	FMJ	TJB
Gymnosperms	585	582.42	QK495.G9	I 6	FNA	TFJ
Monocoty-						
ledon	584	582.52	QK643.M7	I 7	FT	TI
Dicotyledon	583	582.61	QK643.D7	I 8	FOE	TG/TH

DDC, UDC and CC satisfy the principle of later-in-evolution fully. Other schemes nearly conform to the principle.

<i>Subject</i>	<i>DDC</i> (18th edn.)	<i>UDC</i>	<i>LC</i>	<i>CC</i> (6th edn.)	<i>BCI</i>	<i>RIC</i>
Zoology	591	59	QL	K	G	TM
Protozoa	593.1	593.1	QL366 etc	K2	GLB	TOB
Porifera	593.4	593.4	QL371 etc	K3	GLU	TOK
Coelenterata	593.5	593.5/.8	QL375 etc	K4	GM	TOL
Echinodermata	593.9	593.9	QL381 etc	K5	GT	TOQ
Vermes	595.1	—	QL386 etc	K6	GN	TQ
Mollusca	594	594.1/.5	QL401 etc	K7	GS	TP
Arthropoda	595.2	595.2	QL403 etc	K8	GP	—
Prochordata	596	596	QL610 etc	K91	GUA	TQT
Pisces	597	597	QL619 etc	K92	GVI	TSA
Amphibia	597.6	597.6	QL668 etc	K93	GWA	TSP
Reptilia	598.1	598.1	QL666 etc	K94	GWL	TST
Aves	598.2	598.2	QL671 etc	K96	GX	TT
Mammalia	599	599	QL700 etc	K97	TY	TU

In the above subject, all the schemes of classification nearly conform to the principle, thus satisfying the canon of systematic mnemonics.

<i>Subject</i>	<i>DDC</i> (18th edn.)	<i>UDC</i>	<i>LC</i>	<i>CC</i> (6th edn.)	<i>BCI</i>	<i>RIC</i>
Medicine	610	61	R	L	HM	U
Embryo	612.64	611-013	RG600 etc	L9B	EE	UDR

Child	618.92	616-053.2	RJ	L9C	HU	UOU
Adolescent	—	—	—	L9D	—	—
Old	618.97	616-053.9	RC952/954	L9E	HPPR	UOR

BC1 and RIC have violated the principle of later-in-evolution.

Subject	DDC (18th edn.)	UDC	LC	CC (6th edn.)	BC1	RIC
Political	320	32	JC	W	R	M
Science						
Anarchy	321.07	335.8	—	W1	—	—
Primitive	321.12	321.2	JC369/392	W2	RBF	MAK
Feudal	321.3	321.3	JC101	W3	RBM	MAL
Monarchy	321.6	321.61	JC374/393	W4	RBG	MAS
Oligarchy	321.5	321.5	JC419	W5	RBL	MAM
Democracy	321.8	321.7	JC421/458	W6	RBC	MAW

53 Spatial Sequence

Subject	DDC (18th edn.)	UDC	LC	CC (6th edn.)	CC (7th edn.)	BC1	RIC
Architecture, building	721	721	NA2835	NA2	NA,2	V	WC
Foundation	721.1	—	—	—	NA,2,1	—	WCN
Structural frame	—	—	NA2940	—	NA,2,2	VDC	WCO
Floor	721.6	721.011.24	NA2970	NA 2,3	NA 2,3	—	WCS
Screenwall	721.2	—	—	NA2,41	NA,2,4	—	—
Room	—	721.05	—	—	NA,2,5	—	—
Roof	721.5	—	NA2900 etc.	NA2,6	NA,2,6	VDF	WCQ

Any building is three-dimensional; therefore, the spatial sequence of the parts of the building may be considered bottom upwards. CC and BC1 seem to satisfy the canon of systematic mnemonics. It is not clear as to why LC, DDC and RIC have placed roof before floor.

<i>Subject</i>	<i>DDC</i> (18th edn.)	<i>UDC</i>	<i>LC</i>	<i>CC</i> (6th edn.)	<i>BCI</i>	<i>RIC</i>
Botany	581	580	QK	I	F	TD
Root	581.498	581.43	QK644	I,13	FCA	TDJ
Stem	581.495	581.44	QK646	I,14	FCF	TDK
Leaf	581.497	581.45	QK649	I,15	FCL	TDL
Flower	—	581.46	QK653	I,16	FCP	TDH
Fruit	—	581.47	QK660	I,17	FCU	TDH
Seed	—	581.48	QK661	I,178	FCV	TDH

UDC, LC and CC have arranged the array of isolates along a vertical line starting bottom upwards.

54 Quantity Sequence

<i>Subject</i>	<i>DDC</i> (18th edn.)	<i>UDC</i>	<i>CC</i> (6th edn.)
Town planning	711.4	711.43	NB
Village	711.43	711.437	NB,1
Town	711.43	711.434	NB,3
City	711.43	711.433	NB,5
Metropolis	711.43	711.432	NB,7

UDC follows above the sequence of decreasing quantity. CC follows the sequence of increasing quantity.

CC (6th edition) arranges libraries in the decreasing quantity, such as world library, national library, regional library, constituent state library, district library and city library. In UDC, under tax-and rate-supported libraries, we find libraries arranged in the increasing quantity, such as municipal library, regional library, and state library.

CC (6th edition) arranges the universe of geometry on the basis of increasing quantity, the order being line, plane, three dimensions, four dimensions, five dimensions and n dimensions.

55 Complexity Sequence

<i>Subject</i>	<i>DDC</i> (18th edn.)	<i>UDC</i>	<i>LC</i>	<i>CC</i> (6th edn.)	<i>CC</i> (7th edn.)	<i>BCI</i>	<i>RIC</i>
Psychology	150	159.9	BF	S	S	I	BJ
Perception	152.1	159.937	BF211 etc	S:2	S:2	ICR	BKA
Consciousness	152.3	—	BF311 etc	S:3	S:3	ICA	BKK
Cognition	153	159.95	BF365	S:4	S:4	IFR	BKJ
Emotion	152.4	159.942	BF511 etc	S:52	S:52	ID	BLJ
Conation	153.8	159.943	BF698 etc	S:6	S:6	IEV	BLF
Personality	153.9	159.923	BF698	S:7	S:7	IG	BLN
Metapsychology	154	159.96	BF1001 etc	S:8	S:8	ION	BQ

The above table shows that the schemes differ with regard to their understanding of increasing complexity.

In the basic subject of linguistics, CC (6th edition) arranges the elements as isolated sound, syllable, word, phrase, clause, sentence, piece of composition and reader—in the order of increasing complexity.

In the basic subject of geography, CC (6th edition) arranges the subjects in the order of increasing complexity, such as mathematical geography, physical geography, anthropo-geography, political geography and economic geography—thereby satisfying the canon of systematic mnemonics.

6 SEMINAL MNEMONICS

60 Introduction

Let us examine the following concepts occurring in different basic subjects of a scheme for classification:

<i>Basic subject</i>	<i>Concepts of phenomena</i>
Chemistry	Synthesis
Biology	Pathology
Animal husbandry	Disease
Medicine	Disease
Economics	Transport
Sociology	Social pathology

The above concepts of phenomena occur in different basic subjects, and are represented by different terms. These concepts appear to be unrelated at the phenomenal level; however, they seem to be related to one another at the deeper level. Intuitively, they can be perceived as different manifestations of the same basic underlying idea of "disease" Thus we may call these concepts "seminally equivalent" ones.

According to Ranganathan, "A scheme for classification should use one and the same digit to denote seminally equivalent concepts in whatever subject they may occur" (*Prolegomena*, p. 304). This has been referred to as the canon of seminal mnemonics. This means that the seminally equivalent concepts are to be represented by the same number in all subjects, where these may occur. However, these concepts are denoted by different terms in different places. Thus, seminal mnemonics consist of using the same digit (s) to represent seminally equivalent concepts, irrespective of the basic class in which these might occur or the terminology used for them. Class numbers obtained with the help of seminal mnemonic digit will satisfy the canon of filiation sequence, the canon of consistent sequence and the canon of helpful sequence.

Ranganathan used the concept of seminal mnemonics "intuitively and almost unconsciously" in developing the schedules of *Colon classification*. In the first edition of *Prolegomena to library classification*,³ he used the terms "unsheduled mnemonic." However, B. I. Palmer and A. J. Wells suggested the term "seminal mnemonics" in their *Fundamentals of library classification*, which was later adopted by Ranganathan.

61 Identification

"The identity of the concept is cognizable at great depths, beyond the reach of natural language. As and when the concept came up to the surface in particular contexts, a word in the natural language has been coined to denote it in that context. At the unmanifest depth of identity, there has been no need to denote that seminal concept by a term in the natural language" (*Prolegomena*, p. 304). However, in classificatory language, it is possible to denote it by means of definite digit(s).

The perception of seminal equivalents is considered to be a trans-

³S. R. Ranganathan, *Prolegomena to library classification*, Madras, Madras Library Association, 1937, p. 129.

intellectual process. A classificationist should possess a sufficient degree of intuitive insight, so as to be able to recognize seminally equivalent concepts. Such an ability is rare. At the verbal plane, it is not easily possible to recognize seminal equivalents. Therefore, seminal equivalents have to be identified at the idea plane, so that the classificationist can allocate the same digit or group of digits to represent such concepts at the notational plane.

62 Basis

According to Subramanyam, "The ancient Hindu seers have hypothesized that everything in the phenomenal world is subject to change. The continually changing phenomenal world is seen as a projection of an undifferentiated substratum that never undergoes any transformation. This substratum, or the Absolute Reality, manifests itself in the form of myriads of objects and beings constituting the phenomenal universe...eventually discovered that the nature of this undifferentiated substratum is transcendental, that it cannot be perceived by the intellect, and that it can only be experienced when one attains a superconscious state, transcending the limitations of the time-space-causation continuum . . . What is important is the finding that the astounding diversity of nature as perceived by man through his senses diminishes as we go deeper into the subtler levels of consciousness. Ultimately, at the superconscious level, the myriads of entities which appear to be different and independent at the phenomenal level, merge into one undifferentiated substratum"⁴. This has been suggested as an explanation of the seminal equivalence of concepts, which may appear to be unrelated. This could prove to be of help in achieving understanding regarding the basis of seminal mnemonics.

63 Scheduled Mnemonics Versus Seminal Mnemonics

In case of scheduled mnemonics, the same concept is represented by the same term as well as the same number, in whatever subject it may occur. But in seminal mnemonics, the same concept is represented by different terms. However, the same concept is denoted by the same number in whatever subject it may occur. In other words, in different schedules the seminally equivalent concepts are denoted by the same digit(s), but the equivalent term prevalent in the natural language would be different in each schedule of the scheme.

⁴K. Subramanyam, "Seminal mnemonics in classification," *International Classification*, 3, 1976, pp. 16-18.

64 *Colon Classification*

CC follows the canon of seminal mnemonics to some extent. The table below shows the application of the canon in CC6:

<i>Digit</i>	<i>Seminally Equivalent Concepts</i>
1	Unity, God, world, the first in evolution or time, one dimension or line, solid state.
2	Two dimensions, plane, conics, form, structure, anatomy, morphology, sources of knowledge, physiography, constitution, physical anthropology
3	Three dimensions, space, cubics, analysis, function, physiology, syntax, method, social anthropology
4	Heat, pathology, disease, transport, interlinking, synthesis, hybrid, salt
5	Energy, light, radiation, organic substance, liquid, water, ocean, foreign land, alien, external, environment, ecology, public controlled plan, emotion, foliage, aesthetics, woman, sex, crime
6	Dimensions, subtle, mysticism, money, finance, abnormal, phylogeny, evolution
7	Personality, ontogeny, integrated, holism, value, public finance
8	Travel, organization, fitness

The following schedule from the basic class biology illustrates the application of the concept of seminal mnemonics in CC6:

BIOLOGY

G

Foci in [E] cum [2P]

- 1 Preliminaries
- 2 Morphology
- 3 Physiology
- 4 Pathology
- 5 Ecology
- 6 Genetics (phylogeny)
- 66 Evolution
- 7 Development (ontogeny)
- 8 Manipulation

Comments: Preliminaries refer to introductory materials, which must come in the beginning. Morphology, physiology, pathology, ecology and evolution need no explanation. Development (ontogeny) deals with the individual being; therefore, this is concerned with personality. CC6 uses digit 7 to represent personality. Manipulations are concerned with some kind of management. CC uses digit 8 to repre-

sent management. Abdul Rahman and T. Ranganathan⁶ have examined the application of the concept of seminal mnemonics in CC. Their investigation has revealed that:

- (a) seminal mnemonics occur in nearly 13 per cent of all special isolates;
- (b) seminal mnemonics are non-existent in the matter facet (perhaps because this facet formula contains the least number of isolates); and
- (c) the incidence of seminal mnemonics is highest (63 per cent) in the energy facet.

The above findings should be interpreted in terms of the changed concept of energy.

65 Advantages

Abdul Rahman and T. Ranganathan⁶ have put forward the following advantages:

- (1) Seminal mnemonics aids memory
- (2) It discloses coherence, if not the identity in the different fields of the universe of knowledge.
- (3) If understood well, it induces an integrated outlook in the classifier.
- (4) It is a great benefit in itself, besides being capable of begetting many more benefits.

It may be kept in mind that most of the advantages mentioned above pertain to the classificationist, and not to the classifier. Seminal mnemonics can be considered a very powerful tool in the hands of a classificationist. He should take full advantage of them. If he leaves it to classifiers, it will result in a great deal of inconsistency, due to subjectivity in the approach of classifiers. "This is a powerful device, which secures a high degree of autonomy for individual classifiers. For this reason it can be handled only by classifiers who are highly attuned to the insight—I would even say spiritual insight into the identity of patterns at seminal depths—or intuition which enables one to perceive directly—i.e. unassisted by the ordinary senses—the very depths of entities, the depths at which are disclosed the identity of patterns in spite of the differences in their manifestations at the

A. Rahman and T. Ranganathan, "Seminal mnemonics," *Annals of Library Science*, V. 9, 1962, p. 62.

⁶A. Rahman and T. Ranganathan, "Array isolates and seminal mnemonics in CC," *Annals of Library Science*, V. 9, 1962, p. 146.

level of sensual perception" (CC6, p. 1.32). CC is the only scheme which has taken advantage of seminal mnemonics. There is a need for more work to be done to identify more concepts belonging to seminal mnemonics. This is also one of those areas where S.R. Ranganathan could not provide a clear explanation with regard to the theoretical basis of the concept of seminal mnemonics.

As we have seen, seminal mnemonics is a powerful and valuable tool in the hands of classificationists and classifiers. A systematic approach is implied in the concept of seminal mnemonics. It is suggested that future schemes of classification, both general and special, should take full advantage of this device.

7 CONCLUSION

Mnemonics serve as an aid to memory for those concerned with classification in one way or another. Classifiers and reference librarians find this quality of notation very useful in their daily work. Classificationists consider the mnemonic quality of notation very useful in designing schemes of classification.

Of the different schemes of classification, CC has taken maximum advantage of mnemonic notation. This is true mainly because CC is a faceted scheme based on a theory of library classification. The concept of seminal mnemonics used in CC has added to the value of the scheme.

FURTHER READINGS

- ARTHUR MALTBY, *Sayers' manual of classification for librarians*, 5th ed., London, Andre Deutsch, 1975, pp. 41, 74, 84-86.
- A. NEELAMEGHAN, "Seminal mnemonics as a pattern for systems analysis," *Library Science*, 7, 1970, pp. 353-64.
- S.R. RANGANATHAN, *Prolegomena to library classification*, 3rd ed., Bombay, Asia Publishing House, 1967, part K.
- K. SUBRAMANYAM, "Seminal mnemonics in classification," *International Classification*, 1976, pp. 16-18.

Chapter 12

PLANES OF WORKS

0 INTRODUCTION

Ranganathan recognized three planes of work, namely the idea plane, the verbal plane and the notational plane. During the first two decades of his work as a classificationist, he did not realize the significance and possibility of separating the work into three plans. However, in 1944, he was looking into the question of desirability, as well as the possibility of such a step. By 1952, he had been able to get a "better grasp" of this approach. Thus, he wrote; "We start with the following assumed terms:

<i>Plane</i>	<i>Technical Terminology</i>
Idea	Class (used in the idea plane)
Verbal	Subject (used in the verbal plane)
Notational	Class number (used in the notational plane)

Then, we have the relation,

Class ||| Subject ||| Class number, (where ||| means 'has the same meaning as')"¹

From 1952 onwards, Ranganathan made a conscious effort to separate the work on the three planes.

Working towards the development of a dynamic theory of library classification led to the fact that the design and application of a scheme for library classification involved work in the idea, verbal and notational planes. The dynamic theory also led to the realization that work in these planes is separable and can be carried out independently. Of course, work in the idea and notational planes would influence each other. In fact, the first step towards the formu-

¹S.R. Ranganathan, "Optional facets in library classification (9)", *Annals, Indian Library Association*, 2, 1952, pp. 175-6.

lation of the dynamic theory was to recognize the three planes and separate the work along these. The separation of classification work along three planes should be regarded as one of the basic contributions of the dynamic theory of library classification.

1 IDEA PLANE

The mind of man—regarded as his essence—is where ideas originate. An idea is 'the product of thinking, reflecting, imagining, etc., got by the intellect by integrating with the aid of logic, a selection from the apperception mass, and/or what is directly apprehended by the intuition, and deposited in the memory' (*Prolegomena*, p. 81). Language is the medium through which ideas are communicated. At the idea plane, the concepts are viewed by themselves, independent of the terms and numbers representing them. Here, terms refer to expression in the natural language. Numbers denote concepts in the artificial language of ordinal numbers.

In library classification, we are concerned with the universe of subjects. A subject is merely an organized or systematized body of idea(s). The basic work of library classification shall take place at the idea plane. The efficiency of a scheme will largely depend upon the quality of the theory of library classification used for work on the idea plane.

Work at idea plane is paramount, but the idea plane does not manifest itself directly. Take the case of a schedule of classes or isolates in a scheme: the verbal and notational planes are manifest, but not the idea plane. The ideas remain hidden behind class numbers and words. These class numbers and words are of interest because of the ideas denoted by them. Ideas must be represented at the verbal plane in precise terms. In case of terminology, only standardized terms should be used. However, if some of these do not exist, then the specialists should evolve them.

For a long time, the development of the idea plane had been inhibited due to the limitations of the notational plane. It is only recently that the notational plane has been able to overcome these limitations to a great extent.

2 VERBAL PLANE

Human beings possess the capacity to create ideas. An articulate language or a written language serves as a medium for the communication of ideas. The verbal plane involves expression of concepts in a natural language. However, we find that every natural language develops slower than ideas. Because of this, homonyms (the same word is used in different senses in different disciplines or in the same discipline) and synonyms (the two different words may represent one entity) grow at a fast pace. In fact every natural language proves to be inadequate. The ideas are formed faster than words. Often there may be no agreement about certain words. Work at the verbal plane has to be carried out for each natural language separately. We should use terms in current use from standard terminology. There is a need to develop technical terminology free from homonyms and synonyms for each discipline. This would require cooperation between specialists and linguists. It would be helpful if international nomenclature is established and adopted for use. Even in library and information science, this has not been achieved. To overcome the problems of natural languages, some of the schemes for classification add an annotation after the terms. Ranganathan has suggested that a classificationist should follow the canon of context and the canon of enumeration for the designing of schedules. A classifier and a reference librarian should keep these canons in view while doing their work. CC follows these canons.

On examining the schedules of schemes of classification in BCI, CC, RIC and UDC, one becomes aware of a lack of standard terminology. At times, it can prove a handicap for a classifier.

3 NOTATIONAL PLANE

Attempts are being made to make language precise in a specific discipline. Sometimes, words are replaced by symbols. These symbols have precise meanings. In library classification, we deal with the artificial language of ordinal digits, which is called classificatory language. These ordinal digits are helpful in arranging documents. In classificatory language, an idea is represented by an ordinal digit(s). There are no homonyms and synonyms. Thus, the notational plane is a plane of numbers, where concepts are represented by numbers. The main concern at the notational plane is to develop a set of ordinal

digits and the rules for their usage. These are the distinctive features of the notational plane.

Natural language is used by a common man, but classificatory language is not in wide use. The latter is a controlled language—controlled by a classificationist. It is meant for the arrangement of subjects, isolates and documents. As the universe of subjects is dynamic, a classificatory language must be developed continuously so as to be able to meet the onslaught of the universe of subjects. Definite rules based on normative principles of classification, as well as general ones, are prepared for the purpose. The notational system for such a language must be extremely versatile. In order to make library service more efficient, work at the notational plane must be carried on continuously. It should be carried out so that the notational plane is fully able to fulfil the demands of the idea plane. This will satisfy the laws of library science.

4 ADVANTAGES

Separation of work in the three planes has many advantages. These have been described in the next paragraphs.

The role of each plane has been well defined. For instance, it is considered that the decision in the idea plane is paramount and it is the duty of the notational plane to implement findings of the idea plane. In other words, the notational plane should not take its own decisions in certain matters, such as the sequence of subjects, or isolates, or facets. This has greatly helped in the advancement of the theory and practice of library classification.

In case of a good thinker, the work gets separated unconsciously in the three planes till a certain stage. After this stage, it may not be separated completely. As a result, the work at idea plane and notational plane would show inhibition. The verbal plane would also not develop fully. However, conscious separation of work in the three planes allows for a fuller development of these planes.

Looking back before these planes were separated, we find that frequent and unconscious change from one plane to another led to many difficulties. Due to the limitations of the notational plane, work in the idea plane could not progress satisfactorily. There were also inherent shortcomings at the verbal plane. All this added to the difficulties. Many of them have been overcome as a result of the approach described above.

5 PRACTICAL CLASSIFICATION

Eights steps have been suggested by Ranganathan to carry out the translation of the name of a subject into artificial language of ordinal digits. These are the steps prescribed for practical classification. These have been separated according to the three planes, as given below:

Idea plane: Step 0 Raw title; Step 1 Expressive title; Step 2 Title in kernal terms; Step 3 Analyzed title; Step 4 Transformed title.

Verbal plane: Step 5 Title in standard terms.

Notational plane: Step 6 Title in focal numbers; Step 7 Class number.

The above steps have been explained in Chapter 15.

6 CHART OF EQUIVALENT TERMS

It is to be noted that corresponding terms to be used on the idea, verbal and notational planes, to denote ideas in these planes, have been developed. For the sake of convenience, generic terms to denote any of the corresponding terms, or all of them collectively, have been formed. The following is the extract from the chart of equivalent terms:²

<i>Generic</i>	<i>Idea plane</i>	<i>Verbal plane</i>	<i>Notational plane</i>
Isolate	Isolate idea	Isolate term	Isolate number
Common isolate	Common isolate idea	Common isolate term	Common isolate number
Focus	Class	Subject	Class number

7 CONCLUSION

We have already seen that it is essential that work be separated at three planes. The idea plane is supposed to lay down the goals to be achieved. In the idea plane, a classificationist is primarily concerned with the nature of the universe of subjects. The verbal plane provides isolate terms fit to be used as subject headings. Here, the

²Indian Standards Institution, *Glossary of classification terms* (IS: 2550-1963), New Delhi, Indian Standards Institution, 1963, pp. 39-40.

primary concern is to express concepts in suitable terms. It is the work of the notational plane to implement the findings of the idea plane and also mechanize the arrangement of entities classified. The separation of work at three planes has also led to the fact that versatility of the notational plane should be improved, so that findings on the idea plane can be implemented fully. Work in three planes cannot be demarcated completely; it will overlap, but should be coordinated.

FURTHER READING

S.R. RANGANATHAN, *Prolegomena to library classification*, 3rd ed., Bombay, Asia Publishing House, 1967, part M.

FORMATION STRUCTURE AND DEVELOPMENT OF SUBJECT

0 INTRODUCTION

A classifier/classificationist/documentalist/information scientist is essentially concerned with formation, structure, development and the classification of ideas embodied in documents. When ideas get organized or systematized in the form of a body of ideas, a subject is formed. We shall confine ourselves to a study of the universe of subjects, and not of the universe of knowledge. The universe of knowledge is the concern of philosophers.

In order to design and develop the schemes of classification along proper lines, it is essential to make a systematic study of the attributes regarding the formation, structure and development of the universe of subjects.

The study of modes of formation and the structure of subjects in the universe of subjects, as well as of the isolate ideas in the universe of isolate ideas, will serve as a preliminary to the theory of freely-faceted classification. Such a study has led to the development of a typology of relations, which has proved useful for designing schemes for classification.

It has been found that the application of General Systems Theory to the study of structure and the development of the universe of subjects, gives useful results. This methodology has enabled the prediction and understanding of various kinds of interrelations between subjects and their components. The other advantage of this methodology is that it has been found useful in teaching and learning the subject of study.

1 FORMATION OF SUBJECTS

A variety of relations are possible between any two components of a subject. These relations can be formalized into a set of relations leading to a typology of relations. Any typology of relations is based

on the deductions drawn by classificationists, specialists, philosophers and so on. It may be emphasized that the search for a typology of relations is essential for developing a scheme for library classification. Different specialists have recognized different types of relations between the components of a subject, or the modes of subject formation in the universe of subjects. Here, we shall deal with the typology of relations developed by Ranganathan and his school of thought.

In 1950, Ranganathan put forward the viewpoint that subjects in the universe of knowledge can be formed by means of four modes of formation; these are loose assemblage, lamination, dissection and denudation.

The following are the modes of formation¹ of subjects and isolates, or relations between the components of a subject:

- (1) Loose assemblage;
- (2) Lamination;
- (3) Fission;
- (4) Fusion;
- (5) Distillation;
- (6) Agglomeration; and
- (7) Cluster.

The above modes represent various kind of relations which lead to the formation of subjects in the universe of knowledge. We can also have all possible combinations of these modes.

Note : The definitions relating to the formation of subjects have been taken from the article by M.A. Gopinath and S. Seetharama (see footnote below).

II Loose Assemblage

III Loose Assemblage I

In this mode of formation, "two or more subjects—simple or compound—are studied in their mutual relation."

Such a relation is called "inter-subject phase relation" and gives rise to a complex subject. The stage of the taking place of this relationship is considered an initial stage in the evolution of a hybrid discipline or other types of interdisciplinary subjects.

¹M.A. Gopinath and S. Seetharama, "Interdisciplinary subjects and their classification" *In Third International Study Conference on Classification Research (Bombay) (1975), Ordering systems for global information networks: Proceedings, Bangalore, FID/CR, 1979, pp. 121-135.*

The phase relations taken under this mode of formation are:

- (i) General relation;
- (ii) Bias;
- (iii) Comparison;
- (iv) Difference;
- (v) Influence and
- (vi) Tool (one subject may be used as a tool for studying another subject).

EXAMPLES:

- (i) The relation of mathematics to biology.
The General relation between political science and history.
- (ii) Physics biased to biology.
Psychology for doctors.
- (iii) Physics compared with chemistry.
Anthropology compared with sociology.
- (iv) The difference between wave function and wave mechanics.
The difference between physics and chemistry.
- (v) The influence of physics on biology.
The influence of sociology on law.
- (vi) The application of statistics to the study of library science.
The application of statistics to the study of economics.
The application of physics to chemistry.

112 Loose Assemblage 2

In this mode of formation, "Two or more isolates from one and the same schedule are brought into mutual relation."

Such a relation is called the "intra-schedule phase relation," and gives rise to a complex isolate of Kind 1.

The relations may be any one of the kinds given under Loose Assemblage 1.

The phase relations taken under this mode of formation are:

- (i) General relation;
- (ii) Bias;
- (iii) Comparison;
- (iv) Difference;
- (v) Influence and
- (vi) Tool.

EXAMPLES:

- (i) The relation between Jainism and Hinduism.

- The relation between human physiology and disease.
- (ii) Commonwealth preference in India's commerce.
Bias of Bernard Shaw to Shakespeare.
- (iii) The comparison between Hinduism and Buddhism.
The comparison between Shakespeare and Bernard Shaw.
- (iv) The difference between Hinduism and Buddhism.
The difference between human physiology and disease.
- (v) Sikhism influenced by Hinduism.
The influence of human physiology on disease.

113 Loose Assemblage 3

In this mode of formation, "Two or more isolates taken from one and the same array of order higher than 1 in one and the same schedule are brought into mutual relation."

Such a relation is called the "Intra-array phase relation" and gives rise to a complex isolate of Kind 2.

The relations may be one of the kinds given under Loose Assemblage 1.

The phase relations taken under this mode of formation are:

- (i) General;
- (ii) Bias;
- (iii) Comparison;
- (iv) Difference;
- (v) Influence and
- (vi) Tool.

EXAMPLES:

- (i) The relation between city residents and rural residents.
The relation between UDC and DDC.
- (ii) The bias of rural residents towards city residents.
The bias of UDC towards DDC.
- (iii) City residents compared with rural residents.
CC compared with DDC.
- (vi) The difference between rural folk and city folk.
The difference between CC and DDC.
- (v) The influence of city folk on rural folk.
The influence of CC on DDC,

12 Lamination

121 Lamination 1

In this form of mode, "One or more isolate (I) facets are combined with a basic subject (BS)."

This mode gives rise to a compound subject.

EXAMPLES:

- (i) Sociology (BS) city (I) poverty (I)
- (ii) History (BS) India (I) constitution (I)
- (iii) Botany (BS) morphology (I)
- (iv) Economics (BS) public finance (I) production (I)

Note: (BS) is a basic subject. (I) is an isolate.

122 Lamination 2

In this form of mode, either "1. Two or more species of basic subjects going with the same primary basic subjects are compounded over one another, giving rise to a compound basic subject," or "2. Two or more isolates from the same schedule of isolates are compounded, giving rise to the compound isolates."

EXAMPLES:

- (i) Study of radiation according to wave mechanics, (Here, the subject is a compound basic subject got by the combination of the basic subject "radiation physics" with the basic subject "wave mechanics.")
- (ii) Magnetism in quantum physics (similar to example (i)).
- (iii) Urban youths (here, the subject is a compound basic subject got by combination of isolate idea "youths" over the idea "urban.")
- (iv) Arteries of arms (similar to example (iii)).

13 Fission

In this form of mode, "a basic subject or an isolate is split into subdivisions," Subject specialists refer to such a process as "fragmentation."

131 Fission of Basic Subjects

The primary basic subject "philosophy" may be fissioned into the following secondary basic subject: logic, epistemology, metaphysics, ethics and aesthetics.

132 Fission of Isolate Ideas

The fission of an isolate idea may be achieved in the following ways:
(i) As an array division, or (ii) As the combination of a principal isolate and a speciator.

EXAMPLES:

(i) Fissioning of the isolate idea "Asia" gives us array divisions such as Iran, India, Nepal, Afghanistan and so on.

(ii) "Bicycle—Hind Brand" is the combination of "bicycle" (principal isolate) and "Hind Brand" is a speciator.

133 Dissection

* This term is used to denote fission when we consider the array of divisions of an isolate or of a basic subject resulting from fission."

134 Denudation

"This term is used to denote fission when we consider one and only one subdivision of an isolate or of a basic subject resulting from fission."

14 Fusion

In this form of mode, "two or more primary basic subjects are fused together in such a way that each of them loses its individuality with respect to the schedule of isolates needed to form the compound subject going with it." This gives rise to a new primary basic subject.

EXAMPLES:

Biochemistry. (Biochemistry is a primary basic subject achieved by the fusion of "biology" and "chemistry".)

Astrophysics. (Primary basic subject derived by the fusion of astronomy and physics).

Medical jurisprudence. (Primary basic subject achieved by the fusion of medicine and law.)

Educational psychology. (Primary basic subject achieved by the fusion of education and psychology).

Geopolitics. (Primary basic subject achieved by the fusion of geography and political science).

15 Distillation

In this form of mode, "a pure discipline is evolved as primary basic subject from its appearance-in-action in diverse compound subjects

going with either different basic subjects or one and the same basic subject."

Distillation gives rise to primary basic subjects.*

EXAMPLES:

Management science
Research methodology
Statistical analysis
Astronomy
Microbiology
Forestry

16 Agglomeration

"Agglomeration is the process of the collecting together of entities into large masses without cohesion among the components." Earlier, this was referred to as partial comprehension. An agglomerate can be a basic subject, or it can also be an isolate idea. Agglomeration may be made up of consecutive constituents or even non-consecutive constituents.

EXAMPLES:

Agglomerate of Kind 1

Natural sciences
Physical sciences
Biological sciences
Social sciences
The humanities

Agglomerate of Kind 2

Geology and geography
History and economics

17 Cluster

Sometimes, together all possible information about a "phenomenon" or "entity", may require the attention of several specialists from different disciplines. This kind of research may involve interdisciplinary or multidisciplinary research. For the sake of convenience, "the preliminary results and data obtained in the work falling in different subject fields involved in the study of a phenomenon or an entity are brought together in a document and treated disjunctively . . . that is, without any substantial integral treatment . . . The document in which the preliminary results are brought together just as collection,

taken as a whole, presents a subject-field in which there is core entity of study with inputs or viewpoints or work in it coming from specialists in subjects going with diverse basic subjects.²² This is explained as clustering around a nodal idea. Thus, in the cluster form of mode, "several specialized studies on a particular phenomenon or an entity are gathered together into a field of study."²³

EXAMPLES:

- (a) Area study (geographical area forms the focus of cluster)
 - (i) Indology (Indian studies)
 - (ii) Nipponology (Japanese studies)
 - (iii) Orientalia (Asian studies)
 - (iv) Occidentalia (European studies)
- (b) Generalia person study (multifaceted personality forms the focus of cluster)
 - (i) Gandhiana (Mahatma Gandhi is the focus of cluster)
- (c) Entity or phenomenon (entity or phenomenon of study forms the focus of cluster)
 - (i) Soil science (soil is the focus of cluster)
 - (ii) Surface science (surface is the focus of cluster of specialized studies)
 - (iii) Space science (Space is the focus of cluster)
 - (iv) Ocean science (Ocean is the focus of cluster)

18 Stages of Development of Interdisciplinary Subjects

The chart given below indicates the stages of development of interdisciplinary subjects:

<i>Stage</i>	<i>Mode of Formation</i>	<i>Resulting Subject</i>
First	Loose assemblage	Subjects involved are complex subjects
Second	Lamination	Compound subjects
Third	Fusion or distillation or cluster	Basic subjects

It may be added that the typology of relations postulated by Ranganathan is helpful in determining the stage of development of a subject.

²²*Ibid.*, p. 13.

²³*Ibid.*, p. 12.

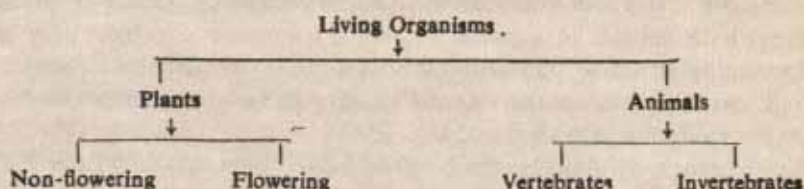
2 STRUCTURE

The mode of formation of a subject affects structure. The various kinds of structures have been described as follows:

21 Dichotomy

"Dichotomy" refers to a division into two. This is also referred to as binary classification. "Tree of porphyry" is a schematic representation of dichotomy. Here, in the first stage, two divisions take place. In the second stage, two sub-divisions of each division are obtained. In this manner, the process of division may be continued. We are thus able to get "tree of porphyry."

Early man must have found the use of dichotomy sufficient for his requirements. Immanuel Kant gave a dichotomous picture of the entire universe of subjects. However, dichotomy is insufficient for designing a scheme for classification for the existing universe of subjects. It has been used in rare instances successfully; one such example is given as follows:



The above process of dichotomy can be continued further.

22 Decachotomy

Decachotomy refers to a division into ten. When Melvil Dewey appeared on the scene, dichotomy was in much use in the form of the tree of porphyry. However, Dewey divided the field of knowledge into nine main classes, and tenth class was formed for general documents not belonging to any of the main classes. This process of division into ten at each stage is continued till as many sub-sections as are required have been obtained. From the point of the nature of growth and the development of knowledge, it is unrealistic to bind the universe of subjects to a decachotomy, because it grows in different directions and at different stages.

23 Polychotomy

Polychotomy refers to a division into many. We have already seen

that decachotomy is arbitrary in nature, being satisfactory to a limited extent.

In 1893 C. A. Cutter, in *Expansive classification*, introduced polychotomy in a limited way by stipulating the number of divisions (at each stage of division) to be 24. However, by the middle of twentieth century, this restriction to 24 was found to be an impediment; the lesson is that the number of divisions to be incorporated at a given stage of division should not be predetermined.

The existing universe of subjects is "a turbulent, ever-growing dynamic continuum" (*Prolegomena*, p. 363). Therefore, it is not possible to predict the maximum number of divisions to be provided for in a particular array or stage of division. Therefore, *Colon classification* (6th edition) has provided for more than a thousand divisions at any stage. This provision has been increased further in CC7.

24 Proliferation

According to Ranganathan, "Various are the ways in which the universe of subjects going with a basic subject can get proliferated. For, a complex subject in that universe may be formed by attaching some other basic subject as a phase. . . . And, a compound subject may be formed by attaching one or more isolate ideas to the basic subject And various are the ways in which such isolate ideas can themselves proliferate" (*Prolegomena*, p. 364).

We can well imagine the tremendous unlimited proliferation that is taking place in the universe of subjects. This is creating an increasing number of problems for the designers of schemes for classification.

3 DEVELOPMENT

31 Research in Parallel

A study of the history of mankind indicates that till recent times population and social pressures were rather low. As a result, there was hardly any incentive for pursuing an organized or cooperative development of the universe of subjects. There was a lack of communication of ideas. A researcher carrying out research in one part of the world did not know about what was being done elsewhere. There was a great deal of secrecy about research. Sometimes, a researcher did not communicate his findings to anyone else. In other words, parallel research was being carried out in various parts of the world.

Because of this, the same findings were achieved at different places by different researchers, thus causing a great deal of wastage of research potential. There was often a large time gap between research findings and their application. As a result of these factors, the universe of subjects was developing at an extremely slow pace.

32 Relay Research

During recent decades, population pressures have attained an all-time high. There has also been a great spread of democracy. Consequently, there are social pressures to satisfy the minimum needs of individuals in a democracy. This has further led to the desire for higher standards of living. Population and social pressures have led to a conscious and organized effort towards the development of the universe of subjects. "As a result, the involuntary work of the stray genius is supplemented by the work of a hierarchy of persons of successive removes in the intellectual scale. With each man of genius is associated, directly or indirectly, an army of persons drawn from various intellectual strata to complete the task by a large volume of developmental research and pedestrian work" (*Prolegomena*, p. 371).

Research conducted by individuals working in isolation leads to the wastage of research potential. Therefore, this has been replaced by relay-research. "In spite of political barriers, except in the sector of Defence Science, there is now a tendency to allow research grid pertaining to any subject to extend over the whole world" (*Prolegomena*, p. 371). In addition, the means of communication of ideas have improved a great deal. Latest methods and techniques of the storing and retrieval of information have made it possible to achieve a prompt communication of new ideas. Thereby, the time gap between research findings and their application has been reduced to a great extent. Due to the availability of organized sources of information and the application of information technology, it has become possible to avoid duplication of research. Of course, due to the explosion of knowledge, it has become more and more difficult for a researcher to be able to keep himself up-to-date and well informed in his field of specialization.

Relay-research had a tremendous effect on the formation of new subjects "In the past, at long intervals, the work of a powerful genius used to throw it into a state of turbulence. But the state of turbulence gave place to one of placidity in a fairly short time; and during the intervening long periods the universe of subjects was

mostly static. But, at present, organized relay research is producing a continuous cascade of new micro subjects, each stimulating another in succession in every area of subjects" (*Prolegomena*, p 373). The continuous cascade has made the universe of subjects a growing and deepening continuum. That is why we say that the universe of subjects has acquired a dynamic continuum.

FURTHER READINGS

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Chapter 14

DEVICES

1 PURPOSE

The devices are used to form or sharpen

- (i) foci of a facet in an analytico-synthetic classification scheme or
- (ii) a class number in an enumerative classification.

2 ADVANTAGES

The advantages of using devices are as follows :

(i) These make it possible to avoid enumeration. This leads to the shortening of schedules, thereby satisfying the law of parsimony;

(ii) They provide autonomy to a classifier. In case, a new subject appears then this would require the formation of new isolates or sharpening of existing isolates and also provision of numbers co-extensive with them. These devices will make it possible for a classifier to achieve the above without waiting for guidelines from the classificationist.

(iii) They satisfy the canons of consistent sequence, helpful sequence, scheduled mnemonics and hospitality in array as well as chain.

(iv) These lead to same isolate idea and isolate number in an analytico-synthetic scheme. In an analytico-synthetic scheme like *Colon classification*, proper use of devices will generally lead to the same isolate idea and isolate number irrespective of who the classifier might be.

Faceted schemes for library classification have taken greater advantage of devices. Out of different faceted schemes, *Colon classification* has taken the maximum advantage of these. UDC has also used a number of devices, which has added to its usefulness.

Ranganathan did a remarkable job in breaking the rigidity of the

notational system in CC. He based its notational system on a general dynamic theory of notation. The notational system, thus produced, possesses a tremendous degree of hospitality. This has been achieved by means of a proper use of devices.

3 VARIETY OF DEVICES

The following are some of the devices used in different schemes of classification:

- Agglomeration device
- Alphabetical device
- Chronological device
- Classic device .
- Common isolate device
- Decimal fraction device
- Empty-emptying digit device.
- Emptying digit device
- Enumeration device
- Environmental device
- Facet device
- Gap device
- Geographical device
- Group notation device
- Mixed base device
- New digit device
- Numerical device
- Phase device
- Scheduled mnemonic device
- Sector device
- Speciator device
- Subject device

In addition to the above devices, one may mention the extension notation and stroke notation devices. *British national bibliography* used [1] extension notation for the interpolation of a missing link or newly emerging link requiring interpolation in a chain. UDC employs the stroke notation device for interpolation in a chain. It uses the stroke (/) sign, meaning "from . . . to . . ." to join the first and last of a series of consecutive UDC numbers for which no comprehensive number is available. The above devices are applicable to the idea and notational planes.

Devices usually employed for forming the foci (in an analytico-

synthetic scheme) in an array, or a class number in an enumerative scheme for classification are: Alphabetical device, chronological device, enumeration device, geographical device and subject device.

Devices for achieving hospitality in array are:

(a) Extrapolation: agglomeration device, common isolate device, gap device, mixed base device and sector device.

(b) Interpolation: gap device, mixed base device, emptying digit device and new digit device

Devices for achieving hospitality in chain are:

(a) Extrapolation: Decimal fraction device, gap device, and mixed base device.

(b) Interpolation: Agglomeration device, extension notation device (used in *British national bibliography*), gap device, mixed base device and stroke notation device (used in UDC).

Devices meant to spread out the pressure of the universe of subjects on the notational system are:

Facet notation device and

Phase device.

4 AGGLOMERATION DEVICE

Two kinds of agglomerates of basic subjects have been recognized, namely, the agglomerate of Kind 1 and the agglomerate of Kind 2.

4.1 *Agglomerate of Kind 1*

An agglomerate of Kind 1 (referred to, earlier, as partial comprehension) consists of subject dealt integrally or disjunctively in one and the same document of concern. In normal practice, it covers subjects going with successive (occurring consecutively) primary basic subjects provided in the schedule.

CC has introduced the agglomeration (or partial comprehension) device. In this device the digit "Z" is used as an emptying digit, generally with the class number denoting the subject immediately preceding the first subject comprehended by the agglomerate (partial comprehension) concerned. An asterisk (*), an anteriorizing digit, is prefixed to Z.

A class number formed by suffixing the agglomeration (partial comprehension) digit is postulated to be coordinate with class numbers comprehended by it. This approach involves telescoping in array. The problem of interpolation in chain has been solved by

means of extrapolation at the beginning of an array

EXAMPLES FROM CC7

- B*Z Mathematical and physical sciences
- E*Z Chemical sciences
- G*Z Biological sciences
- N*Z Fine arts and literature
- O*Z Language and literature
- V*Z History and political science

EXAMPLES FROM SCHEDULE OF MEDICINE (CC7):

- 16 Upper extremity
- 17*Z Head and neck
- 17 Neck
- 18 Head
- 181 Face
- 182*Z Sense organs
- 183 Ear

42 Agglomerate of Kind 2

CC has not made a provision to accomodate an agglomerate of Kind 2 any where—the intention being that a catalogue will bring such subjects to the notice of users by means of cross-reference entries or subject-analytical entries. However, UDC has made a provision for representing agglomerates of Kind 2. The "plus" or "and" sign(+) makes it possible to denote those aggregates, consisting of two or more topics (non consecutive), which are not catered for by the grouping in the scheme itself.

UDC groups all sciences together, and similarly all technologies are put together. Therefore, in order to group specific science with its technology, the "+" sign is used.

EXAMPLES FROM UDC:

- | | |
|---------------|--|
| 027+069 | Libraries and museums |
| 539.1+621.039 | Nuclear physics and nuclear technology |
| 51+54 | Mathematics and chemistry |
| 537.3+532.1 | Dynamics and hydrostatics |

5 ALPHABETICAL DEVICE

The alphabetical device of the idea plane is a "device for forming the focal ideas in an array for (1) forming or sharpening a facet in an analytico-synthetic classification; or (2) sharpening a subject in an enumerative classification; on the basis of the name characteristic, provided they have internationally accepted names and their alphabetical arrangement is as helpful as any other" (*Prolegomena*, p. 347).

Alphabetical device of the notational plane is a "device of implementing the alphabetical device of the idea plane by using the first, or the first two, or the first three, etc., initial letters of the international name as the focal number in an array, to (1) form or sharpen a facet in an analytico-synthetic classification; or (2) sharpen a class number in an enumerative classification" (*Prolegomena*, p. 347).

In DDC18, the alphabetical arrangement has been recommended "as an alternative to systematic arrangement, or as a means for homemade expansion.....alphabetical arrangement (using Cutter, Cutter-Sanborn, or Library of Congress author tables.....) may serve specific local purposes. It is most useful when there is a very large number of specific coordinate subdivisions with accepted names and when the full DDC numbers would be very long" (*DDC 18*, Vol. 1, p. 48).

Options for the use of the alphabetical arrangement are provided in a few places within schedules and auxiliary tables. For example at 583, 598.81—.88 and "Areas" notation 74-79.

Under 583, the instruction reads: "Arrange by order as below; but, if preferred, arrange alphabetically by families."

329.9 Political parties of other countries.

Add "areas notation 3-9 from Table 2 to base number 329.9, e.g. Parties of United Kingdom 329.942.

If desired, arrange specific parties of a specific country alphabetically e.g. Labour Party of United Kingdom 329.942L2.

UDC uses the alphabetical device very often. Authors in literature are arranged alphabetically, as well as periodicals. Biographies of individuals are arranged alphabetically according to the name of the biographee.

EXAMPLES FROM UDC:

Cocci-bacterial diseases
The works of Shakespeare

622.35C
820 (Shak.)

Biography of Schiller

or 820 (Shakespeare)

or (820 Shak.)

92 S

or 92 Schil.

or 92 Schiller

The alphabetical order is used a great-deal by LC. It employs the first Cutter number of the notation in an A-Z sequence.

CC permits a use of the alphabetical device in a number of places. Some of the examples are:

- (i) Individualization of works of literary and classical authors,
- (ii) Strains of cultivars, viruses and bacteria, and
- (iii) Brands of a machine.

In author facet, "If the year of birth of a modern author (say born after 1800) cannot be found by any means, the century of birth may be guessed; and the century digit should be used as the first digit of the author (IN). The latter digits of it may be got by (AD)" (CC6, p. 1.101). This rule is required for many modern authors of Indian literature.

A Hindi poet of 10th century, named, R.C. Sharma would get the following class number:

0152.1 NS

In the schedule of agriculture, cultivar number is to be obtained by means of alphabetical device as given below:

J381 B Basmati rice
J381 P Parmal rice
J912 K Kalyan wheat

EXAMPLES FROM CC7:

L, 25; 424 B+S Disease of intestines caused by *Bacillus subtilis*

L, 45; 42 43 M Mycobacterial disease of lungs

L, 45; 42 43 M+T Mycobacterium tuberculosis of lungs

In the above class numbers plus (+) has been employed for connecting abbreviated components of a multinomial, while applying alphabetical device.

6 CHRONOLOGICAL DEVICE

A chronological device of the idea plane is a "device for forming the focal ideas in an array for (i) forming or sharpening a facet in an

analytico-synthetic classification; or (2) sharpening a subject in an enumerative classification on the basis of the chronological characteristic, when their individualization admits of being made to depend conveniently and helpfully on their epochs of origin or birth or first investigation or discovery or initiation or occurrence or any other epochs that may be definitely associated with it in any manner or for any other reason". (*Prolegomena*, p. 344). A chronological device of the notational plane is a "device of implementing the chronological device of the idea plane by using a chronological number as the focal number in an array, to (1) form or sharpen a facet number in an analytico-synthetic classification; or (2) sharpen a class number in an enumerative classification" (*Prolegomena*, p. 344).

DDC and UDC do not use the chronological device. CC uses it quite often. Though UDC does not make an explicit provision for the chronological device, it is possible, through manipulation, to achieve the same effect by intercalating the time facet at an appropriate place in the class number.

The cases where a chronological device may be used in CC are indicated either within the schedules or in the rules portion. In other cases it may be employed where necessary.

In CC, a schedule of chronological divisions has been provided, which has to be used in the application of the chronological device. It enables one to obtain the same sequence of periods in cases where this device is applied.

In CC6, the chronological device has been used for the individualization of (i) authors in a schedule of literature; (ii) artificial language in the schedule of language classes; (iii) religious sects in the schedule of religion; (iv) systems in basic classes such as mathematics, physics, medicine, psychology, education and economics; (v) equations, functions, series and so on in mathematics; (vi) styles in the schedule of fine arts; (vii) some of the common isolates and (viii) others.

The chronological number should be worked out to the first, or the first two, or the first three digits of the year forming the epoch as specified in the respective rules or, if there are no specific rules on the point, according to the following conventions:

For the first isolate in an array, whose epoch falls within a century (or millennium), the first digit alone should be used.

Among the other isolates calling for the same first digit, for the first isolate, whose epoch falls within the same decade (or century), the first two digits should be used.

Among the other isolates calling for the same first two digits, for the first isolate, whose epoch falls within the same year (or decade), the first three digits should be used.

For each of the other isolates calling for the same first three digits, some vacant neighbouring years are to be used.

If no neighbouring year is vacant to make the application of the above convenient, the digits, 1, 2, etc. respectively, may be added after the three-digit number (CC6, pp. 1.29-1.30).

EXAMPLES FROM CC6:

Q29	Other religions
	Other post Vedic religions by (CD)
Q29M2	Brahmo Samaj (a religion founded in 1820s)
Q29M8	Arya Samaj (a religion founded in 1880s)
B6A	Systems of geometry by (CD)
B6M3	Elliptic
B6M5	Hyperbolic
CA	Systems in physics by (CD)
CK	Gravitation theory
CM	Kinetic theory
CM65	Electromagnetic theory
CM9	Electron theory
LA	Systems in medicine by (CD)
LB	Ayurveda
LC	Siddha
LD	Unani
LL	Homoeopathy
LM	Naturopathy
O111, 2J64	William Shakespeare (born in 1564)
SA	System of psychology
SM	Experimental psychology (system of psychology invented in 1879)
SM9	Psycho-analytic psychology (system of psychology invented in 1895)
SN	Gestalt psychology (system of psychology invented in 1907)
SN1	Behaviouristic psychology (system of psychology invented in 1912).
B36	Infinite series
	special series by chronological device
B36M	Fourier's (series devised in 19th century)
B36M3	Dirichlet's (series devised in 1830s)

A specific scheme of classification should be individualized by (CD).

2:51M76	<i>Dewey decimal classification</i>
2:51M99	<i>Universal decimal classification</i>
2:51N01	<i>Library of Congress classification</i>
2:51N33	<i>Colon classification</i>
2:51N34	<i>Bibliographic classification</i>

7 CLASSIC DEVICE

A sacred religious work is considered a "quasi subject." Therefore, in different schemes the sacred work of a religion is given its own class number in the schedule for subjects going with religion (*Prolegomena*, p. 487). CC goes further, and has given a special treatment to books and other such documents forming a cluster around a classic. This has been achieved by means of the classic device. This device is able to achieve the following:

- (i) It brings together different editions of a classic in a subject;
- (ii) It brings together different editions of each of its commentaries;
- (iii) It brings together different editions of each of its sub commentaries;
- (iv) It makes it possible to form a group consisting of each classic and its commentaries being placed near the groups of other classics in the same subject;
- (v) It enables a group consisting of commentaries of a classic to be placed next to the classic itself; and
- (vi) It enables a group of sub-commentaries of a commentary to be placed next to the commentary itself and so on.

In CC, at the notational plane, the classic device involves the adding successively, after the number denoting the ultimate class (to which the classic would otherwise have been assigned), of the following;

- (a) The digit x;
- (b) The author facet; and
- (c) The work number.

The above procedure is applicable only if the classic is not a sacred work or a work belonging to basic class literature. Detailed rules for the application of the classic device are available in *Prolegomena* (pp. 487-89) and CC6. CC6 also provides a separate schedule of

classics and sacred books.

EXAMPLES FROM CC6:

R635 x1, 1

Patanjali: *Yoga-sutra*

R635 x1, 1, 1

Vyasa: *Bhasya*

The second item is a commentary on the first

L Bx1, 1

Caraka-samhita

L Bx1, 1, 1

Patanjali's commentary

The second item is a commentary on the first.

8 COMMON ISOLATE DEVICE

- Families of isolates such as the family of geographical isolates, the family of time isolates, the family of space isolates, property isolates in general, institution isolates and so on "can form components of several compound subjects going with each of all or almost all of the basic subjects. Each isolate in each such family is called a common isolate" (*Prolegomena*, p. 93). The common isolate device provides for extrapolation in CC. It extrapolates at the left end of an array. Each major scheme provides these isolates, except LC and *Rider's International classification*. Common isolates have been described in Chapter Seventeen.

91 DECIMAL FRACTION DEVICE

"The decimal fraction device consists of treating each class number as a pure decimal fraction" (*Prolegomena*, p. 320). Here, no class number is treated as an integer or as a combination of an integer and a decimal fraction. Each class number is considered a pure decimal fraction. A decimal point is taken for granted before each number, but is not put into practice. Omission of the decimal point satisfies the law of parsimony.

The decimal fraction device enables extrapolation in the chain. A new class or new isolate is created in chain through the process of subdividing a class or an isolate (representing the last link in the chain) formed on the basis of a new additional characteristic. The canons of hierarchy and expressiveness emphasize that at each step of division, one additional digit should be added to the number representing the last link in the chain. This process of subdivision can

be continued endlessly.

The decimal fraction device makes it possible to allocate a distinct helpful number to each new class or isolate that may come up. This is done without disturbing the ordinal value of any existing class number.

From the above it can be seen that the decimal fraction device provides infinite extrapolation in the chain. DDC, UDC and CC use this device, but LC does not.

92 EMPTY-EMPTYING DIGIT DEVICE

The concept of empty-emptying digits was conceived to provide for large number of interpolations between two consecutive ordinal numbers in a given array. A digit considered to be an empty-emptying digit possesses empty as well as emptying value simultaneously. Under these conditions only a digit-triad can represent a coordinate idea.

In CC7, U, W and Y have been postulated as empty-emptying digits to interpolate main subjects in array of main subjects and new countries in the schedule of space isolates.

EXAMPLES FROM CC 7:

LY 1 Nursing

Note: The above number has been interpolated between L and M. Y is an empty-emptying digit.

2. 52Y1 Libraries in Switzerland

Note: Space isolate number 52Y1 has been interpolated between 52 Italy and 53 France. Y has been used as an empty-emptying digit.

LYX Medical Jurisprudence

Note: The above number has been interpolated between L and M. Y is an empty-emptying digit. LYX represents a basic class.

93 EMPTYING DIGIT DEVICE

The emptying digit is a digit which has its usual ordinal value as well as semantic value, "having the power to deprive the preceding rich digit of its power of representing an idea" (*Prolegomena*, p. 314). With the help of an emptying digit, a new number between any two

existing class numbers or isolate numbers in an array can be interpolated. This device has proved to be an important breakthrough.

An emptying digit deprives the preceding digit of its semantic value in a digit group, but retains the ordinal value allotted to it. It helps in interpolation between two consecutive ordinal numbers, if there is no gap available between them. Suppose we wish to interpolate a basic class at the coordinate level between M and N. Then, Z can be employed as an emptying digit. MZ would be a coordinate class and would lie between M and N. Similarly digits like T, V and X can be used for the same purpose.

EXAMPLES FROM CC7:

2.437	Libraries in Malaysia
2.437 X	Libraries in Singapore
2.438	Libraries in Burma
T.51	Education in Turkey
T.51T	Education in Cyprus
T.51V	Education in Greece
T.52	Education in Italy
M	Useful arts
MZ	Mysticism and spiritual experience
N	Fine arts

Notes: In the above examples, digits T, V, X and Z have been employed as emptying digits. However, when these occur as an initial digit, then they are deemed semantically rich digits.

94 ENUMERATION DEVICE

The enumeration device (idea plane) is a "device for forming the classes or the isolates in a facet or the array-isolates in an array by directly enumerating them" (*ISI*, p. 66).

The enumeration device (notational plane) is a "device of using successive digits for forming the classes or the isolates in a facet or the array-isolate in an array by directly enumerating them" (*ISI*, p. 66).

An occasion may arise when the use of mnemonics may either be inapplicable, or not lead to a more helpful sequence of isolates of an array than a mere enumeration. In such a situation the isolates are merely enumerated on the basis of literary warrant or any other factor. In case no suitable factor is available for guidance, then an

arbitrary sequence can be adopted. In such an approach, isolates are considered to have been got by the enumeration device.

The enumeration device is used a great deal in different schemes for classification. It may be kept in view that when a chronological or geographical or subject device is used, it is presumed that in each of these devices the enumeration device would have been used earlier.

In an enumerative classification like *Rider's International classification*, the enumeration device is the only one used in all arrays.

DDC and LC use this device in most of the arrays.

In UDC and CC, this device is used less often than in other schemes. Of the various schemes, CC uses the device less than the others.

95 ENVIRONMENTAL DEVICE

Medicine is a primary basic subject. The speciators derivable on the basis of the characteristic "by environment" can be attached to the primary basic subject "medicine," so as to represent the extra-normal environment of the study. By attaching the speciators to the primary basic subject "medicine," we are able to get environmented compound basic subjects.

Medicine

By environment

Tropical

Polar

Aviation

Thus L-9U3 Tropical medicine

L-9U8 Polar medicine

L-9UD7 Aviation medicine

In the above examples from CC7, environmented compound basic subject numbers have been obtained by the use of hyphen (-) to connect the primary basic subject number with an environment component.

According to A. Neelamegham and his associates, the environmented compound basic subject number is got by the environmental device, which is based on a common schedule of environment. The basic subject can be a primary or secondary basic subject. The digits in the sectors from (S-9L) to (S-9Y) are used to denote the environment component number.

96 FACET DEVICE

The facet device (idea plane) consists of a "device for sharpening a host focus in the form of a class by the addition of new facet(s)" (ISI, p. 64).

The facet device (notational plane) consists of a "device of prefixing connecting symbol (indicator digit) to an isolate number within a class number in order to implement the facet device of the idea plane" (ISI, p. 64). The facet device is a remarkable device meant to spread out pressure exerted due to the onslaught of the universe of subjects on the notational system of a given scheme.

EXAMPLES FROM CC6:

J382 44 Agriculture of wheat in India

Note: Agriculture is a basic facet. Wheat is personality facet. India is space facet. Personality and space facets have been connected by an indicator digit dot (.).

KZ 351:4 53 'N6 Disease of poultry in France in 1960s

Note: Animal husbandry is a basic facet. Poultry is personality facet. Disease is energy facet. France is space facet and 1960s is time facet. Personality and energy facets have been connected by colon (:). Energy and space facets have been joined by dot (.). Time and space facets have been linked by inverted comma (').

284; 44:6 Circulation of newspapers in government department libraries

Note: Library science is a basic facet. Government department libraries is a personality facet. Newspapers is a matter facet. Circulation is energy facet. Personality and matter facets have been linked by semicolon (;). Matter and energy facets have been connected by means of an indicator digit colon (:).

234; 44:51.73'N Classification of newspapers in university libraries in USA in 20th century

Note: Library science is a basic facet. University libraries is a personality facet. Newspapers, classification, USA and twentieth century are matter, energy, space and time facets respectively. These have been connected by different indicator digits.

EXAMPLES FROM UDC:

633.18-29 (540) "19" Prevention of disease of rice plants in India in 20th century

Note: Agriculture is a basic facet. Rice plant is personality.

Disease is energy facet. India is space facet. Twentieth century is space facet. Energy and personality facets have been connected by hyphen (-). Space and energy are linked by parentheses. Space and time facets are separated by means of inverted commas.

669.14: 621.785 (540) Heat treatment of steel in India.

Note: Basic facet is metallurgy. Steel is personality facet. Heat treatment is energy facet. India is a space facet. Personality and energy facets have been joined by a colon (:). Energy and space facets have been linked by parentheses.

338.5: 671.1 (540) "18" Prices of jewellery in India in 19th century

Note: Basic facet is economics. Price is energy facet, Jewellery is matter facet. India is space facet and 19th century is time facet. Energy and matter facets have been joined by a colon (:) Matter and space facets have been linked by parentheses. Space and time facets are separated by inverted commas. The examples from UDC have been interpreted on the basis of concepts described in CC6.

97 GAP DEVICE

This is a "device of leaving a finite gap between the numbers representing two array-isolate ideas appearing to be consecutive at the time of the enumeration, in order to accommodate new isolates, as and when they arise, claiming their filiiary places within that gap" (*ISI*, p. 66). Thus a gap may be left between already existing consecutive numbers in an array. This will allow for the interpolation of newcomers between these in the concerned array. In case the gap is left at the beginning or the end of an array, this will allow for extrapolation in an array.

Similarly, gaps can be left in the numbers belonging to a chain. A gap may be left between any two already existing consecutive numbers in the chain. This will make it possible to accommodate newcomers. This will allow for interpolation in the chain.

If a gap is left in the beginning or end of the chain, then it will become possible to accommodate a new number at the beginning or end of the chain. This will serve for extrapolation in the chain.

From the above, it follows that the gap device allows for extrapolation and interpolation in array as well as in the chain.

Different schemes for library classification use the gap device. But LC classification uses it at an even larger scale.

98 GEOGRAPHICAL DEVICE

The geographical device (idea plane) is a "device for forming the focal ideas in an array for (1) forming or sharpening a facet in an analytico-synthetic classification; or (2) sharpening a subject in an enumerative classification; on the basis of the geographical characteristic, when their individualization admits of being made to depend conveniently and helpfully on their place of origin, or prevalence of habitation or any other place that may be definitely associated with them in any manner or for any other reason" (*Prolegomena*, p. 345). It may be added that the geographical area used as space facet qua space facet in a historical or descriptive account of a host subject, cannot be considered a geographical device.

The geographical device (notational plane) is a "device of implementing the geographical device of the idea plane by using a geographical number as the focal number in an array, to (1) form or sharpen a facet in an analytico-synthetic classification; or (2) sharpen a class number in an enumerative classification" (*Prolegomena*, p. 345).

The geographical device satisfies canons of consistent sequence, helpful sequence, local variation, growing universe and mnemonics.

In DDC 18, the geographical device has been used to form the foci in the community facet of a subject going with history, law, public administration and so on.

930-990 General history of specific continents, countries, localities; of extraterrestrial worlds.

The instruction under the above says "Add areas" notation 3-9 from table 2 to base number 9, e.g. general history of Europe 940, of British Isles 942..."

342.3—.9 Constitutional and administrative law—Specific jurisdictions.

The instruction under the above reads "Add areas" notation 3-9 from table 2 to base number 342, e.g. constitutional and administrative law of Australia, 342.94..."

353.94—.99 State government (specific states)

Instruction reads: "Add areas" notation 4-9 from table 2 to base number 353.9.

In UDC, the geographical device has been used to form foci in the Community facet of a subject going with history.

EXAMPLES FROM UDC.

915 Geography of Asia As (5), e.g. 915.2 Geography of Japan,
915.19 Geography of Korea.

914 Geography of Europe As (4), e.g. 914.4 Geography of
France.

CC6 uses the geographical device a great deal. It is used for the individualization of (i) community in history and law; (ii) style in fine arts; (iii) other religions; and (iv) others.

EXAMPLES FROM CC6:

V2, 16:2 Constitution of local bodies in India

Z44, 2 Indian law of property

ND44, C Buddhist sculpture

Y744 Indian community

Y742 Japanese community

Y753 French community

991 GROUP NOTATION DEVICE

The group notation device has been described in detail in Chapter Nine.

992 MIXED BASE DEVICE

Base of CC is a mixed one, as given below:

a b c d e f g h j k m n p q r s t u v w x y 1 2 3 4 5 6 7 8 A B C D
E F G H I J K L M N O P Q R S and each of these digits enclosed
in circular brackets are postulated as the semantically rich digits.
T U V W X Y Z are semantically rich digits, only when these occur
alone or as a first digit in a number, where one of these is prefixed to
a digit other than an empty digit or an empty-emptying digit. Besides,
there are semantically empty digits, emptying digits and empty-empty-
ing digits used to form basic subjects. As the above base is a mixed
one, the mixed base device allows for extrapolation and interpolation
in array as well as in chain. For example, 91 is to be considered an
extrapolation to sector (S-1). But it will be regarded as a case of
interpolation between 8 and A.

993 NEW DIGIT DEVICE

It is possible to postulate a new digit which may be given an ordinal value, so that it lies between two consecutive numbers representing two array isolate ideas. This is how Ranganathan postulated Greek symbols in *Colon classification*. These symbols were given up later on. The new digit device helps in interpolation in an array.

994 NUMERICAL DEVICE

According to Bhattacharyya, this is a "device for sharpening a subject or concept, as the case may be, on the basis of the numerical name characteristic—that is, by using the number of an individual entity, if any—provided no such sharpened subject or concept is already enumerated in the schedule."¹ At the notational plane in CC it consists of adding, after the number for host subject or concept, the number. The numerical device can be used wherever found helpful in constructing the class number.

EXAMPLE FROM CC (*Depth schedule on Investment*):

X65, 183-1 n3 Investment in Public utility issue at three per cent rate of interest.

At the notational plane, in UDC, it consists of adding—after the number for host subject or concept—the number (or numerical entity, with symbol "No." prefixed to it).

EXAMPLE FROM UDC:

656.4.02 (492.621) No. 12 Amsterdam tram services line number 12.

995 PHASE DEVICE

A detailed description of this device will be found in Chapter Twenty-one.

¹G. Bhattacharyya, "Classifying by UDC and by CC: A comparative study," *DRTC Annual Seminar*, 9, 1971, p. 235.

996 SECTOR DEVICE

The sector device is a "device used for increasing the capacity of an array with the aid of an empty digit" (*Prolegomena*, p. 238). An empty digit is one which has an ordinal value, but is without semantic value. CC has been using the sector device from the beginning. UDC has also adopted this device. This device is an extension of "other device" of DDC. It provides for extrapolation in an array. A detailed description of this device will be found in Chapter nine.

997 SCHEDULED MNEMONIC DEVICE

The use of scheduled mnemonics leads to a scheduled mnemonic device. Scheduled mnemonics are used a great deal in CC. Other schemes like DDC and UDC also use it.

EXAMPLES FROM CC6:

In basic class W, foci in [P2] are same as in V history.

In basic class I, foci in [E] cum [2P] are as in G Biology with the addition of paleobotany.

In basic class Y, 2 family to be subdivided, as in "R4 ethics".

In DDC, the use of parallel schedules leads to scheduled mnemonics by means of the instruction "Add to. . . ." (except add 001-999 and add area notation). This instruction is to be found at many places.

581.1925 Enzymes

Note: The above number has been constructed on the basis of the instruction "Add to 581.19 the numbers following 574.19 in 574.191-574.192." Here, 581.19 stands for biophysics and biochemistry. The number for enzymes has been obtained by means of the "Add to" instruction.

636.0896 Veterinary diseases.

After 636.089 Veterinary diseases, the instruction reads, "Add to 636 089 the numbers following 61 in 610-619 "

523.433 Orbit of mars

Instruction reads: "Add to subdivision identified by* the numbers following 523.3 in 523.31-523.37."

547.3482 Microscopical analysis (Analytical chemistry)

At 547.34 instruction reads: "Add to 547.34 the numbers following 544 in 544.01-544.94."

547.353 Electroanalysis (Analytical chemistry)

At 547.35 instruction reads: Add to 547.35 the numbers following 545 in 545.01-545.84.

596.04 Comparative anatomy (chordata-vertebrates)

At 596 instruction reads, "Add to 596 0 the numbers following 591 in 591.1-591.9."

781 9734 Trade catalogues.

At 781 973 instruction reads: "Add to 781 973 the numbers following 017 in 017.1-017.4."

659.285 Corporations.

At 659.28 in specific kinds of organizations (public relations), the instruction reads: "Add to 659.28 the numbers following 658.114 in 658.1141-658.1148.

998 SPECIATOR DEVICE

In Chapter Two, Speciator Kind 1 and Speciator Kind 2 were recognized. The hyphen (-) is used for connecting a speciator of Kind 1; and the 'equal to sign' (=) is used for attaching a speciator of Kind 2.

EXAMPLES FROM CC7:

Y, 86-2	Sociology of African family
Y, 86-45	Sociology of commercial class in Africa
V, 6=A56	History of British territories in Africa
V, 1=A56	History of the British empire
U, 11.44=zF7	Cartography of rivers of India
L-9C	Child medicine
L-9D	Adolescent medicine
L-D-9C	Child medicine according to Unani
L-L	Homoeopathy

A further description of the speciator device has been provided in the next section, under *Specials, systems and environment*.

9981 *Specials, Systems and Environment*

Neelameghan described the formation of specials compound basic subjects. According to him, the core entity of study in the subjects going with a particular primary basic subject may be restricted or qualified, using speciators derived on the basis of relevant characteristics specific to the subjects concerned, not amounting to any of the

teriorizing isolates or any other isolate. This leads to the formation of specials compound basic subjects. Similarly, using speciators derived on the basis of the characteristic "by environment" leads to environmentated compound basic subjects. Again, the use of speciators derived on the basis of the characteristic "by system" leads to the formation of systems compound basic subjects. All the above compound basic subjects are formed by lamination of kind.

In CC7, in a compound basic subject, indicator digit (hyphen) is used to connect the host primary or secondary basic subject number with any one of the following:

- (a) Specials component; or
- (b) Environment component; or
- (c) Systems component.

99811 Specials Component

In CC7, the digits in the sectors (S-9A) to (S-9K) are used for representing the specials component number. Specials component attached to host primary or the secondary basic subject gives us specials compound basic subject. "By specials" is restricted to the study of attributes of the core entity of the subject under study.

EXAMPLES FROM CC6:

C9B7: 58	Scattering of cosmic rays
L9C	Child medicine
L9D	Adolescent medicine
L9E, 32:4	Heart diseases in old age
E9G, 92Z:3	Biochemical analysis of amino acid

EXAMPLES FROM CC7:

L-9C	Child medicine
L 9D	Adolescent medicine
L-9E	Adult medicine

99812 Environment Component

An environmentated compound basic subject number, got by the environmental device, is based on a common schedule of environments. Here, the environment component is attached to the host primary or secondary basic subject, giving us the environmentated compound basic subject.

An entity has to be studied in an environment. If the study takes place in normal environment, then we do not mention it; otherwise,

we have to.

In CC7, the sectors (S-9L) to (S-9Y) are used for denoting the environment component number.

EXAMPLES FROM CC6:

L9H Tropical medicine
L9X Industrial medicine

EXAMPLES FROM CC7:

L-9U3 Tropical medicine
L-9U8 Polar medicine

99813 Systems Component

Systems component attached to host primary or secondary basic subject results in systems compound basic subject. Systems compound basic subject number is derived by the chronological device. Sector (S-A) to Sector (S-S) is used for representing the systems component number.

EXAMPLES FROM CC6:

LL Homoeopathy
LM Naturopathy
LD, 9X:4 Diseases of industrial workers in Unani medicine
CN2, 5:33 Band spectra according to wave mechanics

EXAMPLES FROM CC7:

L-L Homoeopathy
L-M Naturopathy

Note: The study of a subject has to be undertaken on the basis of a system. In practice, it may be the favoured one. It may be kept in view that the concept of a system is inherent in a subject, though we can separate the two. Systems component is omitted, if exposition is according to favoured system.

99814 Combination of Three Components

The combination of three components will be in the following sequence:

Primary/secondary basic subject—systems component—environment component—Specials component.

The above order is based on the theory of bond strength.

EXAMPLES FROM CC6:

- LD, 9H-9X, 185:4 Eye diseases of industrial workers in tropical medicine in Unani System
 LB, 9H-9C Child in tropical medicine in Ayurvedic medicine.
 LL, 9H-9E Old age in tropical medicine according to homoeopathy system

Note: In the above examples, systems number, specials number and organ number each are separated by a comma. Two specials numbers are attached by hyphen (-). Environment component has preceded specials component.

EXAMPLES FROM CC7:

- L-B-9U3-9C Child in tropical medicine in Ayurvedic medicine
 L-D-9U3-9F Old age in tropical medicine in Unani medicine

9991 SUBJECT DEVICE

The subject device (idea plane) is a "device for forming the focal idea in an array for (1) forming or sharpening a facet in an analytico-synthetic classification; or (2) sharpening a subject in an enumerative classification; on the basis of the subject characteristic, when their individualization admits of being made to depend conveniently and helpfully on subject in any manner or for any reason" (*Prolegomena*, p. 346)

The subject device (notational plane) is a "device for implementing the subject device of the idea plane by using a class number as the focal number in any array, to (1) form or sharpen a facet in analytico synthetic classification; or (2) sharpen a class number in an enumerative classification" (*Prolegomena*, p. 346). The subject device enables satisfaction of the canon of consistent sequence, and the canon of helpful sequence.

EXAMPLES FROM DDC18:

658.37368 Personnel management in insurance agencies.

After 658.37 Personnel management in specific kinds of enterprises and occupations, the Instruction reads: 'Add 001-999 to base number 658.37.' The number for insurance is 368, which has been added to the base number.

016 Bibliographies and catalogs of specific disciplines and subjects. Instruction reads: "Add 001-999 to base number 016."

016.52 Bibliographies of astronomy

025.33001—.339 99 Subject headings, Instruction reads: Add 001-999 to the base number 025.33, e.g. subject headings in science 025.335

025.46 Classification of specific disciplines and subjects. Instruction reads: "Add 001-999 to base number 025.46, e.g., classification of economics 025.4633"

658.9102 Management of libraries

At 658.91 Service and professional (Management of specific kinds of enterprises), the instruction reads: "Add 001-999 to base number 658.91"

029.961 Indexing medical literature

At 029.9 Documentation of specific disciplines and subjects the instruction reads: Add 001-999 to base number 029.9

659.293616 Public welfare agencies

At 659.29 In organizations producing specific kinds of products and services, instruction reads: Add 001-999 to the base number 659.29

EXAMPLES FROM UDC:

- | | | |
|-------|---------------------|--|
| (i) | 32 : 91 | Geopolitics |
| | 31 : 63 | Agricultural statistics |
| | 675 : 331.82 | Working conditions in leather industry |
| | 016 : 331 (71) | Bibliography on labour in Canada |
| | 621.785 : 669.14 | Heat treatment of steel |
| (ii) | 341.63 (540 : 549) | Arbitration between India and Pakistan |
| | 616.2-085 : 615.531 | Homoeopathic treatment of respiratory diseases |
| | 341.68 (540 : 510) | Armed peace between India and China |
| (iii) | 378.9 | Specialist establishments, colleges, etc. As 0/9 |
| | 378.938 | Trade colleges |
| | 378.978 | Music colleges |
| | 378.97 | Art colleges |

EXAMPLES FROM CC6:

In CC, the class number used for implementing a subject device is

considered as if it were a single digit, and is enclosed in circular brackets. CC6 uses the subject device a great deal.

- 2:51 (W) Library classification of Political Science
- 24 (X81):8 Administration of Insurance libraries
- D85:(G) Biology of water supply
- G: (C) Biophysics
- H: (E) Geochemistry
- J:(E: 3) Agricultural analysis
- O111, 2 J64, 28: g (S) Psychology of Hamlet (16th drama of Willam Shakespeare)
- R39 (Y), (Q2) Humanism in Hinduism
- R4: (Q6) Christian ethics
- S4 (2) Psychology of librarians
- S4(D) Psychology of engineers
- S4(L) Psychology of doctors
- T:3 (B2) Methods of teaching algebra
- T: 3(P1) Teaching of mother tongue
- T: 3(P8) Teaching of classical language
- T2: 3 (P5), 3 Medium of instruction for teaching foreign language in secondary schools
- V44: 195,(X)'N7 India's European economic policy brought up to 1970's
- W: 58 (Q) Freedom of conscience
- X.1 (Y:43) Economy of underdeveloped countries
- Y73 (P152) Sociology of Hindi speaking community (irrespective of the geographical region)

FURTHER READINGS

- G. BHATTACHARYYA, "Classifying by UDC and by CC: A comparative-study," *DRTC Annual Seminar*, 9, 1971, paper CB.
- S.R. RANGANATHAN, *Prolegomena to library classification*, 3rd edn., Bombay, Asia Publishing House, 1967, part N.

Chapter 10

POSTULATIONAL APPROACH

0 INTRODUCTION

Library classification arranges groups of documents in a helpful sequence. However, a document can be placed at one place, only. In other words, the arrangement of documents on a shelf is a linear one. But we know that the universe of subjects of concern is multi-dimensional in nature. When one wants to describe the position of any one existent or a group of existents in such a universe, many parameters are required to achieve this purpose. This involves transferring multi-dimensional space into uni-dimensional space.

According to Ranganathan, dimension refers, in mathematics, to "the degree of manifoldness of an aggregate as fixed by the number of parameters necessary and sufficient to identify anyone of its members—that is, to distinguish it from all the others" (*Prolegomena*, p. 377). Therefore, a line has one dimension, a surface has two dimensions and volume has three dimensions. Here, the number of dimensions is based on the number of parameters required to identify a point (member) on it. A similar concept is applicable to library classification. Thus, under universe of geographical isolates, the "world" is a original universe. In order to get contents, we apply one characteristic to the original universe. Thus, the universe of continents is of one dimension. In order to get countries, we have to apply two characteristics. Thus, the universe of countries, is of two dimensions. We can proceed further indefinitely to get the universe of isolates of 3, 4, 5, 6 and 7 and more dimensions. Therefore, we say that the universe of geographical isolate idea is multi-dimensional.

A specific plant in the universe of agricultural plants can be obtained by the use of three successive characteristics, such as utility, part of plant in dominant use and a cultivable plant. Thus each specific plant is of three dimensions. As we have seen, the arrangement

of documents on shelves is a linear one. The books sharing the same ultimate subject are brought together. The subjects themselves have thus been arranged along a line. The subjects belong to a multi-dimensional universe, where these have been arranged according to mutual relationship.

In the disciplines of mathematics and cartography, transformation from a multi-dimensional to a uni-dimensional universe can be done by keeping invariant (constant) all the interrelations (except one) of the entities of the original multi-dimensional universe. Thus, from the angle of mathematical abstraction, the classification of subjects involves transforming the system of points marked in multi-dimensional space into a system of points along a line. That is mapping can be done along a line.

In library classification, our problem is to choose what should be kept invariant in the classification of subjects. The immediate-neighbourhood-relation of several of the subjects can have the same remove because of the multi-dimensional nature of the space in which the subjects lie. But only one of the subjects can be considered to have its immediate-neighbourhood-relation kept invariant in the mapping. Documents on botany, can either be arranged according to plant or matter or energy or space or time (in the first instance). If it is according to plant, then the others get subordinated. An indefinitely large number of immediate-neighbourhood-relations are possible among them. Mapping is an extremely complicated matter.

Different schemes have provided different solutions to this problem. The problem of mapping has been solved by Ranganathan by means of the postulational approach. The seminal ideas have been postulated and work is carried out with these. Nothing can be asserted about them being true or false. "A postulate is a statement about which we cannot use either of the epithets "right" or "wrong." We can only speak of a set of postulates as "helpful" or "unhelpful".¹

The formulation of postulates is guided more by intuition and logical inference at the unconscious level. It is not easily possible to verify these physically, by means of a direct approach to our senses. But it is essential that these must be valid, consistent (not subject to variation in different cases) and determined beforehand. Only then can a theory based on them prove successful.

These are postulated because they have proved to be helpful. The

¹S.R. Ranganathan, *Elements of library classification*, Bombay, Asia Publishing House, 1962, 3rd. edn., p. 82.

terms used to refer to these are merely assumed terms, and not fully defined ones—the whole idea being that we assume those ideas about which we vaguely agree. There is nothing final about those postulates. New ideas can be postulated if they are found helpful in mapping the universe of subjects in a helpful sequence along a line. Similarly, the existing postulates can be modified or replaced if found necessary.

From 1955 onwards, Ranganathan used the postulates of five fundamental ideas, as well as the other postulates and principles going with it, rather successfully. In practical classification, the sequence of compound or complex subjects going with a basic subject is not predetermined, but it should be helpful to the majority of users. The postulational approach places the subjects in a helpful sequence. Its most important achievement is that "classification of a subject on the basis of the postulates and the principles is done without any pre-determined idea about the facets it should or should not have, or about their number, or about their sequence" (*Prolegomena*, p. 397). Such a scheme for classification is a freely facted classification.

It may be noted that present-day schemes, such as CC, BC, DDC and UDC, seem to have been designed on the basis of postulates for work at the idea plane. But these have adopted different sets of postulates for work at the notational plane.

The postulational approach (that is, the approach based on postulates) in library classification brings objectivity in the study and practice of this discipline. It also puts the study and practice of library classification on a scientific basis. As a result of such an approach, practical classification has become easier and more interesting.

The postulational approach also puts the work of a classifier, as well as that of a classificationist, on firm basis. A classificationist should base his work of designing and developing a scheme on such an approach, which can help avoid pitfalls. The approach also helps a classifier to avoid the hit-or-miss approach to classification. The postulates also provide us a tool useful for the comparison of the efficiency of different schemes of classification.

1 POSTULATES FOR FREELY FACETED CLASSIFICATION

As explained earlier, a postulate is a statement where the words "helpful" or "unhelpful" are applicable. We cannot use the words

"true" or "false." The postulates at the idea plane regarding the design of a scheme for library classification were not provided in largely descriptive theories of library classification. However, the postulates for work at the idea plane were given by Ranganathan in his *Prolegomena to library classification* (2nd edition, 1957). In this book the postulates have been described from the third edition of *Prolegomena to library classification* (1967).

Postulates for the idea plane form a basis for different schemes of classification, but postulates for the notational plane are likely to be different from scheme to scheme. In the next few pages, postulates for freely faceted classification have been described as formulated by S.R. Ranganathan. The description is primarily based on his *Prolegomena to library classification* (3rd edition; 1967).

2 POSTULATE OF FUNDAMENTAL CATEGORIES

"There are five and only five fundamental categories—viz., Time, Space, Energy, Matter, and Personality" (*Prolegomena*, p. 399). These terms, as well as the ideas represented by them, have been used in the context of library classification. Their usage should not be confused with the use of such terms in the disciplines of physics and metaphysics. These categories have also no relationship with the categories of Aristotle. They are assumed categories, which are inherent in any subject. Each facet of a subject and each division of a facet may be regarded as a manifestation of one of the fundamental categories.

The fundamental categories of Time (T) and Space (S) are self-explanatory. These have been used here as commonly understood. Therefore, there should be no difficulty in their identification. Energy (E) is a little more difficult to identify. Generally speaking, "its manifestation is action of one kind or another. The action may be among and by all kinds of entities—inanimate, animate, conceptual, intellectual, and intuitive" (*Prolegomena*, p. 400). As regards Matter (M), it is more difficult to identify than energy. It can manifest itself as material and property. The fundamental category Personality (P) is most difficult to identify. One can identify it by a "method of residues." If the given manifestation is not one of time or space or energy or matter, then it can be regarded as a manifestation of the fundamental category of Personality. A detailed description of fundamental categories has been provided in Chapter Sixteen.

When a new isolate has to be identified, a classificationist, and sometimes a classifier, has to face the problem. As seen above, identification of energy, matter and personality isolates can create a problem. However, it seems that a person with some experience is able to recognize these in a majority of cases without much difficulty.

3 POSTULATE OF BASIC FACET

"Every compound subject has a basic facet" (*Prolegomena*, p. 402). As already explained, a compound subject consists of a basic subject and one or more isolate ideas as components. In the case of a phase relation between the basic facets or between the compound subjects, we can have two or more basic facets.

The title of a document may itself indicate the basic facet of its subject, or one should have knowledge of the schedule of basic subjects of the scheme concerned.

EXAMPLES:

<i>Title</i>	<i>Basic facet</i>
Diagnosis of diseases	Medicine (implicit)
History of chemistry	Chemistry (explicit)
Income tax	Economics (implicit)
Bibliography on British history	History (explicit)

4 POSTULATE OF ISOLATE FACET

"Each isolate facet of a compound subject can be deemed to be a manifestation of one and only one of the five fundamental categories" (*Prolegomena*, p. 403).

Those isolate ideas which occur as manifestation of fundamental categories like time, space, energy and matter are easy to recognize. Any isolate idea which does not belong to these, should be considered a manifestation of personality.

The title itself might indicate the isolate facets of its subject. The basic subject of the document will help in determining which necessary facets of the compound subject are missing. One should examine the contents page or other parts of the document for the purpose.

EXAMPLES:

<i>Title</i>	<i>Basic and isolate facets</i>
Treatment of disease of the stem of wheat plant in 1974	Agriculture (basic facet). Treatment [energy facet].

in Haryana

Disease [matter facet].
 Stem [personality facet].
 Wheat plant [personality facet].
 1974 [time facet].
 Haryana [space facet].

5 POSTULATES OF ROUNDS AND LEVELS

Work on the classification of subjects of great intension brought forth the need to recognize the cycle of a recurring manifestation of the fundamental categories with regard to compound subjects. This led to the formulation of the postulates of rounds and levels. It may be pointed out that no definitions of the words "round" and "level" are available. They have to be understood by means of postulates. In the first three editions of *Colon classification*, rounds and levels were provided for unconsciously. However, the concepts of rounds and levels were introduced consciously in the fourth edition of *Colon classification* (1952). These concepts were fully implemented in the fifth edition.

51 Postulate of Rounds for Energy

"The fundamental category "Energy" may manifest itself in one and the same subject more than once. The first manifestation is taken to end Round 1 of the manifestation of the three fundamental categories "Personality", "Matter" and "Energy". The second manifestation is taken to end Round 2, and so on" (*Prolegomena*, p. 410).

The manifestation of the fundamental category "Energy" in Round 1 is indicated by [1E]. Similarly, the manifestation of "Energy in Round 2 is denoted by [2E].

52 Postulate of Rounds for Personality and Matter

"Each of the fundamental categories "Personality" and "Matter", may manifest itself in Round 1, Round 2, and so on" (*Prolegomena*, p. 410).

A manifestation of the fundamental category "personality" in Round 1 is called as Round 1 personality facet represented by [1P]. Similarly, we can denote Round 2 personality facet by [2P]. We can also have [3P], [4P], and so on. In the same way we can have Round 1 matter facet. Round 2 matter facet and so on, which may be represented by the symbols [1M], [2M], and so on.

53 *Postulate of Round for Space and Time*

"Ordinarily, any of the fundamental categories "space" and "time" may manifest itself only in the last of the rounds in a subject" (*Prolegomena*, p. 410). In view of this postulate, we may represent the fundamental categories "space" and "time" by the symbols [S] and [T] respectively.

54 *Postulate of Levels*

"Any of the fundametal categories "personality" and "matter" may manifest itself more than once in one and the same round within a subject; and similarly with "space" and "time" in the last "round" (*Prolegomena*, p. 411). The first manifestation of a fundamental category within a round is called its Level 1 facet in that round. Similarly, its second manifestation within that round is named its Level 2 facet in that round. The manifestations go on in a similar way.

541 *Personality*

From the above, it follows that the fundamental category "personality" can have successive manifestations in different rounds. These may be represented by symbols, as given below:

- [1P1] = Round 1 level 1 personality facet
- [1P2] = Round 1 level 2 personality facet
- [2P1] = Round 2 level 1 personality facet
- [2P2] = Round 2 level 2 personality facet

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 , ,
 , ,
 , ,
 , ,

542 *Matter*

We may conclude that the fundamental category "matter" can have successive manifestation in different rounds. These may be represented by symbols, as given bslow:

- [1M1] = Round 1 level 1 matter facet
- [1M2] = Round 1 level 2 matter facet
- [2M1] = Round 2 level 1 matter facet
- [2M2] = Round 2 level 2 matter fucet

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 , ,

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• •
• •

543 Space

As the fundamental category "space" can manifest itself only in the last round of a subject, we need not indicate the round in the names as well as symbols used to represent it. The symbols used to denote various manifestations of this category are given below:

[S1] = Level 1 space facet

[S2] = Level 2 space facet

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• •
• •

544 Time

As the fundamental category "time" can manifest itself only in the last round of a subject, there does not arise any need to indicate the rounds in their names as well as in their symbols. The symbols used are given below:

[T1] = Level 1 time facet

[T2] = Level 2 time facet

• •
• •

545 Energy

The fundamental category "energy" can occur only once in a round; therefore, the question of having levels does not arise.

6 POSTULATES FOR FACET SEQUENCE

Once various facets occurring in a compound subject have been determined, the next step should be to arrange these facets in a helpful sequence. The sequence of different kinds of facets of a compound subject are determined by means of the following postulates:

The postulate of first facet: "In a compound subject, the basic facet should be the first facet" (*Prolegomena*, p. 412).

According to one of the postulates, a compound subject should have basic facet. We also know that isolate facets cannot form a subject unless these are attached to a basic facet. A helpful sequence

requires that all the compound subjects going with the same basic facet should come together at one place. This is possible only if the basic facet is allocated the first position among the facets of a compound subject.

The postulate of concreteness: "The five fundamental categories fall into the following sequence, when arranged according to their decreasing concreteness: P, M, E, S, T" (*Prolegomena*, p. 412). This postulate conforms to the thinking of a majority of persons regarding the relative concreteness of isolates, these isolates being the manifestations of any one of the five fundamental categories.

The above two postulates (postulate of first facet and postulate of concreteness), taken together, give the following sequence for a compound subject containing all the five kinds of isolate ideas:

(BS) [P] [M] [E] [S] [T]

The postulate of facet sequence within a round: "In any round of facets of a compound subject in which each of any of the fundamental categories—Personality, Matter and Energy—occurs only once, their sequence should be: Personality Facet, Matter Facet, and Energy Facet" (*Prolegomena*, p. 412).

The postulate of facet sequence within the last round: "In the last round of facets of a compound subject, in which each of the fundamental categories other than Energy may occur and occurs only once, the sequence of the facets should be Personality Facet, Matter Facet, Space Facet, and Time Facet" (*Prolegomena*, p. 412). Energy does not occur in the last round, and other fundamental categories occur only once.

The postulate of a level cluster: "Facets of different levels of the same fundamental category within a round of facets in a compound subject should be kept together" (*Prolegomena*, p. 412).

The five postulates mentioned above enables one to obtain a helpful sequence of different subjects as well as among facets occurring in a compound subject. Each postulate covers a particular aspect, without coming into conflict with other postulates.

EXAMPLES FROM CC7:

<i>Subjects not having more than One Isolate Facet</i>	
<i>Subject</i>	<i>Facet Sequence</i>
Medicine (BF)	Medicine (BF)
Diagnosis [E] in Medicine	Medicine (BF). Diagnosis [IE]

(BF)	
Disease [M] in Medicine (BF)	Medicine (BF). Disease [1M1]
Lungs [P] Medicine (BF)	Medicine (BF). Lungs [1P1]
Sociology (BF)	Sociology (BF)
Sociology (BF) in 20th century [T]	Sociology (BF). 20 century [T1]
Sociology (BF) in India [S]	Sociology (BF). India [S1]
Improvement [E] in Sociology (BF)	Sociology (BF). Improvement [1E]
Personality [M] in Sociology (BF)	Sociology (BF). Perronality [1M1]
Rural [P] Sociology (BF)	Sociology (BF). Rural [1P1]

7 PRINCIPLES FOR FACET SEQUENCE

70 Introduction

The postulates for a sequence of different kinds of facets of a compound subject have been described in Section 6. These are helpful in determining the sequence of isolate ideas in a compound subject in those cases where each isolate idea is a manifestation of a different fundamental category. However, these postulates do not provide any help in determining the sequence of two or more isolate ideas, which may be deemed a manifestation of the same fundamental category.

In other words, this means that if we have to decide the sequence between two personality isolates or two matter isolates or two energy isolates or two space isolates or two time isolates, then the postulates are not able to help us. Therefore, there is a need for guiding principles which could provide a solution to this problem.

71 Wall-Picture Principle

The fundamental category "energy" may manifest itself in the same subject more than once. The first manifestation is assumed to be the end of Round 1 of the manifestation of the fundamental categories of "personality," "matter" and "energy." The same goes for other manifestations of energy. The wall-picture principle helps us decide which manifestation of the fundamental category "energy" should be deemed as Round 1 or Round 2 and so on.

It was in 1962 that Ranganathan formulated the wall-picture principle. This principle is meant for the determination of a sequence

between isolate ideas which are deemed a manifestation of the same fundamental category.

According to the wall-picture principle, "If two facets A and B of a subject are such that the concept behind B will not be operative unless the concept behind A is conceded, even as a mural picture is not possible unless the wall exists to draw upon, then the facet A should precede the facet B" (*Prolegomena*, p. 425).

The wall-picture principle has proved to be a master principle for the purpose of determining the sequence of facets. The principle can also be used for arranging characteristics. If the number of facets or characteristics to be arranged is large, then we use group strategy. Within each group apply wall-picture principle. At times it becomes difficult to apply wall-picture principle, then we prefer to use other principles available for the purpose. One of the postulates has prescribed that in any subject or round, the sequence of manifestation of the five fundamental categories should be PMEST. The same sequence can also be obtained by means of the wall-picture principle. Thus, the postulate can be regarded as a corollary of this principle.

The application of this principle results in the same sequence as obtained by the application of the 'principle of decreasing concreteness'.

711 Examples

In "Diagnosis of disease," the concept behind the term "cure" is not operative unless the concept behind the term "Disease" is conceded. Expressed in a transformed skeletal form, we get "Disease. Diagnosis." This means that the round to which the concept "Disease" be allocated should be the one preceding the energy facet "diagnosis."

In "prevention of disease" the concept behind the term "prevention" is not operative unless the concept behind the term "Disease" is not conceded. Expressed in a transformed skeletal form, we get "Disease. Prevention." This means that the round to which the concept "Disease" be allocated should be the one preceding the energy facet "Prevention."

In the first example, the disease has actually taken place before the diagnosis begins. But in the second example, the disease does not come in. Prevention is mentioned, so that disease does not appear. There is a subtle difference between the two. In the first case, "the concept as well as what is conceived are conceded before "cure" begins. In the latter, the concept "disease" alone is conceded but not "disease" itself, before "prevention" begins. Thus, in applying the

wall-picture principle it is only the concept that should be conceded, but not the correlate of the concept existing outside the mind" (*Prolegomena*, p. 425).

In "Hindi drama," the concept behind the word "drama" is not operative, unless the concept behind the word "Hindi" is not conceded. Expressed in a transformed skeletal form, we get "Hindi drama." This means that the level to which the concept "Hindi" be allocated should be the one preceding the personality facet "drama." In this example, wall-picture principle has determined the respective levels to which the concepts "Hindi" and "drama" should be allocated.

In "Godan by Premchand (Hindi novelist)," the concept behind the name "Godan" is not operative unless the concept behind Premchand is conceded. Again, the concept behind the term "Premchand" is not operative unless the concept behind "novel" is conceded. In the same way, the concept behind the "novel" is not operative unless the concept behind the "Hindi" is conceded. Expressed in transformed skeletal form, we get "Hindi. Novel. Premchand. Godan." In this example, the wall-picture principle has enabled a determination of the respective levels to which the concepts "Hindi," "Novel," "Premchand" and "Godan," should be allocated.

72 Supplementary to the Use of Postulates

The following observations can be made with regard to an application of the wall-picture principle and the postulates for the facet sequence:

(i) Whenever both are applicable, these give the same result. However, it is preferable to use the postulates.

(ii) Postulates can determine the sequence of isolate ideas in a compound subject only in those cases where only one isolate idea is deemed as a manifestation of a particular fundamental category. As such it is not helpful if there are two or more isolate ideas deemed to manifest the same fundamental category. That is to say it cannot determine the sequence between two "personality" isolates, two "matter" isolates, two "energy" isolates, two "space" isolates or two "time" isolates.

The examples discussed above show that postulates by themselves are not able to determine the rounds and levels indicated. Here, use of the wall-picture principle is supplementary to the application of postulates. The principle determines the respective rounds and levels to which the concepts should be assigned.

(iii) On the basis of (i) and (ii), we may conclude that the "wall-picture principle" is more versatile than the postulates.

73 Corollaries of Wall-picture Principle

Other principles available for facet sequence are corollaries of wall-picture principle.

731 Whole-organ Principle

The whole-organ principle: "If, in a subject, facet "B" is an organ of facet "A", then A should precede "B" " (*Prolegomena*, p. 427). Before examples are given to illustrate this, it would be useful to understand the concepts of "whole" and "organ." "Whole" in Sense 1, applied to a universe of entities, refers to "all the entities taken together." In Sense 2, applied to a typical entity of a universe of entities it is "the complete—the entire-entity." "Organ" is the "functional part of a typical entity of the Universe of Entities" (*Prolegomena*, p. 422). Take the universe of human bodies; any one typical entity would be any one human body. The digestive system, respiratory organ, circulatory organ and so on represent functional organs. In the universe of sovereign states, a typical entity of the universe would consist of any state. The head of state, legislature, party and so on can all be considered structural organs.

EXAMPLES:

In "Judiciary of India," the facet "judiciary" is an organ of the facet "India." Expressed in a transformed skeletal form, we shall get "India. Judiciary." This sequence, obtained by means of the whole-organ principle, can also be got directly from the application of the wall-picture principle. It may be kept in view that the whole-organ principle is applicable in those cases only where the relation of whole and organ exists. The limitation does not exist for the wall-picture principle however.

732 Cow-Calf Principle

The cow-calf principle: "If a facet A and another facet B belonging to the same subject are not to be separated though they are distinct from each other and thus separable, A and B should be kept together in the same round, even as a milch cow and its unweaned calf are not separately sold out though they are distinct entities and thus separable, but are kept together in possession of the same owner" (*Prolegomena*, p. 427). The principle emphasizes that the facets of the same subjects should be put together in the same round in the successive

levels.

EXAMPLES:

In "Enforcement of constitution of local bodies in India," there are three facets—"India," "constitution" and "local bodies," which are not to be separated and put into different rounds. These facets should either be put in the first round, before "enforcement," an energy facet, or after it. Wherever they are included, they should be put in the same round. As far as the question of which round is concerned, that will be determined by the wall-picture principle. It may be added that the sequence obtained by means of the cow-calf principle can also be achieved through repeated application of wall-picture principle. The application has to be repeated because the wall-picture principle is applicable to two facets at a time.

In "Enforcement of construction of transmission wires in electrical engineering," there are three facets—"electrical," "transmission wires" and "construction," which are not to be separated and put into different rounds. These facets should either be put in the first round before "enforcement," the energy facet, or after it. Other remarks are the same as those provided in the previous example.

733 Actand-Action-Actor-Tool Principle

The actand-action-actor-tool principle says: "If in a subject, facet B denotes action on facet A by facet C, with facet D as the tool, then the four facets should be arranged in the sequence A, B, C, D" (*Prolegomena*, p. 428).

EXAMPLES:

In "machine silk spinning by youth," machine is a "tool," silk is "actand," spinning is "action" and "youth" represents actor. Therefore, when expressed in transformed skeletal form, we get "silk. spinning. youth. machine." This sequence can also be obtained by repeated application of the wall-picture principle.

Note: Ranganathan also formulated another principle, called the "principle of commodity-raw material-transformation-transformer-tool." This can also be reworded as "commodity-actand-action-actor-tool principle." Compared with the principle described in the previous section, the word "commodity" has been added here.

8 STEPS IN CLASSIFYING

On the basis of the General Theory of Classification, we may regard

classifying to mean translating the name of the specific subject embodied in the document into its class number. The translation will take place from natural language into classificatory language. According to Ranganathan, eight successive steps are involved in such a translation. These steps keep into consideration the theory of library classification. It should be a good experience for a beginner to learn the art of classifying by following these steps. However, a person, after attaining some experience in classifying, need not go through each step in a conscious manner, but will classify by means of reflex action.

Step 0	Raw title
Step 1	Expressive title
Step 2	Title in kernal terms
Step 3	Analyzed title
Step 4	Transformed title
Step 5	Title in standard terms
Step 6	Title in focal numbers
Step 7	Class number

These steps in the classifying of a subject are carried out on the basis of the postulates and associated principles. It was claimed by Ranganathan that if all the documents classified in this manner are arranged according to their class numbers, then these documents would get arranged in a helpful sequence.

Step 0 to step 4 belong to the idea plane. Step 5 belongs to the verbal plane, and Steps 6 and 7 to the notational plane.

Step 0 Raw Title

A raw title is the title found on the title page, or at the head of a document.

Step 1 Expressive Title

An expressive title is the one expressive of the subject of the document covering all the facets.

The expressive title can be the title given on the title page, if it is fully expressive of the contents of document. A glance through the concerned document would be necessary for the purpose.

If the raw title is not fully expressive, the basic subject term or/and some isolate terms may have to be added. That is, ellipses are filled up. This would require a perusal of document itself.

In case the raw title contains derived composite terms, then these are replaced by fundamental constituent terms.

If the raw title happens to be a fanciful title, the expressive title is provided by the classifier after a perusal of the document.

Step 2 Title in Kernal Terms

The kernal title is the one containing only the kernal terms. Kernal terms are terms other than apparatus ones. The kernal title is obtained from the expressive title by removing the apparatus words, including auxiliary words, puffs, and so on. The kernal terms are converted into nominative singular form. The terms are separated from each other by means of a full stop.

Step 3 Analysed Title

In this step, the basic subject term is labelled "(BS)." Each isolate term is assigned the abbreviation representing the fundamental category of which it may be deemed a manifestation, as well as the round and level. The abbreviations include:

[1P1]	Personality	facet,	round 1,	level 1
[1P2]	Personality	facet,	round 1,	level 2
[1M1]	Matter	facet,	round 1,	level 1
[1M2]	Matter	facet,	round 1,	level 2
[1E1]	Energy	facet,	round 1,	level 1
[1E2]	Energy	facet,	round 1,	level 2
[S1]	Space	facet,	level 1	
[S2]	Space	facet,	level 2	
[T1]	Time	facet,	level 1	
[T2]	Time	facet,	level 2	

Step 4 Transformed Title

In Step 4, the kernal terms, along with their respective abbreviations, are rearranged with the help of postulates of helpful sequence.

Step 5 Title in Standard Terms

Here, the kernal terms are replaced by the equivalent standard terms used in the preferred scheme for classification. This is a step which belongs to the verbal plane.

Step 6 Title in Focal Numbers

The basic subject term, as well as the isolate terms, are replaced by respective numbers given in the schedules of the preferred scheme for classification.

Step 7 Class Number

All the labels and full stops in the title in focal numbers (obtained in Step 6) are removed. The proper indicator digits are prefixed to each isolate number. The indicator digits should be the ones prescribed by the preferred scheme for classification or classificatory language.

EXAMPLE 1 :

Raw title: Study of anger in children

Expressive title: In psychology, study of anger in children

Title in kernal terms: Psychology. Anger. Children.

Note: Here, the conjunctions, prepositions and so on are omitted. Therefore, words like *in* and *of* are dropped.

Analyzed title: Psychology (BS). Anger [1M1]. Children [1P1]

Transformed title: Psychology (BS). Children [1P1]. Anger [1M1]

Title in standard terms: Psychology (BS). Children [1P1]. Anger [1M1]

Title in focal numbers: S(BS). 1[1P1]. 524[1M1]

Class number: S, 1; 524 (CC, 7th edn.)

EXAMPLE 2:

Raw title: Method of teaching algebra

Expressive title: In education, Method of teaching algebra in Indian Universities

Title in kernal terms: Education. Method of teaching. Algebra. India. Universities

Analyzed title: Education (BS). Method of teaching [1M1]. Algebra [1M2]. India [S1]. Universities [1P1]

Transformed title: Education (BS). University [1P1]. Method of teaching [1M1]. Algebra [1M2]. India [S1]

Title in standard terms: Education (SBS). University [1P1]. Teaching technique [1M1]. Algebra [1M2]. India [S1]

Title in focal numbers: T(BS). 4 [1P1]. 3[1M1]. B2[1M2]. 44[S1]
Class number: T, 4; 3 (B2). 44 (CC, 7th edn.).

EXAMPLE 3:

Raw title: Strike by clerical staff in textile industries

Expressive title: In Economics, strike by clerical staff in textile industries in USA in 1960s

Title in kernal terms: Economics. Strike. Clerical staff. Textile Industries. USA. 1960s

Analyzed title: (i) Economics is a basic subject. Strike denotes [E]. Clerical staff denotes [P]. Textile industries denotes [P]. USA denotes [S]. 1960s denotes (T).

(ii) Now there are two [P] in the subject. Therefore, we must fix their sequence. Between strike [E] and textile industries [P], we can say that the concept of strike cannot become operative unless the concept of textile industries [P] is conceded. Therefore, the wall-picture principle tells that the sequence should be Textile Industries [P] strike [E]. Therefore, we can say that the kernel term "Textile industries" belongs to the first round and can be represented as [1P1], because [E] starts the second round.

(iii) Now let us decide the sequence of strike [E] and clerical staff [P]. Here, strike is action and clerical staff is actor. Therefore, by applying the Actand-action-actor principle, we achieve the following sequence:

Strike [E] clerical staff [2P]

Here, clerical staff belongs to the second round.

(iv) We know that space and time belong to the last round.

(v) Thus analyzed, the title would be:

Economics (BS). Strike [E]. Clerical staff [2P]. Textile industries [1P1]. USA [1S1]. 1960s [1T1]

Transformed title: Economics (BS). Textile industries [1P1]. Strike [E]. Clerical staff [2P]. USA [1S1]. 1960s [1T1]

Title in standard terms: Economics (BS). Textile industries [1P1]. Strike [E]. Clerical staff [2P]. USA [1S1]. 1960s [1T1]

Title in focal number: X(BS). 8(M7) [1P1]. 99P[E]. 79D[2P]. 73[S]. N6[1T1]

Note: According to the rules of CC (6th edn.), 99P represents "clerical" and belongs to the earlier level. 79D represents "strike" (more concrete sector of 97) and belongs to a later level. According to CC rules, the first digit 9 of 79 D must be omitted.

Class number: X 8(M7): 99P, 79D. 73 'N6 (CC, 6th edn.)

EXAMPLE 4:

Raw title: Infra-red spectrum for the study of physiology.

The above is a complex subject in which two compound subjects occur in a biased phase relation. Infra-red spectrum is a biased phase and the study of physiology is a biasing phase. Here, we shall have to construct the class numbers for each phase separately, and then combine them.

Classification of Phase 1

Raw title: Infra-red spectrum

Expressive title: In radiation physics, infra-red spectrum

Kernel title: Radiation physics. Infra-red spectrum.

Analyzed title: Radiation physics (BS). Infra-red [1P1]. Spectrum [1M1]

Transformed title: Radiation physics (BS). Infra-red [1P1]. Spectrum [1M1]

Here, the postulate of sequence within a round has been applied.

Title in standard terms: Radiation physics (BS). Infra-red [1P1]. Dispersion [1M1].

Title in focal numbers: C5(BS). 6[1P1]. 3[1M1].

Class numbers: C5, 6; 3(CC, 7th edn.)

Classification of Phase 2

Raw title: Study of physiology

Expressive title: In Botany, study of physiology

Kernal title, Botany. Physiology.

Analyzed title: Botany (BS). Physiology [1M1]

Transformed title: Botany (BS). Physiology [1M1]

Title in standard terms: Botany (BS). Physiology [1M1]

Title in focal numbers: 1(BS). 3[1M1]

Class number: 1; 3 (CC 7)

Synthesis of the Class numbers of the Phases

In CC7, inter-subject bias relation is denoted by b and the indicator digit for such a relation is &. The wall-picture principle insists that the biased phase should precede the biasing phase. Therefore, the full class number would be:

C5, 6; 3 & b 1; 3 (CC, 7th edn.)

EXAMPLE 5:

Raw title: Library Herald (Official organ of Delhi Library Association).

The above subject consists of two parts, namely, library science and an anteriorizing common isolate "periodical." The first is a core subject and second an anteriorizing element. The class numbers shall be constructed separately for the two, and then combined together.

Classification for Core Subject (Host Class)

Raw title: Library Herald

Expressive title: Library science

Title in kernal terms: Library science

Analyzed title: Library Science (BS)

Transformed title: Library Science (BS)

Title in standard terms: Library science (BS)

Title in focal numbers: 2(BS)

Class number: 2

Classification for Anteriorizing Element

Raw formulation: Indian journal started in 1953

Expressive formulation: Indian journal started in 1953

Formulation in kernal terms: India. Journal. 1953

Analyzed formulation: India [S1]. Journal [ACI]. 1953 [T1]

Transformed formulation: Journal [ACI]. India [S1]. 1953 [T1]

Formulation in standard terms: Periodical [ACI]. India [S1]. 1953 [T1]

Formulation in focal number: m[ACI]. 44[S1]. N53[T1]

Class number: m44, N53

*Synthesis of Host Class Number and Number
for Anteriorizing Element*

2 m44, N53

EXAMPLE 6:

The following example has been provided to illustrate that the eight successive steps are also applicable to UDC.

Raw title: Method of teaching chemistry.

Expressive title: In education, method of teaching chemistry in.
Indian secondary schools.

Title in kernal terms: Education. Method of teaching Chemistry.
India. Secondary schools.

Analyzed title: Education (BS). Method of teaching [1M1]. Chemis-
try [1M2]. India [S1]. Secondary schools [1P1]

Transformed title: Education (BS). Secondary schools [1P1].
Method of teaching [1M1]. Chemistry [1M2]
India [S1]

Title in standard terms: Education (BS). Secondary Schools [1P1].
Methods of instruction—Chemistry [1M1].
India [S1]

Title in focal numbers: 37(BS). 373. 5[1P1]. 371.3 54 [1M1]. 540
[S1]

Class number: 373.5:371.3:54 (540)

EXAMPLE 7:

The following example has been provided to illustrate that the eight successive steps can be applied to DDC.

Raw title: Availability of finance for jute industry in India.

Expressive title: In Economics, availability of finance for jute industry in India

Title in kernal terms: Economics. Finance. Jute industry. India.

Analyzed title: Economics (BS). Finance [E]. Jute Industry [1P1]. India [S1].

Transformed title: Economics (BS). Jute industry [1P1]. Finance [E]. India [S1].

Title in standard terms: Economics (BS). Jute agriculture [1P1]. Financial considerations [E.] India [S1]

Title in focal numbers: 330 (BS). 633.54 [1P1]. 338.13 [E]. 954 [S1]

Note: In DDC, there is no provision for linking two class numbers; therefore, the 633.54 [1P1] has to be dropped.

Class number: 338.13 0954

91 BOND STRENGTH

The class structure is reflected fully in the structure of the class numbers constructed according to *Colon classification*. The structure of class numbers also expresses the strength of the bond between the parts of the class number (these parts can consist of phases, facets and the links in a basic class chain). This quality of the structure of class numbers has led to the Bond theory of the class structure. This was recognized at conscious level in 1962. Let us consider the title 'Teaching of chemistry in secondary schools in India.' Its transformed skeleton form would be as given below:

Education (BF). Secondary Schools [1P1]. Method of teaching [1M1]. Chemistry [1M2]. India [S1]

The above sequence of facets is based on the 'Postulate of concreteness.' The facet structure is in the order of decreasing concreteness. According to Ranganathan, "the decreasing concreteness inherent in the facet structure can also be looked upon as one in the decreasing sequence of the Bond strengths between the basic subject and the successive isolates" (*Prolegomena*, p. 431). Thus the bond strength of 'Education' is greatest with 'secondary schools'. It is less with 'Method of teaching'. The strength goes on decreasing so that bond strength of 'Education' with 'India' is the least.

The above examples illustrate the bond strengths between the basic subject and the successive isolates. Similarly we can study the bond strength between basic subject and other isolate ideas belonging to any round or any level. We can also study strength between

facets or phases of a complex subject or isolates (in array or chain). The levels of phase relations may be taken to indicate the difference in the strength of bond between phases. Inter-subject, intra-facet and intra-array phase relations represent increasing order of bond strength.

92 CONCLUSION

The postulational approach is an indispensable condition for the success of any scientific theory or process. Therefore, it is appropriate that the design and development of faceted schemes for classification should be based on a sound body of postulates and principles. There is a need for formulating postulates explicitly by each school of thought in classification. The Indian school of thought has already achieved this. The helpfulness of this approach was emphasized in as early as 1957, at the Dorking Conference. Experience has proved the success of such an approach.

In order to be able to apply the postulational approach to classification effectively, one must have good practice in recognizing the fundamental categories, rounds and levels of facets, the formation of the full name of a subject and its transformation according to the postulates and other steps involved in such an approach.

Postulates for the idea plane described in this chapter have been used successfully in *Colon classification* for obtaining a consistent sequence of classes going with basic subjects. Experience has shown that such an approach is helpful to a classificationist, as well as to a classifier. Postulates for the facet sequence and well-picture principle have proved extremely useful in determining the sequence of facets. The latter has been found to be more versatile.

FURTHER READINGS

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- S.R. RANGANATHAN, *Elements of library classification*, 3rd ed., Bombay, Asia Publishing House, 1962, chap N, U.
- , *Prolegomena to library classification*, 3rd ed., Bombay, Asia Publishing House, 1967, part R, S, chap XF, XD.

Chapter 16

CATEGORIES

0 DEFINITION OF CATEGORY

Different persons have used the word "category" in library classification, but the concept has been used differently. Therefore, one should try to understand this term in the context in which it might have been used. Wildhack¹ regards a category as a synonym of "point of view," according to which a subject can be divided. *Glossary and subject index* defines it as "a concept of high generality and wide application which can be used to group other concepts." D.J. Foskett² goes further and regards it as a synonym of the term "faceted," brought into popular use by Ranganathan. We may generalize that categories are used to group different concepts.

Ranganathan uses the term "Fundamental category." His basic postulate is concerned with the conception of fundamental categories. "There are five and only five fundamental categories—viz., Time, Space, Energy, Matter and Personality" (*Prolegomena*, p. 399). Thus, fundamental categories are defined by enumeration only.

1 DEVELOPMENT OF THE CONCEPT

In 1876, Melvil Dewey introduced the principle of division by transfer in literature, history and philology. The same order was closely followed in the subdivision of different classes. Dewey was the first to use such an approach.

C.A. Cutter was the first to use "common subdivisions" separated from the table of general divisions. These included the "local list,"

¹Quoted in Eric de Grolier, *Study of general categories applicable to classification and coding in documentation*, Paris, Unesco, p. 15.

²International Study Conference on Classification for Information Retrieval (Dorking) (1957), *Proceedings*, London, Aslib, 1957, p. 115.

i.e. a list of geographical divisions applicable to any subject.

Next, James Duff Brown, in his scheme entitled *Subject classification*, included chronological divisions, as well as divisions of form, place and language. He used categorical tables, which contain a series of "common stand points," by means of which any subject can be further subdivided.

UDC made a provision for tables of common subdivisions regarding places, chronological divisions, languages, races, bibliographical forms, point-of-view divisions and analytical divisions.

LC is an enumerative scheme of classification and does not make any provision for general categories. However, some provisions have been made in certain specific subjects.

H.E. Bliss conceived his scheme in 1910. Even at that time, he made an effort to use auxiliary tables.

J. Kaiser, in 1911, developed the process of systematic indexing. He developed two categories: concretes and processes. Concretes consisted of substances or equipment materials. Processes included actions carried out or suffered by concretes. This was perhaps the first example of a uniform application of "categories" of terms.

In the first two editions of *Colon classification*, isolates other than space and time were named on the basis of their respective basic subjects. For example, the personality facet had names such as "wave-length facet" and "cultivar facet." Matter material, matter property and energy facets were all named "problem facets."

In 1944, Ranganathan³ postulated five fundamental categories to be used in library classification. Matter material was recognized as the fundamental category matter. Matter property and matter method were considered problem isolates. This happened because he realized that isolate facets belonging to all subjects could be reduced to five types of isolate ideas: namely, personality, matter, energy, space and time.

In the third edition of *Colon classification* (1950), the facet formula for each basic class is given in terms of categories. The concept of categories as a basis is used clearly.

The following instructions have been given:

Each main class should be divided according to a facet formula, or into canonical classes as indicated at the beginning of the chapter devoted to it in Part 2 (CC3, p. 141).

³S.R. Ranganathan, *Library classification; fundamentals and procedure*, Madras, Madras Library Association, 1944, Section 514.

Each canonical class should be divided according to a facet formula, or into canonical classes of a higher order, as indicated in the chapter in Part 2, in which it occurs (CC3, p. 142).

The facet formula for mineralogy was H1 [S]: [P]. Here, [S] stands for the substance facet. [P] is the problem facet. The facet formula for textiles was M7 [M]: [W]. [M] was the material facet, and [W] the work facet.

In the fourth edition (1952), there is concrete use of the concept of fundamental categories. Different indicator digits (such as , ; : .) are prescribed for facets of different categories, instead of the colon being used in all cases. Problem isolates were renamed "energy isolates." Facet formulae for each main and canonical class were provided in terms of P M E S T. Rounds and levels were also provided for.

In the fifth and sixth editions, no changes were made with respect to the concept of fundamental categories and their application. In the 6th edition (reprinted in 1963 with amendments), instead of using the dot (.), the inverted comma (') was suggested as an indicator digit for time.

The second edition of *Prolegomena to library classification* (1957) postulated five fundamental categories, and explained these in detail. Other postulates were also provided.

Till the beginning of 1966, isolates such as morphology, physiology, disease, ecology and others were forcibly regarded as manifestations of the fundamental category "energy." In February 1966, Ranganathan was engaged in the preparation of the 7th edition of *Colon classification*, when he re-examined the above category of isolates. Generally, energy had been postulated as action of one kind or another. It was, however, discovered that these isolates did not involve any action. Therefore, they were redefined as properties or attributes of concerned entities. Thus, they were deemed as manifestations of the fundamental category "matter," instead of those of energy. This mistake had persisted in *Colon classification* from the first edition (1933) onwards. The 7th edition which has started coming out in parts has incorporated the necessary changes.

The question arises as to why this error persisted for so long. The error has been traced to trickery of the verbal plane. According to Gopinath, "In the early years, he [Ranganathan] used to denote whatever was not a special kind of isolate such as educand, community, etc. or space isolates or time isolates, by the term "Problem." Under this umbrella "Problem" came not only energy isolates but

also property isolates."⁴

2 PRESENT POSITION

According to the Ranganathan school of thought, there are five and only five fundamental categories—personality, matter, energy, space and time. These can be recognized. We can define them only by means of enumeration. Ranganathan referred to these categories as fundamental categories because they operate in all fields of knowledge. His categorical framework is based on the assumption that any specific field whatsoever, taken into consideration, is formed by the interaction of the five fundamental categories postulated. However, such an operation is confined to the bounds of a given basic class, the reason being that the concept of fundamental categories is used within the confines of a basic class. These categories have no scientific justification, and are based on intuition. They have been found to be both convenient and extremely useful, and have led to satisfactory results. These concepts acquire different meanings in different subjects.

Recognition of space and time do not give much trouble. Energy is action of one kind or another. As regards the matter facet, some people have recognized three kinds of matter, such as matter material, matter property and matter method. However, according to Neelameghan, the question of deeming an idea denoting a "method" as a manifestation of F.C. (M) does not seem to arise because "an idea denoting a "method" may occur as (1) (IP1) isolate; or (2) array division or specifier to "property" or (3) personality isolate immediately preceded by an energy isolate."⁵ This needs further investigation.

The concepts of matter, energy, space and time are basic to science and have been defined explicitly by scientists. However, these terms and the ideas represented by them (as well as personality) in this book have been dealt strictly in the context of library classification as developed by Ranganathan. Thus, their use here is somewhat different from that of metaphysics or physics.

According to present day thinking, the term "matter" has been

⁴M.A. Gopinath, "DRTC research cell; A report for 1966," *DRTC, Annual Seminar*, 4, 1966, p. 456.

⁵A. Neelameghan, "Trend of research in notational System. . ." *DRTC Annual Seminar*, 9, 1971, p. 493.

TABLE 16.1
CATEGORIES

<i>Name of Author</i>	<i>Personality</i>	<i>Matter material</i>	<i>Matter property</i>	<i>Matter method</i>	<i>Energy</i>	<i>Space</i>	<i>Time</i>
S.R. Ranganathan Barbara Kyle	Personality Personality (Natural phenomena, artefacts, aims, pur- poses, ideas, etc.)	Material	Property		Energy Activities	Space Space	Time Time
D.J. Foskett J.E.L. Farradane	Products, part Entities	Materials	Properties abstracts	Process	Operations Activities	Abstract	Abstract
B.C. Vickery	Substance, product, organism, part, organ, structure, agent, tool	Constituent, object of action, raw material	Property, measure, general property, behaviour	Process	Action, operation	Space	Time
Jesse Shera and M.E. Egan Erle de Grolier	Agent, tools product Organ, form	Object of action Substances	Property		Act	Space	Time
G. Cordonnier	Organisms and services, persons (miscellaneous cate- gories), individuals, bodies (natural, simple, compound), intellectual concepts, documentary forms		Biological conditions, miscellane- ous condi- tions	Miscellane- ous equip- ment	Action, Analytic, Synthetic, Organization Miscellaneous actions	Space Space Place	Time Time Time

replaced by the term "property." Property can be either attribute entity or material context.

Table⁶ 16.1 (p. 264), based on Seetharama's article, indicates that the number of categories varies from person to person. However, the number of categories has a relationship with the subject(s) for which they are formulated. The categories suggested by different persons are for special schemes for classification. However, Ranganathan and Farradane have listed the categories which can be used for special as well as general schemes for classification.

Ranganathan has suggested five categories, called fundamental categories. On analyzing the various categories proposed by different authorities, we find that these can be reduced to the five fundamental categories listed by Ranganathan, because many categories belong to levels within a round.

Ranganathan has defined his fundamental categories in an explicit way. However, a recognition of the fundamental categories of personality and energy occasionally creates a difficulty. But the categories used by others are not often defined explicitly. There is no difference of opinion about space and time, which are stated explicitly or implicitly.

Of the various approaches, Ranganathan's has proved very helpful in designing a scheme for classification. His approach has been tested over years and used in formulating a general classification as well as a large number of depth classification schemes. However, categories proposed by others have been experimented only on limited scale.

3 ARE FIVE FUNDAMENNAL CATEGORIES ENOUGH?

Ranganathan examined the major universal schemes of classification and came to the conclusion that all the characteristics used as a basis of division in classification could be considered a manifestation of five fundamental concepts or categories. In spite of the apparent differences in different basic subjects, the kinds of facets occurring in these can be grouped into five groups. He also found that the same five categories (personality, matter, energy, space and time) operate in all fields of knowledge. Therefore, these have been termed fundamental categories. There is no scientific justification for assuming that "there are five and only five fundamental categories." However, working

⁶S. Seetharama, "Categorization of isolate ideas," *Library Sciencce*, 9, 1972, pp. 491-3.

on the basis of the five fundamental ideas since 1955 has led to satisfactory results. It has helped in mapping out the universe of subjects along a helpful sequence. Ranganathan's approach in postulating five fundamental categories is a pragmatic one and has proved to be very convenient.

Although there are only five fundamental categories, these can manifest themselves in one and the same subject more than once. The number of times a fundamental category can manifest itself is based on the nature of the subject being dealt with, and the postulates for rounds and levels.

People belonging to the Indian school of thought feel that the five fundamental categories are enough. According to Neelamegham, "...it would appear that the manifestations of the fundamental categories give rise to facets. The fundamental category to which a facet belongs is probably lost sight of and the facet alone is evident. Therefore, to treat the train of characteristics as fundamental categories is a superficial approach, mistaking the phenomenal for the near-seminal."

B.C. Vickery does not agree with Ranganathan's five fundamental categories. He feels that "For the field of science and technology, a longer list of fundamental categories has proved helpful: substance (product), organ, constituent, structure, shape, property, object of action (patient, raw material), action, operation, process, agent, space, and time."⁷ He further goes on to add that "any such list of fundamental categories should not be used mechanically and imposed upon the subject, but to use it as a provisional guide in approaching a new field can be helpful. It provides an outline framework which may fit the field, and give guidance in suggesting possible characteristics which should not be overlooked. On the other hand, it must never be taken to exhaust the field, nor to be necessarily applicable in all subjects."⁸ By means of examples, Vickery has attempted to illustrate that for different fields of specialization, different categories are needed. Some people have advanced the view that instead of the five fundamental categories, we may recognize seven, such as personality, matter material, matter property, matter method, energy, space and time. This suggestion is worth consideration.

⁷B.C. Vickery, *Faceted classification*, London, Aslib, 1960, (reprinted in 1970) p. 23.

⁸*Ibid.*, p. 24.

4 TIME

The fundamental category "time" is used here in the same sense as is commonly understood. Time occurs in every subject forming a local description or local history of any subject.

EXAMPLES:

Growth of libraries in India, 1947-1975

Economic conditions in France during 19th century

Secondary education in India during 1960s

Rainfall in Bangladesh during winter season

There is no difficulty—in fact it is rather easy—to identify the fundamental category "time."

5 SPACE

The fundamental category "space" is used here in the same sense as is commonly understood. It occurs in every subject forming a local description or local history of any subject.

EXAMPLES:

Teaching of French in India

Road transport in Burma

Sports in the developing countries of the world

Street cleaning in Bombay

Navigation in Pacific Ocean

It is quite easy to identify the fundamental category "space"—in fact easier to identify than personality, matter and energy.

6 ENERGY

The fundamental category "energy" has been used by Ranganathan strictly in the context of classificatory discipline. Thus, according to him, "generally speaking, its manifestation is action of one kind or another. The action may be among and by all kinds of entities—inanimate, animate, conceptual, intellectual, and intuitive" (*Prolegomena*, p. 400).

EXAMPLES:

Treatment of inflammation of eyelids

Cure for appendicitis

Storing of harvested wheat

Etiology of social tension in France brought up to 1960s

Charity for the poor among the Aryans

Prevention of the disease of the stem of the rice plant

Distribution of the chemicals to prevent disease of the stem of rice plant.

Identification of the fundamental category "energy" is certainly more difficult than that of the fundamental categories of space and time.

In CC7, a large number of energy isolates are being provided. These occur in mineralogy, petrology, economic geology, botany, agriculture, zoology, animal husbandry, medicine and so on. These may occur as etiology, diagnosis, treatment, surgery, etc. Till CC6, morphology, physiology, disease, ecology, hygiene etc., were wrongly included under energy. In CC7, these have been rightly shifted from the energy facet to the matter property facet. As a result, the number of energy isolates has decreased a great deal in CC. It seems that in future, CC schedules would contain very few special energy isolates, because a schedule of common energy isolates will be compiled, which could serve the requirements for energy isolates in different compound subjects.

According to Ranganathan, "The fundamental category "energy" may manifest itself in one and the same subject more than once. The first manifestation is taken to end Round 1 of the manifestation of the three fundamental categories "personality," "matter," and "energy." The second manifestation is taken to end Round 2, and so on." The first manifestation of energy is taken as [1E] and the second as [2E], and so on. As energy can occur only once within a round, there are no levels in this fundamental category. These are the basic concepts governing the provision of energy isolates in CC.

In UDC and DDC provision has been made for energy isolates but concepts of rounds and levels have not been recognized.

7 MATTER

Manifestation of the fundamental category "matter" can be of three kinds, namely, matter material, matter property and matter method. Matter material is simple enough to visualize. It usually consists of materials used for construction, consumption, and so on. It can take a variety of forms. In the subject of sculpture, wood, marble, stone, bronze and so on can be considered matter material. Similarly, in

the subject of painting, wood, paper, fresco, stone and metals can be considered as matter material.

In chemistry, additive property, constitutive property and electronic structure, are considered as matter property. In medicine, disease, physiology and morphology, are regarded as matter property.

In analytical chemistry, we can have matter method isolates such as biological method, volumetric method, chemical method, magnetic method and so on. Some people do not recognize matter method. They regard matter method as speciation to action.

EXAMPLES:

- (i) Indian *fresco* painting of landscape
Application of *reagent* in quantitative analysis
Use of *fluorescent* in qualitative analysis
- (ii) *Physiology* of cell
Microscopical *anatomy*
Prevention of agricultural *disease*
Photochemical property of emulsion
Diseases of lungs
Catalysis in industry
Optical activity in physical chemistry
- (iii) *Indirect volumetric method* for analysis of organic substances

Identification of the fundamental category "matter" is more difficult than that of the fundamental category "energy."

Matter property occurs a great deal in various schemes of classification. But matter material and matter method are to be found only in a few places.

The fundamental category "matter" can manifest itself in Round 1, Round 2, and so on. Matter can also manifest itself more than once in one and the same round. Thus, we can have levels of matter in each round. This concept has been adopted in CC.

In CC6, the number of matter isolates was rather few. In this edition, matter was usually considered as consisting of materials used for construction, consumption and so on. Later, developments in the general theory of classification led to the realization that property isolates should be considered as manifestation of matter (rather than of energy). As a result of this conclusion, a majority of the so-called energy-cum-personality isolates of CC6 were renamed matter property isolates. Therefore, a majority of energy-cum-personality isolates of CC6 have been shifted to matter property in CC7. The number of such isolates is quite large. Again, in 1968, the method isolates were

also deemed as manifestation of matter. This has led to the recognition of a large number of isolates under matter property, and a few have been left under energy. Such is the position of these isolates in CC7.

8 PERSONALITY

The fundamental category "personality" has been used by Ranganathan strictly in the context of classificatory discipline. Generally, speaking, one might say that any manifestation which has a distinctive character (for example shape or specialized organs) is likely to be one of the personality. Personality is difficult to define. Ranganathan did not succeed in providing a satisfactory explanation of the concept. At times, there is a confusion between personality and matter.

Personality denotes the thing itself. It forms the basis as well as the locus of all the other fundamental categories. This becomes clear from the fact that without personality, there can be no organ, constituent, attribute or reaction in space and time.

EXAMPLES:

Treatment of *heart* disease

Reference service in *college library* in Delhi

Designing of *aeroplanes* in USA

Circulation of newspapers in a *university library*

Audio-visual method of teaching mathematics in *secondary schools*

Anger of *children*

Constitution of *India* brought till 1950s

Identification of the fundamental category "personality" presents the greatest difficulty. It is often too elusive in nature. The method of residues is adopted in its identification. In case a given manifestation is not one of the fundamental categories of "time," "space," "energy" or "matter," then it should be considered a manifestation of the fundamental category "personality."

This approach is based on the assumption that there are five and only five fundamental categories. It follows logically that if we are able to rule out the fundamental categories of time, space, energy and matter, then we will be left with personality. This is the method of residues. In practice, it has not always been found to be easy to apply, because there are still many areas where it is difficult to distinguish between manifestations of fundamental categories like energy, matter and personality. Experience is of great help in such cases.

Like matter, personality can manifest itself in Round 1, Round 2 and so on. Similarly, it can also manifest itself more than once in the same round within a subject. Thus, we find that personality can occur again and again as levels. The approach through rounds and levels has been adopted in CC.

In CC6, every basic class has been provided with a schedule for the personality facet. In library science, library has been treated as personality. In chemistry, technology and geology, substance is considered as personality. In agriculture, the plant and its organs have been treated as personality. Due to the development of the concept of speciators, CC7 will have a large variety of personality isolates having different kinds of speciators.

In UDC, in many classes, a series of divisions based on parts or kinds of entities belonging to a basic class have been listed. Under 633, field crops and industrial crops have been enumerated. These crops represent personality. Under 027, types of general libraries have been listed. These represent personality. Under 546, non-metals and metals have been listed. These, again, represent personality.

In DDC, in many classes, a series of divisions based on parts or kinds of entities belonging to a basic class are given. In agriculture, from 633 to 635, specific crops have been enumerated. Crops belong to the personality facet. In motor and vehicles, and cycles (engineering), 629.22 represents types of vehicles and 629.24-629.27 stands for parts of vehicles. These class numbers belong to the personality facet.

EXAMPLES FROM CC6 :

X61 ; 4 : 75.73'N

Control of paper money in USA
in the 20th century

236 ; 48 : 51.44'N

Classification of patents in
Indian research (academic)
libraries in 20th century

234 ; 46 : 55.44'N

Circulation of newspapers in
Indian universities in 20th
century

Y 394 : 8 : 7.44'N5

Improvement of refugee habitants
in India during 1950s

91 CONCLUSION

It is generally agreed that a faceted scheme is superior to an enume-

rative scheme. Any good faceted scheme formulated these days would clearly state the number of categories used as its basis. If one follows Ranganathan's approach, then five fundamental categories would prove sufficient for all subjects. Otherwise, one would have to determine the number of categories separately for each basic class. There is no doubt that Ranganathan's solution has proved to be quite successful. Ranganathan's fundamental categories have been criticized a great deal but many of the critics have not fully understood the basis of these categories. He used the order PMEST to determine the citation order for facets in a class number. This has proved to be helpful in CC as well as in other schemes. He never claimed any philosophical basis for accepting five and only five fundamental categories. He merely postulated these and accepted the order PMEST. This has proved to be a remarkable contribution.

FURTHER READINGS

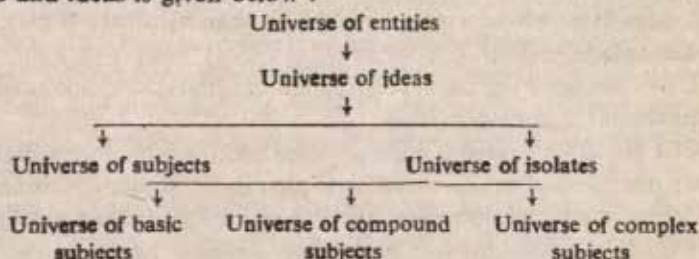
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Chapter 17

COMMON AND SPECIAL ISOLATES

0 INTRODUCTION

An isolate idea is "any idea or idea complex fit to form a component of a subject, but not by itself fit to be deemed to be a subject." At the verbal plane, we use the term "isolate term." Similarly, isolate number is the term at the notational plane. The schematic representation showing the relationship of the original universe of isolates to subjects and ideas is given below :



Ranganathan recognized two kinds of isolates, namely common isolates and special isolates. Similarly, UDC recognizes common auxiliaries and special auxiliaries. DDC 18 has listed standard subdivisions and area notation which correspond to common isolates. The isolates listed in Table 3 to Table 7 correspond to special isolates.

1 COMMON ISOLATES

11 History

In the second edition of DDC (1885), Dewey introduced the concept of "form divisions" for the extension as well as the synthesis of classes. In DDC 12 (1922), these were still named "form divisions." In DDC 13 (1932), these were renamed "common subdivisions." The provision was made for three categories (miscellaneous common subdivisions,

viewpoints and form divisions). In DDC 15 and DDC 16, these were renamed "form divisions." DDC 17 used the name "standard subdivisions." It was argued that these included not only form divisions but also aspects of the study of the subject or mode of treatment; therefore, these were to be called standard subdivisions. In DDC 17, space isolates were made independent as area table (in DDC 16, space isolates were part of the history schedule). These were expected to be applied with Zero (0). At certain places, instructions were given to omit even the zero (0). DDC 18 has extended the nine form divisions of DDC 2 into two separate lengthy tables, listing standard subdivisions and area notation. This has been done to meet the challenge posed by growing universe of subjects.

Charles Ammi Cutter, in his *Expansive classification* (1891-93), used the local list for the division of geography itself, as well as for those subjects which admitted the application of geographical subdivisions. The local list consisted of a series of numbers from 11 to 99. F stands for history and F39 would represent History of France. The scheme indicates as to where a geographical division by local list may be used to advantage.

UDC has used the concept of common isolates and has made many improvements in recent years.

CC1 (1933) provided a separate schedule for common subdivisions. Only one kind of subdivisions was provided. Besides common subdivisions, space and time isolates were also provided separately. It was in CC4 that anteriorizing and posteriorizing common subdivisions were given as separate categories. In CC5, these were named common isolates. CC7 has elaborated the concept of common isolates.

BC1 provided systematic schedules (common isolates), consisting of anteriorizing (numerical subdivisions), time, geographical and language schedules. The scheme also listed seven auxiliary schedules enumerating historical and philosophical subdivisions, and 31 tables of special auxiliary schedules (special isolates) for application.

BC2 has given an elaborate treatment regarding common and special isolates in the scheme.

Schedules for each of the family of common isolates are provided by different major schemes irrespective of any particular basic subject. LC and RIC form exceptions.

12 CC

In CC, family of geographical isolates (continents, countries, states, districts and so on), feature time isolates (day, night, summer and so

on), physiographical isolates (delta, forest, valley, mountain, river, lake and so on); action isolates in general (measurement, investigation, design, evaluation, and so on), property isolates in general (length, area, volume, density, elasticity, specific heat, psychological value, educational value, and so on) institution isolates (observatory, laboratory, learned body, museum, association, and so on), can all "form components of several compound subjects going with each of all or almost all of the basic subjects. Each isolate in each such family is called a common isolate . . . A common isolate is an isolate idea denoted by the same isolate term and represented by the same isolate number, quite irrespective of the compound subject in which it occurs, or the basic subject with which the compound subject goes" (*Prolegomena*, p. 93).

Ranganathan has recognized the following types :

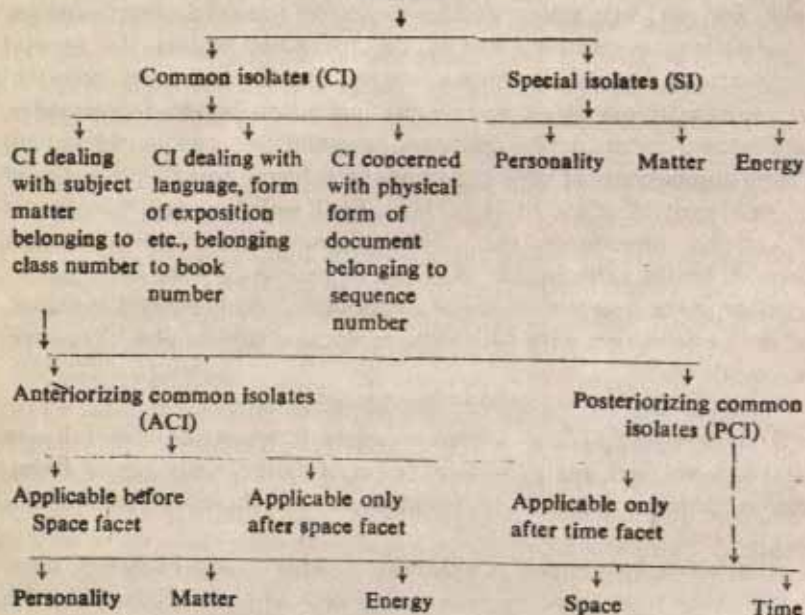
Time isolates (all are common isolates), space isolates (all are common isolates), energy isolates (most of these are common isolates), matter isolates, personality isolates (some of these are common isolates).

Another categorization of common isolates by Ranganathan recognizes two types of common isolates, such as anteriorizing common isolates (ACI) and posteriorizing common isolates (PCI). Anteriorizing common isolates are those which cannot be designated on the basis of fundamental categories.

Anteriorizing common isolates are those which are used for documents, which require to be arranged anterior to ordinary documents on the subject of concern. These documents can be called "approach material." Experience shows that approach material is usually needed for preliminary perusal before the use of regular books required for continuous study. The examples include bibliography, concordance, table, formula, atlas, encyclopaedia, syllabus and so on. However, CC6 has included periodicals, conference proceedings, etc. under ACIs. But these cannot be considered approach materials.

Posteriorizing common isolates are used for documents which do not require the need for anterior position. All space and time isolates belong to it. Calculating, designing, measuring, weighing, profession, institution, learned society, industrial body and commercial body are all examples of posteriorizing common isolates.

The schematic representation of different types of isolates is given as follows :

Isolates

Note : Anteriorizing common isolates cannot be assigned to fundamental categories.

CC7 has provided the following schedules for common isolates:

- (a) Time isolates
- (b) Space isolates
- (c) Common energy isolates
- (d) Common matter isolates
- (e) Common personality isolates
- (f) Anteriorizing common isolates

Time isolates have been described in Chapter Nineteen. Space isolates have been dealt with in Chapter Eighteen.

A long list of common energy isolates has been given in CC7. A few of them are listed below :

- | | |
|-----|-------------|
| a0Z | By action |
| a12 | Decreasing |
| a14 | Increasing |
| a3 | Removing |
| a5 | Separating |
| aM | Ranking |
| aN | Classifying |

- aP Naming
- b1 Determining
- b2 Calculating
- b3 Counting
- b4 Measuring
- b5 Repeating

A long list of common matter isolates has been given, some of which are enumerated below:

- a01 Property
- a02 Existence
- a03 Function
- a05 Relation
- a06 Identity
- a11 Accuracy
- a12 Reliability
- a13 Consistency
- a15 Precision
- a17 Efficiency

A few isolates from common personality isolates are:

- b Profession
- d By institution
- f Investigating
- f2 Observatory
- g Learned body
- t Educational institution

EXAMPLES FROM CC6:

- 2aa Bibliography of Bibliographies of Library Science
 - G91a N7 Bibliography on microbiology (1964)
 - Va 66,7 Reading list of current books on history
 - Ga 71, 3V Catalogue of books on biology (first editions) of the Vikas Publishing House
 - Bav 44'N7 History of bibliography of mathematics in India brought up to 1970's
 - Σk1, N68 International encyclopaedia of social sciences (1968)
- Note : In CC7, Σ has been replaced by T*Z.
- 2m44, N75 Journal of Library and Information Science (started in 1975)
 - Bma Bibliography of periodicals on mathematics
 - Bv44 'N6 History of mathematics in India brought up to 1960s
 - 2wM92 Biography of S.R. Ranganathan (born in 1892)
 - 2wM92,1 Autobiography of S.R. Ranganathan (born in 1892)

- 2wM92,2 Anas of S.R. Ranganathan (born in 1892)
 2wM92,4 Letters of S.R. Ranganathan (born in 1892)
 Aw73,N3 Collected biographies of American scientists (youngest
 born in 1925) (N3 represents latest effective decade)
 Dx44, N3 Collected works of Indian engineers (youngest born in
 1939)
 Bw56, N1 Collected biographies of British mathematicians
 (youngest born in 1911)
 Tw56, N1 Collected biographies of the British educationists
 (youngest born in 1918)
 2x44, N3 Collected works of Indian librarians (youngest born in
 1939)
 BxN88 Collected works of Ramanujan (India mathematician
 born in 1888)
 Cy2 Syllabus of physics
 V44y7No4 Biography of Lal Bahadur Shastri (born in 1904)
 (former Prime Minister of India)
 V44y7 N17 Biography of Indira Gandhi (born in 1917)
 V56y7 M74 Life of Winston Churchill (born in 1874)
 L : 4 : 7 : f Research in surgery
 V56 : f. 44'N7 Research on British History carried on in India in the
 1970s
 O, 1 : g Poetic criticism
 O111 : gwN21 Biography of a critic of French literature (born in
 1921)
 O111,1 : g Love in English poetry
 (S : 55)
 2, b Library profession
 L. 44, b Medical profession in India
 A. 44, f Research institutions in Science in India
 2. 44, g, 9N33 History of Indian Library Association (founded in
 1933)
 2.44,g, 9N33 : Constitution of Indian Library Association in 1970s
 2'N7

13 DDC

DDC18 has provided seven tables, which aid in number building and also serve a mnemonic function. These are also called auxiliary tables (formerly called supplementary tables). A table in DDC is "a sequence of dependent notations indicating various special concepts used repeatedly with a variety of subjects and disciplines" (DDC18, V. 1,

p. 61). These are used in the construction of numbers, but are not applied by themselves.

The numbers in these tables represent the same topic or possess the uniform meaning throughout its application to the schedule. In 340.05, 330.05, 301.05, —05 denotes periodicals. This leads to mnemonic (memory) function. The numbers added from these tables to the numbers taken from classification schedules lead to combinations of numbers having a consistent meaning in different contexts.

The numbers taken from these tables cannot be used alone; they must be used along with numbers taken from the classification schedules. The dash (—) given before notation in these tables indicates that these numbers must be added to another number. These numbers in the tables provide synthesis.

The names of seven tables are listed below:

Standard subdivisions (Table 1)

Area table (Table 2)

Individual literatures (Table 3)

Individual languages (Table 4)

Racial, ethnic, national groups (Tables 5)

Languages (Table 6)

Persons (Table 7)

Table, 1 and 2 have listed common isolates. Other tables have provided lists of special isolates.

Table 1 Standard Subdivisions

This is a table listing "certain frequently occurring forms or methods of treatment applicable to any subject or discipline" (DDC18, V, 1, p. 61). They may be added, when required, to any number in the schedules.

Standard Subdivisions (Table 1)

Summary

- 01 Philosophy and theory
- 02 Miscellany
- 03 Dictionaries, encyclopedias, concordances
- 04 General special
- 05 Serial publications
- 06 Organisations
- 07 Study and teaching
- 08 Collections
- 09 Historical and geographical treatment

The above standard subdivisions represent various forms (such as synopsis or outline, periodical, collection of writings, tables, illustrations, and so on), and modes of treatment (theory, technique, study and teaching, history). These forms of presentation and modes of treatment taken collectively have been called standard subdivisions. These may be applied wherever they are considered appropriate,

EXAMPLES :

- 507 Study and teaching of science
- 605 Serials on applied sciences
- 770.1 Theory of photography
- 520.16 Bibliography of astronomy
- 301.05 Serials on sociology
- 630.202 Manual on agriculture
- 220.3 Dictionary of Bible
- 361.005 Serials on social welfare work

Usually, a single zero (0) is used to attach standard subdivisions. In the last example a double zero (00) has been employed because, in certain classes, the notation beginning with a single zero (0) has already been used. In some cases three or four zeroes have to be used for standard subdivisions.

In the use of standard subdivision 016 representing bibliography, DDC provides a number of alternative as given below:

- (a) 520.16 Bibliography of astronomy

Note: In the above number, bibliography of the subject goes with the subject. The above number has been got by attaching 016 the standard subdivision denoting bibliography.

- (b) 520.0 Bibliography of astronomy

Note: The bibliography of the subject would go with the subject. Here zero (0) has been added to the number for the subject and 520 denotes astronomy. The class number is a short one.

- (c) 016.52 Bibliography of astronomy

Note: The class number has been obtained by using the instruction "add 001-999 to the same number 016". As a result all bibliographies would come together irrespective of the subject.

- (d) 520 A1

or 520Z9

Note: The instruction reads, "class with the specific discipline or subject using book number A1 or Z9."

The above class numbers show that in some cases, options are available in the scheme, which can be used to meet the special requirements of a library. (c) is preferred by DDC and others are alter-

native treatment.

Table 2 Areas

This is a table of notations denoting geographical areas. These notations are applied to other notations in the schedules (series of numbers constituting the notation for the ten main DDC classes and all their subdivisions) and tables by means of "add notes." Area notation has been dealt with in detail in Chapter Eighteen.

14 UDC

UDC has recognized two kinds of auxiliaries: common auxiliaries and special auxiliaries.

Common auxiliaries consist of the following:

Common auxiliaries of language

Common auxiliaries of form (of presentation)

Common auxiliaries of place

Common auxiliaries of race and nationality

Common auxiliaries of time

Common auxiliaries of point-of-view

Common auxiliaries of materials

Common auxiliaries of persons

Out of the above list, the following can be included under common isolates:

Common auxiliaries of form (of presentation)

Common auxiliaries of place

Common auxiliaries of time

Common auxiliaries denote salient features which are common to most of the classes. Ordinarily, these can be used throughout the scheme representing the same connotation. The common auxiliaries are attached to numbers taken from the main schedules with the help of indicator digits, except when the alphabetical device is used.

141 Common Auxiliaries of Form

Common auxiliaries of form distinguish documents according to their physical form, bibliographic form or form of presentation. These are attached to the main UDC number.

(a) Physical form

551.1 (086.43)

General shape and form of each: a globe

(b) Bibliographic form

54(03)

Chemical dictionaries.

Alphabetically arranged
works on Chemistry

54(048) *Chemical abstracts*

54(05) Periodical on chemistry

(c) *Form of presentation*

54(091) History of chemistry

Note : The presentation above is a historical one.

142 Common Auxiliaries of Place

These have been dealt with in Chapter Eighteen.

143 Common Auxiliaries of Time

These have been dealt with in detail in Chapter Nineteen.

2 SPECIAL ISOLATES

21 CC

The families of isolates, such as family of heavenly body isolates in astronomy, the family of educand isolates in education, the family of cultivar isolates in agriculture, the family of substance isolates in chemistry and form isolates in literature are all examples of special isolates. Each such family of isolates has a distinctive character, which is shared by each of its members. The special isolates belonging to a particular family can be used to form compound subjects going with a particular basic subject.

We have already mentioned families of isolates where each family belongs to a particular basic subject. Besides these, there are some special isolates which can form "components of compound subjects going with more than one" basic subject, but not with many basic subjects. Such special isolates include the family of language isolates and the family of environment divisions (environment, physical pressure, radiation and so on).

Each isolate idea included in the above families of isolates is called a special isolate.

CC does not provide compound subjects, but gives the schedule of special isolates for each basic subject. The special isolates "special to the compound subjects going with a particular basic subject" are given separately for each basic subject. The class numbers are to be constructed by combining the special isolate numbers.

A list of selected special isolates from the schedule of political science (CC7) is given below:

W Political Science

W, [1P1]; [MP]: [E]

Political Science, [Polity]; [Property]: [Action]

Schedule of [IP1] isolates

1 State

2 Government

By political ideology

—41 Idealism

—43 Facism

—4A Communism

Schedule of Matter Property [MP] isolates

A Political culture

B Political socialization

F Policy

By duties of state

F25A Equity and justice

F25E Welfare promotion

F26 Liberty

From the above, we can construct the class numbers:

W, 2-4A; F26 Liberty in communism

W, 2-43; A Political culture in facism

In CC7, a separate list of language isolates has been enumerated.

Language isolates (such as Teutonic, Greek, Slavonic, Sanskrit, Hindi) belong to one family of isolates. Therefore, these isolates may be called the family of language isolates. These are all special isolates, applicable to the basic classes of literature and linguistics. It may be added that in literature, language is a means of communication, and in linguistics, we study the language itself.

CC7 has given a schedule of environment divisions for use in the division of basic subjects and isolates. An extract is given below:

L Environment

M Physical

M5 Radiation

M6 Potential

N Chemical

W Political environment

Y Social environment

22 DDC 18

As already noticed, Tables 1 and 2 represent notations denoting what, in CC terminology, are called common isolates. Similarly, Tables 3 to 7 list notations representing special isolates of DDC.

DDC 18 provides major schedules consisting of compound sub-

jects. Tables 3 to 7, listing special isolates, have been added only in the present edition. This is a major addition in the scheme.

221 Table 3 Subdivisions of Individual Literatures

This is a table of notations denoting "regularly occurring topics applicable to any literature." These notations may be added to individual literature in 810-890, and are special subdivisions of the standard subdivisions -08 for collections of literature, and -09 for history, description or critical appraisal of literature. (852.91408 Collection of Italian drama for later 20th century.)

222 Table 4 Subdivisions of Individual Language

This is a table of notations denoting "regularly occurring topics applicable to any language." The notations may be added to individual languages in 420-490. (428.1 Spelling in English language).

223 Table 5 Racial, Ethnic and National Groups

This is a table of notations "designating specific racial, ethnic or national groups." These notations are applied to other notations from schedules by means of add notes. (301.45 1111 Canadians).

224 Table 6 Languages

This is a table of notations "designating specific languages". These notations are applied to other notations in the schedules and tables by means of "add notes". (220.53931 Bible translated into Dutch. Here the number is constructed by adding -3931, which stands for Dutch and 220.5 for Translation of Bible.)

225 Tables 7 Persons

This is a table of notations denoting "persons by specific occupational and other classes". These are applied to other notations in the schedules and tables by means of "add notes" (808.8992241 Collections from more than one literature (808.8992) by Lutherans (-241 in Table 7).

23 UDC

The following common auxiliaries belong to special isolates:

- Common auxiliaries of language
- Common auxiliaries of race and nationality
- Common auxiliaries of viewpoint
- Common auxiliaries of materials and persons

All the special auxiliaries belong to special isolates.

231 Common Auxillaries

231 Common Auxiliaries of Language

Common auxiliaries of language have been provided separately. This list can be extended, when required, with the help of subdivisions of the language schedule given in the main tables.

23111 Scope

The common auxiliaries of language are introduced by the equal sign (=). These common auxiliaries are used to denote the language or linguistic form of a document whose specific subject is represented by means of a main UDC number.

Theoretically speaking, we might denote the language of each document being classified. But in Practice, the language of document is denoted only when there is a special need to make a distinction between documents in different languages. Such is the case when it is a polyglot document or a translation.

54 (021)=20 or =20:54 (021)	Chemistry, handbooks in English
=40:61	Documents in French on medicine
=30:61	Works in German on medicine
=82:08	Russian language, collected works
=914.32:08	Collected words in Hindi
=20:05	English periodicals
53(038)=40	Pocket dictionary of physics in French
61 (03)=20	Medical encyclopaedia in English

Note: The above class numbers have been constructed on the basis of UDC (BS1000: Auxiliaries 1974).

23112 Multilingual Document

In order to specify the languages of a multilingual (polyglot) document, the concerned common auxiliaries of language are cited in an ascending order of their ordinal values after the symbol=00, for example:

54 (021)=00=20=40 Handbook of chemistry, bilingual English/French.

23113 Translations

Translations are denoted by=03, as shown below. 03 may be subdi-

vided in parallel with $=2/9$. Thus, $=03.2/9$, will be used to denote the source language. Further, $=2/9$ may be added to indicate the languages into which translated.

61=03.82	Medical documents translated from Russian
61=03.82=40	Medical documents translated from Russian into French

Note: If the intention is to bring all French translations together, then the number will be $61=40=03.82$.

The above examples show that the common auxiliaries of language can achieve the following:

(a) Simultaneous designation of a subject by form as well as language

(b) To distinguish translations of specific works

(c) To achieve primary grouping by language

(d) To specify the language of a multilingual (polyglot) document.

Note: UDC (BS1000: Auxiliaries: 1974) has been used to construct the above class numbers.

2312 Common Auxiliaries of Race and Nationality

These are useful for representing races not confined to any one political unit. For example, $(=97)$ the Arabs, $(=1.22)$ Islanders.

2313 Common Auxiliaries of View Point

This represents the second sign of relationship used to represent point of view numbers. Some of the divisions belong to common isolates, and others to special isolates. For instance, from the point of view of research division, (001.5) is certainly a common isolate.

EXAMPLES:

678.0015	Rubber research
621.039.577.003.3	Nuclear reactors for electrical power production, from the point of view of accountancy

These divisions often come in conflict with facets enumerated within subjects in the main schedules. Even the term "point of view" is considered a misnomer. However, in the case of "author's point of view," we are supposed to use ".00 colon." Their usage seems to be correct, and was adopted later.

EXAMPLES:

162.6.00:335.5	Dialectics from the point of view of Marxism
----------------	--

2314 Common Auxiliaries of Materials and Persons

23141 Materials

The -03 (hyphen nought three) auxiliaries "indicate the materials or constituents of which objects or products are made, and may be applied throughout main UDC schedule 0/9 if the material aspect is secondary to the subject content" (ES1000: Auxiliaries: 974, p 31).

23142 Persons

The -05 (hyphen nought five) auxiliaries were formerly (in the abridged edition of UDC) special auxiliaries listed at 3 and 658.3, and specially prepared for pathology at 616. These have now been made common auxiliaries and are applicable throughout UDC to indicate concepts not provided otherwise. (These are listed in BS1000: Auxiliaries: 1974).

EXAMPLES:

02-055.2

Female librarians

232 Special Auxiliaries

The following is a list of special auxiliaries employed in UDC:

<i>Name of special auxiliary</i>	<i>Indicator digit</i>	<i>Range of digits</i>
Hyphen	-	(-00/-009,-0/-09,-/-9)
Dot zero	.0	(.01/.09)
Apostrophe	'	
Celestial	*	

— is used for synthesis to be applied within the context of particular subjects.

— is used to introduce facets within a subject, and its meaning as an indicator digit depends on the context.

This is a restricted use of -(hyphen).

EXAMPLES:

616.22.05-055.1

Throat diseases of men

616.314-083

Dental care and hygiene

616.314-084

Dental prevention

617.71-001.1

Burns of conjunctiva

617.54-001.4

Surgical treatment of the wounds of chest

621-41

Sheets

669.3-41

Copper sheets

Note: Divisions under 621 are applicable to all subdivisions of 6 (other than 61), with certain exceptions noted.

.0 is used for synthesis applicable within the context of particular subjects.

.0 is used to introduce facets within the subject, and its meaning as an indicator digit depends upon the context.

78.01 Musical aesthetics

Note: Usually, a dot is placed after three digits, but here a dot has been included after two digits.

784.01 Vocal music aesthetics

677.052 Spinning machines (general)

677.21.052 Cotton spinning machines

Note: Special auxiliaries are also applicable to subdivisions of main numbers as well.

The apostrophe (') is used to obtain compound numbers for a substance derived from two or more components. It is used mainly in chemistry and metallurgy. Thus, its use is limited to a few schedules in UDC. The apostrophe is used for subject synthesis, as opposed to notational synthesis.

The apostrophe sign is available on a standard typewriter keyboard. The restricted use of this sign indicates its underutilization. Therefore, it is suggested that other schedules be developed so that there can be a greater use of the apostrophe.

EXAMPLES:

546.33' 13 Chemistry of salt. (Here, 546.33 is sodium and 546.13 denotes chlorine. Common salt is a combination of these two.)

666.113' 41'28 Lime-silica Glass

Explanation: 666.113 Glass

546.41 Calcium

246.28 Silicon

EXAMPLE:

Celestial special auxiliaries:

(533.2*) Minerals on moon

UDC provides major schedules containing compound subjects. Besides, it also lists short schedules containing special isolates called special (auxiliary) subdivisions in the general tables. Some of the common auxiliaries also belong to special isolates. However, it may be added that some common auxiliaries seem to be a mixture of common isolates and special isolates.

More than one auxiliary would be required in few cases. Order of auxiliaries to be used in a class number would depend upon the requirements of the specialists. In case the same concept can be represented by a special auxiliary or a common auxiliary, then pre-

fer the special auxiliary.

3 CONCLUSION

In UDC, statics is denoted by 531.2 and in CC6, statics is represented by B7:2. The UDC class number is a compound subject and no special isolates can be isolated. But the CC class number contains two special isolates, represented by "7" and "2". Here, the class number has been constructed with the help of special isolates. However, this is not always the case in UDC. In many cases, UDC provides special isolates, and these can be combined to construct a number. In UDC, again many of the energy, matter and personality facets have been enumerated in rigidly fused form. As a result, one is not completely free to expand the numbers. One reason for this is that the DDC core has been adopted by UDC. In order to overcome these problems, very often the colon (:) is used to combine two or more facets forming part of the same or different basic subject -.0 and (apostrophe) are also available for connecting different types of facets in certain subjects under certain conditions. These remarks are, in general, equally true about DDC 19. In fact DDC 19 has fewer provisions for synthesis than UDC. UDC and DDC have provided a large number of common isolates.

In CC, special isolates and common isolates have been categorized. For each basic subject, special isolates have been enumerated and assigned to a certain level and round of a specific fundamental category. A class number can be constructed by combining the numbers for special isolates belonging to a basic subject by means of indicator digits. Common isolates can be attached, whenever needed. There are instances, in CC6, where energy and second round first level personality are found fused. For instance, this is the case in basic classes education, history and so on.

The CC approach serves as a model. UDC and DDC are also moving in this direction. By providing for special isolates for each basic class, as well as common isolates, and allowing for their combination, shortens the schedules and also makes it possible to face the onslaught of the growing universe of subjects in a more satisfactory manner.

FURTHER READING

MARTY BLOOMBERG AND HANS WEBER, *An introduction to classification and number building in Dewey*, Littleton, Colo. Libraries Unlimited, 1976, pp. 20-29.

A. NEELAMEGHAN, "Colon classification" *Encyclopedia of library and information science*, Vol. 5, pp. 316-40.

S.R. RANGANATHAN, *Prolegomena to library classification*, 3rd ed., Bombay, Asia Publishing House, 1976, chap C S, RR.

Universal decimal classification: auxiliary signs and subdivisions (except those of place), second English full edition (BS 1000: Auxiliaries; January 1974).

Chapter 18

SPACE ISOLATES

0 INTRODUCTION

The fundamental category "space" is used here in the same sense as is commonly understood. It occurs in every subject forming local description, or the local history of any subject. It is limited by the surface of earth, space inside and space outside. It takes the following forms:

- (a) Usual geographical areas like continents, countries and districts
- (b) Water formations like oceans, seas and rivers
- (c) Physiographical formations like deserts, mountains and plateaux and
- (d) Population clustres such as cities, towns and villages

EXAMPLES:

- (a) Education in *India* from 1947 to the present day
Geography of the *world*
Airways of the *world*
Railways in *developing countries of world*
Freedom movement in *Ghana* in the twentieth century
- (b) Minerals in *Pacific Ocean*
Plant life in *Indian Ocean*
Navigation in *Atlantic Ocean*
- (c) *Himalayan* travels in the 1960s
Fauna of the *Vindhya Mountains*
Street cleaning in *Delhi*

It is rather easy to identify the fundamental category "space." As compared to other fundamental categories, it comes next to the category of time in respect of problems faced in its identification.

1-1 SPACE ENTITY AS A QUALIFIER

Take the example of a subject such as "British period in Indian

history". British period is a time isolate. According to Ranganathan, in British period, the space entity is merely a qualifier.

2 IMPERSONATION OF SPACE

* Sometimes, space can impersonate as personality. In "History of India," India occurs as personality. Here, India is not a space isolate idea (That is, it is not space qua space). In other words, space has merely impersonated as personality.

3 PROBLEMS

✓ Space is two-dimensional and, at times, it can become three-dimensional. (For example, mining of coal fifty metres below the surface of the earth at Jharia). Therefore, it is more difficult to deal than time, which is unidimensional.

The characteristics to be chosen for determining space isolates are based on political, physical and administrative divisions. But we know that political and administrative divisions keep on changing, creating problems. In case we were to use the physiographic characteristic as a basis for classification, we might succeed in achieving more permanent divisions. But the literary warrant in existence is often written from the point of view of political or administrative divisions. This means that we cannot choose the physiographic characteristic as our basis. The only suitable solution seems to be to prepare a separate schedule for space isolates to deal with different epochs, though even this is full of difficulties.

Space is limited by the surface of the earth, the space inside it, and the space outside. Any worthwhile scheme of classification must provide for the entire surface of the earth. This means that an enumeration of the whole surface of the earth needs to be done, though in some cases the scheme can provide for devices to construct numbers for certain space isolates. But the enumeration of space isolates is a big job.

Having determined the characteristics to be used for obtaining space isolates, one can proceed to prepare the list of space isolates. The next problem is to arrange these in a helpful sequence. Our experience shows that there is no unique way of determining the arrangement, because divisions of the surface of the earth (such as continents, countries, provinces, districts or other administrative

divisions) lie on a surface, and not on a line.

4 COMPARATIVE STUDY OF SPACE ISOLATES

In CC, space isolates have been postulated as common isolates.

In UDC, space isolates have been provided under common auxiliaries.

In DDC, space isolates have been placed under areas table.

41 Indicator Digits

CC uses the dot (.) as an indicator digit.

UDC uses the bracket ().

DDC generally uses zero nine (09). It can be 009 or 0009. At times, the zero may be dropped.

42 Guiding Principles

421 CC

CC has made an attempt to follow the principle of spatial contiguity. According to it, "If the subjects in an array of subjects or the isolates in an array of isolates occur contiguously in space—roughly along a unidirectional line or a radial line, or a circle—they should be arranged in a parallel spatial sequence, except when any other overwhelming consideration rules it out" (*Prolegomena*, p. 187). This will lead to spatial contiguity sequence.

The above principle is a bundle of principles, as listed below:

- (a) Entities along a vertical line
 - (i) Principle of bottom upwards
 - (ii) Principle of top-downwards.
- (b) Entities along a horizontal line
 - (i) Principle of left-to-right
 - (ii) Principle of right-to left
 - (iii) Principle of back-to-front
 - (iv) Principle of front-to-back
- (c) Entities along a circular line
 - (i) Principle of clockwise direction
 - (ii) Principle of anti-clockwise direction
- (d) Entities along a radial line
 - (i) Principle of periphery to centre
 - (ii) Principle of centre to periphery

(e) Distance from a point

(i) Principle of away-from-position or increasing distance

(ii) Principle of decreasing distance

(f) Geographical contiguity

× *Note:* (i) There are five groups of principles belonging to the principle of spatial contiguity. It will be noted that principles occur in antithetic pairs (for example, principle of clockwise direction and principle of anti-clockwise direction). A choice will have to be made between a pair, which may be found applicable. The one to be chosen will depend upon the context. However, if both in an antithetic pair are equally helpful, then either may be chosen (in such a choice the canon of consistence sequence should be respected).

(ii) In the above list, principles listed under *b* (iii), *b* (iv), *e* (ii) were added later; therefore, these are not listed in *Prolegomena*.

(iii) In a scheme for library classification, divisions of the surface of the earth would have to be provided. The divisions of concern (such as continents, countries, states, districts and other political or administrative divisions) lie on a surface; these are not situated on a line. Therefore, geographical contiguity can be determined in a variety of ways. As indicated above, a number of principles are available for the purpose. Each principle is suitable in a particular situation. Therefore, in practice, a particular principle would be applied depending upon the situation. The choice of a principle to be chosen for a given group of space isolates would be governed by one's judgement. However, no definite guidelines can be laid down for the purpose.

(iv) "Ordinarily, any of the fundamental categories of "space" and "time" may manifest itself only in the last of the rounds in a subject" (*Prolegomena*, p. 410). Therefore, there is no need to indicate rounds in a space facet.

422 UDC

× No guiding principles lying behind the formulation of the schedule have been stated explicitly. However, one can determine the principles which might have been used by the scheme. The same remarks are equally applicable to DDC.

43 Schedules

431 CC6

✓ Space isolates in CC6 consist of a schedule of isolates in [S] and [S2].

These include geographical divisions and physical features respectively. The main divisions of geographical divisions, and a complete list of physical features are given below:

TABLE 18.1
ISOLATES IN (S): GEOGRAPHICAL DIVISIONS

1	World
1-0	Empire to be divided by (GD)
16	Atlantic countries
161	Mediterranean countries
167	Baltic countries
17	Pacific countries
19	By Zone
19A	By Orientation
1A	Near-sovereign formation to be divided by (CD)/(SD)
2	Mother country
3	Favoured country
4	Asia
5	Europe
6	Africa
7	America
8	Australia
93	Land within Pacific Ocean
9473	Spitsbergen
	The Oceans
95	Indian
96	Atlantic
97	Pacific
983	Antarctic
987	Arctic

ISOLATES IN [S2]: PHYSICAL FEATURES

a	Geosphere	g7	Mountain
e5	Delta	j	Hydrosphere
e6	Island	p1	River
f	Forest	p6	Lake
g1	Valley	r	Ocean
	<i>Telescoping point</i>		
	Political Divisions		
	<i>Earlier level</i>		

✓ *Comments:* In [S1], the characteristic "by physical occupant" has been used to divide the surface of the earth. Thus, we get land and sea.

Land and sea have been further subdivided into canonical subdivisions. As a result, we get continents and oceans.

Next, these are again subdivided on the basis of the characteristic "by political division." This characteristic is applied again and again. At some stage, we pass on from "by political division" to "by administrative division." Experience shows that the two characteristics "by political division" and "by administrative division" are not easily distinguishable at the stage of separation.

Thus, the three characteristics used are physical, political and administrative characteristics.

The principle of spatial contiguity has been used to arrange the isolates in [S]. A few examples are discussed below:

(i) Within a continent, a start is made from east or south and it goes round picking up the countries for the first sector. When the first round is finished, the second round starts for the second sector. This is how it continues, till all the countries in the continent are exhausted.

As regards the continent of Asia, the first cycle starts with China and ends with Russia (in Asia). The second starts with Afghanistan and ends with Tibet. Despite the best effort, certain countries located nearby would get separated. For instance, in CC6, Afghanistan and Pakistan have become separated in the arrangement, though both are neighbours.

In the continent of America, countries happen to be situated parallelly. Therefore, CC6 makes a start from the north and proceeds towards the south, picking up countries one by one.

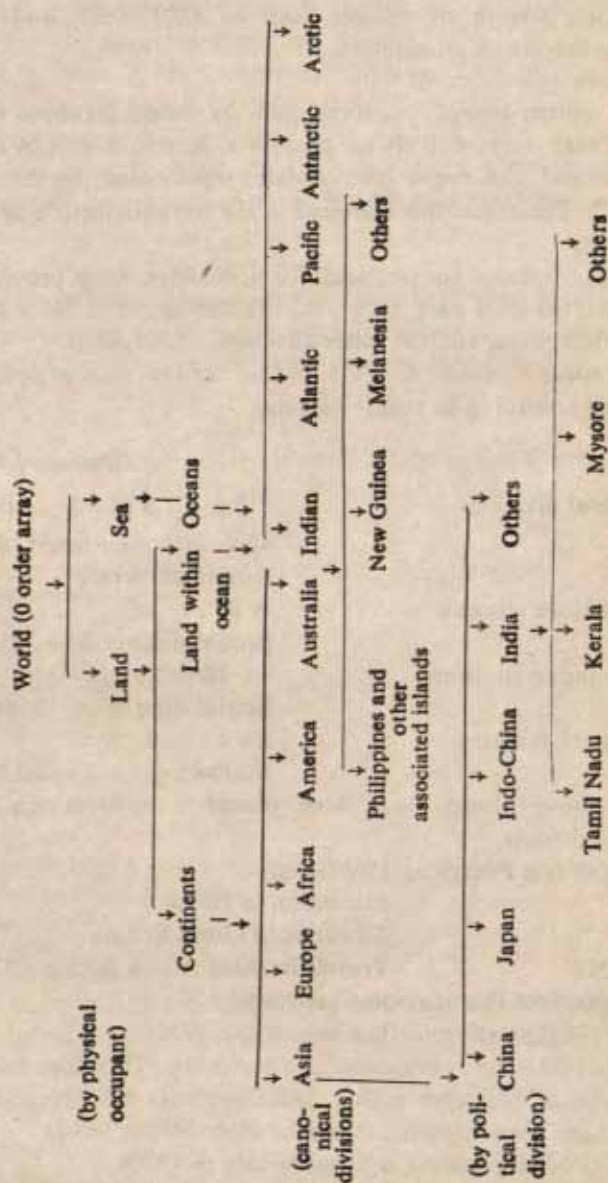
(ii) Within a country, the sequence of states (or countries) is obtained on the basis of principles mentioned in (i). This is the case with countries such as Japan, Australia and so on. However, in the case of India (after 1956), it has been divided first into convenient groups, such as southern states, western states, north-western states, northern states, eastern states and centrally-administered areas. Next, the principles used in (i) have been applied.

(iii) Within a state, CC6 has first made an attempt to achieve some sort of convenient grouping of contiguous districts. In case of Madras state (as before 1956), it has been divided first into convenient groups (eastern districts, southern districts, west coast, ceded districts and Andhra Desa). Within each group, principles mentioned in (i) have been applied.

✓ Some of the special features of isolates in [S] are given below:

(a) Use of mnemonics:

Atlantic countries	16	Atlantic Ocean	96
Mediterranean countries	161		



Baltic countries	167	
Pacific countries	17	Pacific Ocean 97

✓ The application of devices such as (CD), (SD), and so on also leads to the use of mnemonics.

(b) *Law of parsimony*:

The mother-country is represented by 2 and favoured country by 3. A library is more likely to possess a large amount of documents, which would require the space isolates represented by the digits "2" and "3". Therefore, this will lead to the the satisfaction of the law of parsimony.

In [S2], isolates for physical features have been provided. These consist of (a) solid part of earth, as distinguished from atmosphere and hydrosphere, and (b) water envelope of the earth.

The space isolates in CC6 consist of the following four blocks arranged according to relative levels:

<i>Block</i>	<i>Species of digits</i>
✓ Political divisions	1 2 3 . . . 8 9 1 92 . . . (initial digit and first significant digit is an Arabic numeral)
Population clusters	A B . . . (initial digit is A . . . Z)
Orientation divisions	9A 9B 9C . . . (initial digit is an emptying digit)
Physical features	a b c . . . y (initial digit is a small letter)

The above blocks have been placed in the form of a single telescoped schedule.

✓ EXAMPLES FOR POLITICAL DIVISIONS:

T.44	Education in India
2.56	Libraries in Great Britain
U8 65'N7	Travels in West Africa during 1970s

EXAMPLES FOR POPULATION CLUSTERS:

✓ T.44.B'N7 Education in Bombay city in 1970s.

Note : Bombay is regarded as a supercity. Therefore isolate of the geographical area representing India precedes the isolate number for population cluster got by means of alphabetical device.

✓ T.4455.G'N7 Education in Gwalior city in 1970s

Note: Gwalior is a city having a population between 100,000 and 500,000. Therefore, isolate number for Madhya Pradesh state precedes population cluster got by alphabetical device.

T.444371.P'N7 Education in Patti in 1970s

Note : Patti is a small town in district Amritsar.
444371 is an isolate number for Amritsar district.

EXAMPLES FOR ORIENTATION DIVISIONS:

T.19E'N7 Education in Far Eastern countries in 1970s

2.44.9W Libraries in North Eastern zone of India

EXAMPLES FOR PHYSICAL FEATURE:

J.44.gl G'N7 Agriculture in the Gangetic valley in 1970s

K : 12. 44.g 7V Fauna of the Vindhya Mountains

U11 g7 Cartography of mountains

U8.g7 Mountaineering

Note : A document dealing with a physical feature in general terms will contain only the isolate number of the physical feature without being preceded by the isolate number of a geographical area.

432 CC7

× The following is an extract from the schedule of space isolates:

TABLE 18.2

0Z	By geographical area
1	World
2	Mother-country
3	Favoured country
3Z	Eurasia
4	Asia
5	Europe
6	Africa
7	America
8	Australia
92	Atlantic islands
93	Land within Pacific Ocean
935	Micronesia
943	Antarctica
947	Arctic islands

Special components to form compound space isolates (note: the indicator digit for special component is the digit "=" (equal to)):

y	By geographical feature same as the divisions from "Ub" to "Ux6" for Environment Divisions in chapter DC
zf7	River
zj8	Forest
zk2	Desert, Individual geographical feature by (AD) with a "0" (zero) preceding the (AD) number compound isolates

1=zf7	Rivers of the world
4=zm70H	The Himalayas
44=zf7	Rivers of India
	By population cluster group (for collective treatment)
01	Hamlet (till 500)
02	Village (500 to 5000)
03	Town (5000 to 50,000)
05	City (100,000 to 500,000)
1=05	Cities of the world
44=0B	Bombay city
1	By zone
2	Equatorial
3	Tropical
8	Arctic
	Compound isolates (illustrative)
1=3	Tropical zone of the world
91	By area surrounding an ocean
96	Atlantic countries
961	Mediterranean countries
	Compound isolates (illustrative)
1=96	Atlantic Countries of the world
9A	By orientation
9B	East
9C	Near-East
9E	Far-East
9G	South
	Compound isolates (illustrative)
44=5G	South India
A	By empire divisions by (GD)
A52	Roman empire
A55	French empire
A56	British empire
C	By near-sovereign formation
	individual formation divisions by (CD) (illustrative)
CN	League of Nations
CN4	United Nations
CN48	The Commonwealth
	Compound isolates (illustrative)
1=CN4	United Nations countries
4=CN4	United Nations countries of Asia
1=CN48	The Commonwealth countries
(. . .)	By subject group divisions by (SD) (illustrative)
(J,381)	Rice belt
(P,111)	English speaking
(Q,7)	Muslim area
1=(Q,7)	Muslim area of the world
44=(J,381)	Rice belt of India

Comments : An examination of the above schedule shows that a

pattern has been used for listing the space isolates. The pattern consists of: by geographical area, by geographical feature, by population cluster group, by zone, by area surrounding an ocean, by orientation, by near-sovereign formation and by subject group divisions, respectively. It may be noted that each group of isolates has been allocated different sectors.

A special feature of CC7 is the provision of special components to from copound space isolates. This has provided a solution for the provision of special kinds of speciators, such as orientation, population cluster groups, near-sovereign formations, and so on.

In CC6, interpolation between two consecutive numbers was a problem. This problem has been solved by postulating emptying digits.

EXAMPLES:

	CC6	CC7
India	44	44
Nepal	44974	44T
Pakistan	44Q7	44X
Iran	45	45

In CC6, some of the countries which should have been allocated coordinate places at the notational plane had been given subordinate places. This fault has been corrected in CC7, by postulating T, V, Z and X as emptying digits. In addition, the isolate numbers have been shortened. U, W and Y, have been employed as both empty-emptying digits.

X

433 UDC

The following is an extract for common auxiliaries of place from UDC:

- (1) PLACE IN GENERAL
- (100) Universality of place; world . . . international . . .
- (—) Zones, orientation, grouping, spheres and so on
- (2) PHYSIOGRAPHIC DESIGNATION
- (22) Islands
- (23) Mountains (ranges, plateaux, upland)
- (24) Earth's interior
- (26) Oceans, Seas
- (27) Ocean currents, Gulf stream
- (28) Fresh (surface) waters, Rivers, Lakes
- (3) THE ANCIENT WORLD
- (4/9) THE MODERN WORLD
- (4) EUROPE
- (5) ASIA

- (6) AFRICA
- (7) NORTH AMERICA
- (8) SOUTH AMERICA
- OCEANIA, ARCTIC AND ANTARCTIC REGIONS
- (91) Malay Archipelago, East Indies
- (910) Indonesia
- (914) Philippines (Republic)
- (93) Australasia generally, Melanesia
- (931) New Zealand
- (94) Australia (Commonwealth)
- (96) Polynesia and Micronesia
- (98) Arctic and North Polar regions
- (984) European Arctic islands
- (987) American Arctic, including islands
- (988) Greenland
- (99) Antarctica, South Polar regions

✕ *Comments:* The characteristics "by physiographic designation," "by continent," "by island" and "by polar regions" have been used mainly to obtain common auxiliaries of place. The sequence of auxiliaries consists of: place in general; zones, orientation, political, administrative units and areas etc., grouping of independent states, spheres for enterprises, etc.; physiographical divisions; continents; islands, polar regions.

Division (4), (5), (6), (7), (8) form a grouping based on the traditional pattern. (4) to (8) represent the continents and (91) to (99) stand for Oceania, Arctic and Antarctic regions. Here, Australia has not been provided as a continent, but listed along with islands under Oceania, Arctic and Antarctic regions.

Traditional grouping has been used a great deal in the arrangement of countries within each continent. For instance, in Asia, traditional grouping based on the regional approach consists of the Far East, Middle East, South Asia, South West, Central Asia and South East. Again, under India, grouping consists of Eastern India, Central India, Northern India, Western India.

The underlying principles for arrangement have not been stated. We can only derive these on the basis of the study of the schedule of common auxiliaries of place. The examination of the schedule does show that the scheme has attempted to follow the principle of spatial contiguity. But there are some faults in the schedule which cannot be overlooked. It needs to be revised drastically to meet present day needs. Divisions on India are out of date. There is a lot of scattering of contiguous regions. Russia and Turkey are found scattered in Asia and Europe. Hawaii, one of the states of USA, has

been placed far away from USA. Islands have been placed separately, which is not always helpful. The arrangement of physiographic divisions is also not helpful.

In UDC, empires go with the country whose empire it is. The number for British empire is (41-44). However, in CC, all empires have been put together. The number of British empire is (1-56) and Roman empire is (1-52). The empires have been put with the number for world.

X UDC has tried to use mnemonics in various places. Some of the places where these have been used include mountains and rivers. However, there should have been a greater use of mnemonics.

The common auxiliaries of place can be put to the following uses:

(a) To indicate the geographical range of the subject denoted by a preceding main number.

EXAMPLES:

Libraries in Scandinavia today 027(048) "1979"

Mobile library services in Canada: 021.64 (71) (047.1)

A progress report

Bibliography on labour in India 016:331 (540)

Development of public libraries

in India from 1947 to 1972 027.5 (540) "1947/1972"

Indian patent law 347.771 (540)

Indian railway system 385 (540)

(b) To indicate the geographical or regional aspect of the subject, when such an aspect is paramount. Here, the auxiliary will precede the main number.

EXAMPLES:

India, its patent law (540) 347.771

India, its railway system (540) 385

(c) To indicate intercalation, by interposing the auxiliary after the first two digits, or in some other preferred position (the entry under the main (subject) number being still retained).

EXAMPLES:

Prices in India 33(540) 8.5

(d) To denote the relation between, and association of, places may be expressed with the help of connection signs being used inside the brackets. The specifying numbers are reversible.

EXAMPLES:

Foreign policy of India and UK: A comparative study 327(540:41-4)

India and (in relation to) France (540: 44)

Comparison between ancient Greek and Roman war strategy

355.43 (37: 38)

Arbitration between India and Japan 341.63 (540:520)

The Americas (considered together) (7/8)

India and (together with) France (540+44)

Marriages in ancient Egypt and Babylonia 392.5 (32+354)

434 DDC

In DDC 18, seven tables have been provided to serve as an aid in the construction of class numbers. Table 1 consists of standard subdivisions. Its last division, "09—Historical and geographical treatment," is relevant here. This division, as well as its subdivisions are used to achieve geographical treatment.

Extract from Table 1 (standard subdivisions)

—09 Historical and geographical treatment

—091 Treatment by areas, regions, places in general. Add "areas." notation 1 from table 2 to base number—09. (Class persons associated with the subject, regardless of area, region, place in 092; treatment by specific continents, countries, localities, in—093-099.

—093-099 Treatment by specific continents, countries, localities; extra-terrestrial worlds. History and description by place, by specific instance of the subject. Add "areas" notation 3-9 from Table 2 to base number—09.

Extract from Table 2 (Areas table)

—1 Areas, regions, places in general

—2 Persons regardless of area, region, place

—3 The ancient world

—4-9 The modern world

—4 Europe

—5 Asia Orient Far-East

—6 Africa

—7 North America

—8 South America

—9 Other parts of world and extra-terrestrial worlds Pacific Ocean islands (Oceania)

Comments: The above notations given in Table 2 are never used alone but allowed to be used with any number taken from the schedules.

These notations are used either directly, when so directed, or by means of the interposition of "standard subdivisions" notation 09 taken from Table 1. These can also be used when directed with numbers taken from other tables. However, a decimal point is always

placed after the third digit of any number constructed in this manner.

EXAMPLES:

Wages in Japan 331.2952

Note: Japan in Table 2 is represented by —52, and wages by 331/29.

Railroad transportation in Brazil is 385.0981

Note: In Table 2 Brazil is represented by —81.

Thus, the notations in Table 2 make it possible to expand the number to provide for geographical significance. Table 2 is the largest auxiliary table.

It may be added here that the outline of area tables of DDC is more or less the same as that of UDC. Other divisions and subdivisions of both the schemes are similar to some extent. Therefore, some of the comments are equally applicable to both. Limitations in DDC, due to the lack of a faceted approach, do place a restriction in the use of the areas table. As already noted, availability of " : " " + " and " / " has given a great advantage to UDC. Otherwise the schedule of DDC is more up-to-date.

44 Examples

Topic	CC6	CC7	UDC	DDC
India	.44	.44	(540)	- 54
Christian countries	.1 (Q6)	.1=(Q,6)	—	—1761
The British empire	.1-56	.1=A56	(41-44)	—171242
British Commonwealth countries	.1N48	.1=CN48	(41-44)	—171242

5 CONCLUSION

CC6 and DDC18

Most of the space isolates need to be enumerated, unlike time isolates. As a result, the schedule of space isolates in a scheme of library classification is longer than that of time isolates. This is also true for CC, UDC and DDC.

The space isolates are obtained on the basis of political and administrative characteristics. As political and administrative changes take place from time to time, space isolates cannot remain permanent.

This results in a violation of the canon of permanence. However, keeping in view the practical requirements, it seems that a scheme for library classification should provide different schedules of space isolates to serve the different epochs. In UDC and DDC, two schedules have been provided, one for the ancient world and another for the modern world. In CC6, two schedules have been given for India; one for India before 1956 and another one for India after 1956. Similar provisions need to be made in other places in the CC schedule.

FURTHER READINGS

- GOPINATH, M. A. AND MALHOTRA, V. K. "Geographical schedule in CC, UDC and DC," *Library Science*, 3, 1966, pp. 169-211.
- NEELAMEGHAN, A., "Colon classification," *Encyclopedia of library science and information science*, V. 5, pp. 322-5.
- RANGANATHAN, S. R. "Connecting symbols in time and space in CC," *Annals of Library Science*, V. 8, 1961, pp. 69-79.
- , "Optional facets in library classification," *Annals, Indian Library Association*, 1, 1949/50, 73-88, 97-107, 104-7.
- , *Prolegomena to library classification*, 3rd ed., Bombay, Asia Publishing House, 1967, sections EF5, RB3, RE3, RG3, RJ3, RRI, SE3, TE4.

Chapter 19

TIME ISOLATES

0 INTRODUCTION

The fundamental category "time" is used here in the same sense as is commonly understood. Time occurs in every subject forming a local description or local history of any subject. It is unidimensional. It flows along one direction uniformly. It takes the form of usual times isolate ideas, such as (i) millenium, century, decade, year etc. and (ii) day, night, seasons, wet weather, dry weather etc. All of these are considered manifestations of the fundamental category "time."

EXAMPLES:

(a) Glimpses of Indian culture in 1920

Education in India during 1950s

Portrait of Indian civilization in the 5th century

Story of Hinduism from *Mughal period to the present day*

(b) Rainfall in India during *winter season*

Dry period farming in India

It is rather easy to identify the fundamental category "time." Of all the fundamental categories, this one gives least difficulty in the matter of identification.

1 TIME ENTITY AS A QUALIFIER

The time entity can occasionally occur as a qualifier. A particular entity may be nothing but personality; however, the time entity in it may merely serve as a qualifier.

EXAMPLES:

1972 Ambassador Car

1971 Fiat Car

1978 Hind Cycle

In the above examples, the specific subject denotes personality, but

the time entity has occurred merely as a qualifier.

2 IMPERSONATION OF TIME

So far, we have described time qua time. Time can also impersonate as personality, matter, energy and space. That is to say, time can impersonate or officiate as a fundamental category other than time itself.

21 Personality

✓ In CC6, in the schedules of literature and classics, the author facet of the subject is personality. Here, time impersonates as a fundamental category personality.

22 Matter

The isolate number of kinds of plastics may be obtained from the number for plastics by means of a chronological device. As different kinds of plastics may have different names in different languages, it will be much better if the chronological device is preferred over the alphabetical device. Thus, time will manifest itself as matter.

Similarly, different kinds of processes in technology can be obtained with the help of the chronological device.

23 Space

In CC6, numbers for oil resources in NATO countries and India under Maratha power have been obtained in such a way that time manifests itself as space.

3 CHARACTERISTIC

Duration is usually used as a characteristic to divide time. For example CC7 employs the characteristics such as "by division of year," "by geological age," "by calendar time."

4 STARTING TIME

To measure time, we must have a starting point. For this purpose, we may use an era. It may be a cosmic era (based on cosmos that is

relating to universe especially distinguished from earth), religious era (based on foundation of a religion), historical era (based on a historical event) and so on.

We may use the Christian era (based on the birth of Christ) as a starting point, because this era is used all over the world. Therefore, we may call it a favoured era. As a result, no indication would be necessary in the class number to show the use of the Christian era. An indication would be required, if the non-Christian era is allowed to be used by the scheme for classification for certain purposes.

5 UNIT OF DURATION

In order to measure time, we require not only a starting point but also a unit of duration. Experience shows that it is desirable to adopt larger units of durations for far-off periods. Century, as a unit, may prove to be suitable for many of the subjects for periods prior to A.D. 1000. Similarly, for periods after A.D. 1000 "decade", as a unit, may prove to be sufficient enough. There is no hard and fast rule for this purpose. The unit to be adopted will depend upon the specific subject involved. Some subjects may require larger or smaller units. However, for documentation, we may occasionally require units as small as minutes or seconds, or perhaps still smaller ones. The unit may be as small as a microsecond, if the document deals with a fundamental particle. On the other hand, for a document dealing with the formation of minerals, it may be a geological age. Thus the unit of time to be adopted will depend upon the kind of specific subject being dealt with, as well as the level of classification required.

6 CONVERSION OF CALENDARS

Different eras use different units of time and have a different starting point. In the Indian calendar, 60 years are equal to a century. A day is divided into 60 intervals. Similarly, for other units of time. In an Arabic calendar, the lunar month is used as a base instead of the solar month. The year is also worked out on the same basis. However, it is possible to reduce one calendar to another with the help of a conversion formula.

7 COMPARATIVE STUDY OF TIME ISOLATES

71 *Scope*711 *CC*

The time isolates are considered common isolates. These occur as:

- (i) The usual time isolate ideas like millenium, century, decade, year, and so on.
- (ii) The time isolate ideas such as seasons, time with meteorological qualities, time by lunar divisions, time by solar divisions, and so on.
- (iii) Manifestation of fundamental category time.

712 *UDC*

The time isolates are called common auxiliaries of time, and these serve to specify the following:

Date, period or other time aspects such as past, present, future, seasons of the year, months of the year, weeks of the month, days of the week, hours of the day, peace time, war time, work time, rest time, time duration, time intervals, various (non-Christain) time reckonings and phenomenal divisions.

These auxiliaries are meant to denote date, period or other time aspects of the subject matter or content of a document denoted by the main UDC number. However, these cannot be used to denote the date of publication or issue.

713 *DDC*

- ✓ The time isolates are provided under standard subdivisions. These are called historical periods, and occur as usual time isolate ideas like decade, century etc.

72 *Indicator Digits*721 *CC*

Time isolates occur in every subject, forming a local description or local history of any subject. These can be attached to a host class by means of an indicator digit.

From the first to the third editions of CC, the colon (:) was used as an indicator digit for time isolates. From the fourth to sixth editions, the indicator digit was changed to a dot (.). In the reprint of 6th edition, it was finally changed to the inverted comma (').

From the first to third editions, the colon (:) was used. This led to an unhelpful arrangement. This would be clear from the examples given below:

Library Science (general account) 2

Descriptive account of library conditions in India till 1950s 2u2 : N5

Note: u was used forcibly, otherwise a homonym would be caused. 2 : 2 can represent public libraries or libraries in India, because the same indicator digit was employed to connect the type of library and the time facet.

Library management in India till 1950s 24u2 : N5

Comments: When the above three documents are arranged on the shelf, the order would be Title 2, Title 1 and Title 3. u represents the descriptive account (survey). Survey material was considered approach material. Therefore, u was given an ordinal value less than Arabic numerals and Roman caps. It was also given anteriorizing value. Any number followed by u gets a precedence over the original number. It may be said that it is not correct to place the descriptive account earlier than the general account, represented by Titles 1 and 3. This happened because only one indicator digit, namely, the colon (:) was available for the purpose.

From the fourth to sixth editions, the dot (.) was apted as an indicator digit. This was also found unhelpful—as can be seen from the example given below :

Travel in Servai Hills in 1960 U8. 4411. 2S. N60

Travel in Madras (city) in 1960 U8. 4411. 3M. N60

Travel in Tamil Nadu State in 1960 U8. 4411. N60

Comments: When the above three titles are arranged on the shelf, the sequence would be Title 1, Title 2 and Title 3, because Roman capitals have greater ordinal value than Arabic numerals. This means that a general book concerned with the State of Tamil Nadu would be placed on the shelf after a specific book dealing with Madras(city). It has been found, from experience, that the general should appear before the specific. Therefore, the above arrangement is considered unhelpful.

In the reprint of sixth edition, the dot (.) has been replaced by the inverted comma ('). This has made it possible to achieve a helpful sequence for the above titles because it has been given an ordinal value less than that of a dot (.). Thus the sequence would be as given below:

Travel in Tamil Nadu State in 1960 U8. 4411 'N60

Travel in Servai Hills in 1960 U8. 4411.2S'N60

Travel in Madras (city) in 1960 U8. 4411.3M'N60

722 UDC

Common auxiliaries of time can be attached to the main number, except 571 (prehistory). The reason being that for prehistory, a special series developed specifically for this field has been provided for. The indicator digit used for common auxiliaries of time is inverted commas (" ").

723 DDC

Historical periods have been listed under standard subdivisions. Standard subdivisions form one of the auxiliary tables. Historical periods are used only in conjunction with numbers taken from classification schedules. The zero (0) is used as an indicator digit.

73 Guiding Principles

731 CC

CC is based on a set of guiding principles. These have been provided in *Prolegomena*. They include a few postulates which are specifically meant for time isolates which are:

"Ordinarily, any of the fundamental categories "space" and "Time" may manifest itself only in the last of the rounds in a subject" (p. 410).

"Since space and time facets can occur only in the last round of a subject, there is no need to indicate the round in their names or their symbols" (p. 411).

"The five fundamental categories fall in the following sequence, when arranged according to their decreasing concreteness: P, M, E, S, T. . ." (p. 412).

732 UDC

No specific guiding principles are available.

733 DDC

No specific guiding principles are available.

74 Schedules

In CC and UDC, a few of the time isolates have been enumerated. The rest of the isolates can be formed with the help of the directions given in the schemes. In DDC, a few time isolates have been enumerated, but it is not possible to construct other isolate numbers.

741 CC

In the 6th edition of *Colon classification*, time isolates have been provided for T (chronological divisions) and T2 (second level time) (feature time) as given below:

TABLE 19.1

ISOLATES IN [T] (CHRONOLOGICAL DIVISIONS)

A	Before 9999 BC	K	1600 to 1699 AD
A1	Eozoic	L	1700 to 1799 AD
A2	Palaeozoic	M	1800 to 1899 AD
A3	Mesozoic	N	1900 to 1999 AD
A4	Cainozoic	P	2000 to 2099 AD
A5	Quaternary	Q	2100 to 2199 AD
B	9999 to 1000 BC	R	2200 to 2299 AD
C	999 to 1 BC	S	2300 to 2399 AD
D	1 to 999 AD	T	2400 to 2499 AD
E	1000 to 1099 AD	U	2500 to 2599 AD
F	1100 to 1199 AD	V	2600 to 2699 AD
G	1200 to 1299 AD	W	2700 to 2799 AD
H	1300 to 1399 AD	X	2800 to 2899 AD
I	1400 to 1499 AD	YA	2900 to 2999 AD
J	1500 to 1599 AD	YB	3000 to 3099 AD
		YC	3100 to 3199 AD

TABLE 19.2

ISOLATES IN [T2] (FEATURED TIME)

c	day-time
d	night
e	twilight
n	season
n1	spring
n3	summer
n5	autumn
n7	winter
p	meteorological period
p1	dry
p5	wet
p8	snow

Note: As the indicator digit for time isolates is the inverted comma, the sign 'will precede time isolates. Time isolates for T and T2 are also joined by an inverted comma.

Comments: Examination of time isolates in T and T2 shows that time isolates have been arranged by means of a systematic approach.

In T, A1 to A5 denote geological periods. B denotes a period of 9000 years. C and D cover a period of 1000 years each. E to YC cover a period of 100 years each. Therefore, we may conclude that time isolates in T consist of isolates made up of units of time arranged in the descending order of quantity. This approach is based on the premise that it is desirable that we use large units of time for far-off periods of time and smaller units for recent periods.

In T2, we can recognize three groups of time isolates. The first group consists of day-time, night and twilight. The second group represents seasons and the third denotes meteorological divisions.

Chapter DC gives a schedule of time isolates for CC7. The following is an extract from the same:

a	By meteorology	94 Week
		Divisions as
c	By wind	9401 Week 1
d	Calm	9452 Week 52
e	Breezy	95 Month (solar) Division as
j	By temperature	9501 January
m	Temperate
n	Hot	9512 December
q	By humidity	96 By season
r	Dry	961 Spring
t	Humid	963 Autumn
OZ	By divisions of year	97 Year (solar)
OZZ	By lunar divisions	Earlier level
l	Waxing moon	Civil time
11	First half	9Z By civil time
12	Second half	A By Geological age (before 9999 BC)
13	Full moon	A1 Eozoic
8Z	By solar divisions	A4 Cainozoic
91	Day time	AZ By calendar time
912	Morning	B 9999 to 1000 BC
916	Evening	E 1000 to 1099 AD
92	Night	G 1200 to 1299 AD
93	Day	J 1500 to 1599 AD
931	Sunday	K 1600 to 1699 AD
937	Saturday	M 1800 to 1899 AD
		N 1900 to 1999 AD
		Q 2100 to 2199 AD
		S 2300 to 2399 AD

Comments: As compared to the sixth edition, the schedule of the 7th edition is more detailed and a number of changes have also been incorporated. The isolates have been divided into two parts. The first part includes meteorological, lunar and solar divisions, along with

seasons. The second part consists of civil time, which is an earlier level. Meteorological divisions are represented by Roman small letters. Lunar and solar divisions, as well as seasons, are denoted by Arabic numerals. However, civil divisions have been obtained by a combination of Roman capitals and Arabic numerals.

742 UDC

Extract from the table of common auxiliaries of time (UDC, p. 22) is given below:

TABLE 19.3

" "	CHRONOLOGICAL DIVISIONS. DATES
" "	Antiquity. Ancient times. B.C.
" "	Christian era. A.D.
"04/14"	Middle Ages. Medieval
"15/18"	Modern times. Modern. . . .
"19"	20th century. . . .Recent. . . .Contemporary. . . .
"3/7"	OTHER TIME ASPECTS
"31"	Past, present, future. . . .Cf. "71"
"311"	Past, previous. . . .former. . . .
"312"	Present, current. . . .Cf. "19"
"313"	Future
"32"	Seasons of the year
"33"	Months of the year <i>e.g.</i> , (refers to months in general, not to dates)
"33.04"	April
"33.11"	November
"339"	Weeks of the month (1st, 2nd, 3rd, 4th)
"342"	Days of the week: Monday to Sunday
"342.1"	Monday
"342.7"	Sunday
"344"	Hours of the day
"36"	Peacetime, wartime, etc., and so on
"37"	Worktime, rest-time, etc.
"4"	Time duration. Period or term of time
"5"	Time intervals. Periodicity.
"6"	Various (non-Christian) time reckonings
"7"	Phenomenological divisions

Comments: Digits 0 and 1 have been assigned for civil divisions, representing the first two millenia A.D. The digit 2 has not been used. Possibly, it was left out to be used later on, for the third millenium A.D. The digits from 3 to 7 and their subdivisions have been adopted to represent other time aspects. Under other time

aspects, provision has been made for the following:

Past, present, future; seasons of the year; months of the year; weeks of the month; days of the week; hours of the day; peacetime, wartime and so on; worktime, rest-time and so on; time duration, period or term of time; time intervals, periodicity; various (non-Christian) time reckonings; phenomenological divisions.

In CC, time reckonings provided according to the non-Christian calendars are supposed to be converted in terms of the Christian calendar. However, UDC has made no such provision.

027.5 (540) "1947/1972"	Development of public libraries from 1947 to 1972
069 (48) "1987"	Museums in Scandinavia today
338.984.3 (540) "1951/1956"	First five year plan (India)
551.578.4 (545.4 Simla-201) "1962:324"	Snow fall in Simla in the Winter of 1962

743 DDC

In DDC18, time isolates have been listed as historical periods (in addition, provision has been made for the 21st century), under standard subdivisions (DDC18, v. 1, pp. 121-22). The Table 19.4 given below lists the time isolates:

TABLE 19.4

	—0901-0904 HISTORICAL PERIODS
—090 1	To 500 A.D.
—090 12	To 1400 B.C.
—090 13	4000-1000 B.C.
—090 14	1000 B.C.-1 A.D.
—090 15	1-500
—090 2	500-1500
—090 21	500-1200
—090 22	13th century, 1200-1300
—090 23	14th century, 1300-1400
—090 24	15th century, 1400-1500
—090 3	Modern period, 1500—
	<i>For 20th Century, 1900-2000, see -0904</i>
—09031	16th century
—09032	17th century
—09033	18th century
—09034	19th century
—0904	20th Century, 1900-2000
—09041	1900-1920
—09042	1920-1930
—09043	1930-1940

-09044	1940-1950
-09045	1950-1960
-09046	1960-1970
-09047	1970-1980
-09048	1980-1990
-09049	1990-2000
-0905	21st Century, 2000-2100

Comments: There is no provision for specific dates in DDC. The above table shows that as we proceed towards the 20th century, the unit of duration becomes smaller and, in the 20th century, the unit is a decade, except for the 1900-1920 period. Provision has also been made for the 21st century. These divisions would usually serve the purpose of book classification. In the 20th century divisions, in the indication of end point, DDC has not followed the usual convention. For example, the 1950s could have been indicated by 1950-1959.

In addition to the above schedule, time isolates have been provided in the history schedule, languages, literatures and so on. Time isolates in these subjects are not common isolates. For instance, in the case of Indian history, an ad hoc schedule for time isolates has been enumerated. Such ad hoc schedules are available for different countries in history, literatures and different languages.

EXAMPLES:

	CC6	UDC	DDC
3BC	'C996	"-0003"	—
10BC	'C989	"-0010"	—
500BC	'C499	"-0500"	—
2356BC	'B7643	"-2356"	—
9000BC	'B0999	"-9000"	—

Note: CC uses the method of complements to get an isolate number for the BC year.

For dates, UDC recommends "ordinary calendar reckoning notation to be placed between inverted commas in the order of year, month, day, using four-two-two pattern. Dates before the birth of Christ (B.C.) are to attached—(minus sign)."

It is not possible to obtain specific dates in DDC; therefore, the places for DDC are vacant in the above examples.

	CC6	UDC	DDC
18th century	'L	"17"	09033
20th century	'N	"19"	0904

Decade 1910-1919	'N1	"191"	09041 (This represents 1900-1920)
Year 1912	'N12	"1912"	—
August 1942	'N4208	"1912.08"	—
15th August 1942	'N420815	"1942.08.15"	—
	CC6	UDC	DDC
16th to 19th century	'M←J	"15/18"	0903
17th to 19th century	'M←K	"16/18"	0903
Period of 3 months	—	"44.03"	—
Between second and tenth day	'93010←002 (CC7)	"42.02/-010"	—

Note: Ranganathan was of the view that an arrangement based on the latest period gives a more helpful sequence. In UDC, the documents would get arranged on the basis of the beginning of the period, which is not always helpful.

A bounded duration would be required to represent both the beginning and the end of a period of time. This provision becomes necessary for documentation work. CC and UDC have made specific provision for the same. DDC has not made such a provision; however, it has provided a few numbers, which meet the requirements in some cases.

	CC6	UDC	DDC
Autumn of 1969	'N69'n5 'N69-963(CC7)	"1969:323"	—
Future with regard to 1980 A.D.	'N80	"1980:313"	—

Note: In CC7, the hyphen digit (-) has been postulated for compounding two isolates in the same schedule. This leads to a shortening of the schedule of all possible isolates, which would otherwise have to be listed.

	CC6	UDC	DDC
Past	'N←	"311"	—
Future	'N→	"313"	—
EXAMPLES FROM CC6:			
Y'N←M	Development of society since 19th century		
y'N→	Future of society		
y'N	Society in the 20 century		

Note: There is no specific provision in DDC 18 for past and future as such, but one can provide for specific periods in some cases only.

75 Public Time and Private Time

In the second edition of Ranganathan's *Prolegomena to library classification* (London, Library Association, 1957), the concepts of public time and private time were recognized. However, in the later literature one does not find a mention of the concept of private time, as well as the special treatment provided to it.

The terms of public time and private time, as employed in the second edition of *Prolegomena* (pp. 258-61), are described below:

In order to measure time, we need a starting point. The origin of an era may be used as a starting point. The origin of each era may be regarded as a public event. Therefore, a time isolate got by means of measuring time from such an origin can be called public time. It may be added that public time is generally measured with respect to the date of birth of Jesus Christ, which would be regarded as an origin.

Occasions arise in the study of specialized subjects, when time measured by means of the public calendar may prove to be unhelpful. In such cases, we may "measure time from an epoch inherent to the subject itself." Thus, in the study of the natural history of bacteria, the time of the beginning of its culture may be treated as a suitable origin. This leads to the concept of private time. Hence, the unit of duration would depend upon the nature of the subject.

EXAMPLE OF PRIVATE TIME:

Development of reptiles between 2nd day and 10th day K94:7/f010←002

Note: f is the unit of time, that is day. The stroke (/) is a symbol for private time. This indicator digit had been suggested by Ranganathan earlier.

76 Concept of Effective Decade

The concept of the latest effective decade has been used in CC. This refers to: "Grouping by intervals of about one generation is helpful and also sufficient in the arrangement of subjects. For, a generation is a natural and significant unit in the progress of human affairs and thought" (CC6, p. 1.49). This concept is a useful one, and perhaps unique to CC.

EXAMPLES:

Bibliography on physics brought up to 1940s CaN5

Bibliography on chemistry brought up to 1950s EaN5

Note: 1940s is respresented in CC by N4. The rule says that when the natural decade number ends with 4 or 5, then the latest effective

decade is to end in 5. Therefore, N4 would be replaced by N5. However, no change is made for the 1950s because they are represented by N, and it would be retained as it is.

8 CONCLUSION

Time is unidimensional, and geographical area two-dimensional. (At times, we may have to provide for three dimensions in dealing with topics concerning mining, flying of moon, surface of the earth, and so on.) Therefore, time is easier to deal with. It is infinite, without an ending or a beginning, but geographical area is usually limited by the surface of the earth. In spite of this, CC and UDC are able to provide for isolate numbers in the time facet, so that in almost all cases these are coextensive with the time isolate in the subject. The same cannot be said about DDC.

UDC and CC provide full autonomy to classifiers to get coextensive isolate numbers for time. Only a few of the isolates have been enumerated, the rest can be constructed with the help of the directions given in these schemes. DDC does not provide such an autonomy.

It may also be added that, ordinarily, time isolates are common isolates in CC and UDC, but in UDC, besides standard subdivisions of time, a large number of ad hoc schedules have been given in subjects such as languages, literatures, history and so on. Time isolates given in these subjects are not common isolates. This is a weakness in the scheme due to its being an almost enumerative one. Most of the isolates can be arranged on the basis of the later-in-time principle, and unlike space isolates, the problems of interpolation and extrapolation are fewer. These problems can be solved usually without much difficulty.

Documents are coming out on specialized subjects, such as fruition: bearing period of an apple tree, two weeks in the life of a fly, time for maturation of the cataract of an eye, etc. This would require enumeration of special time isolates for the purpose. CC will be required to enumerate special time isolates. These can occur in any round. In CC, the position of any special time isolate can be decided with the help of the wall-picture principle. Similarly, UDC and DDC will also have to take special care of special time isolates. Some of these have already been provided in the schedules.

FURTHER READINGS

- A. NEELAMEGHAN, "Colon classification," *Encyclopedia of library and information science*, New York, Dekker, vol. 5, p. 322.
- S R. RANGANATHAN, "Common isolates in documentation work," *Review of Documentation*, 23, 1956, pp. 70-9.
- , "Optional facets in library classification," *Annals, Indian Library Association*, 1, 1949/50, pp. 49-58.
- , *Prolegomena to library classification*, 3d ed., Bombay, Asia Publishing House, 1967, sections FB, KD2, PM3, RE2, RE2, RG2, RJ3, RR1, SE4.

Chapter 20

INDICATOR DIGITS

0 INTRODUCTION

A faceted scheme for classification does not provide readymade class numbers for compound or complex subjects. Such a scheme consists of schedules of basic classes, common isolates and special isolates. In a prefabricated building, standard components are joined together with the help of bolts and nuts. The schedules referred to above correspond to the standard components. The indicator digits serve as bolts and nuts, which help to join together the isolates taken from different schedules, so as to form a variety of compound or complex subjects.

According to Ranganathan, an indicator digit is "a digit prefixed to an isolate number to indicate the fundamental category of which the isolate is a manifestation."¹ However, the concept of an indicator digit has undergone change. According to a later definition, an indicator digit is "a digit that indicates the interrelation between two component ideas of a subject."² Such a digit possesses ordinal value, but does not represent an idea. It does not have semantic value. It indicates the interrelation between the two components in a subject. The different kinds of indicator digits can be used to represent, coextensively, various kinds of relations between components in subjects.

1 TERMINOLOGY

Various terms have been used at one time or the other to refer to

¹S.R. Ranganathan, "Development in the use of digits in Colon Classification," *Library Science*, 6, 1969, p. 2.

²A. Neelamegham etc., "Colon Classification, Edition 7: Schedule of basic subjects," *Library Science*, 10, 1973, p. 226.

indicator digits. These are: auxiliary number; connecting apparatus; connecting digit; connecting symbol; conjunction; connector; division figure; facet indicator; fence; operator; separating digit; sign post and signal digit.

The above terms are not exactly synonyms. If we examine them carefully, we shall be able to discover certain shades of difference in their meanings.

In the first and second editions of *Colon classification*, the term "connecting apparatus" was used. The third, fourth, fifth and sixth editions used the term "connecting symbols." The third edition of Ranganathan's *Prolegomena to library classification* (1967) adopted the term "connecting digit," instead of connecting symbol. The seventh edition of *Colon classification* has preferred the term "indicator digit."

Of the various terms, "indicator digit" seems to be more appropriate. The use of this term was suggested by Palmer and Wells in 1951. They put forward the argument that "when a symbol is used to announce a change of method of division, it can be called an indicator digit because it indicates a new method of division."³ Later, this term was adopted by Ranganathan. Some people do prefer to use the term "facet indicator," but this is a restricted use of the concept of indicator digits.

2 FUNCTIONS

The functions of indicator digits are to:

(i) indicate relationship: indicator digits can be used to indicate relationships of various kinds, such as hierarchical and coordinate inter-relationships between or among subjects, or the idea components of a subject. In CC7, the indicator digit "&" serves to indicate the phase relation.

(ii) perform sequential function: indicator digits enable a scheme of classification to achieve the preferred helpful sequence of subjects, or idea components of subjects, in a linear arrangement. This becomes possible because the ordinal value of indicator digits is given in such a way that it leads to a helpful sequence on the shelf.

(iii) accommodate new subjects or idea components of a subject in an array or chain: indicator digits make it possible to achieve a

³B.I. Palmer and A.J. Wells, *Fundamentals of library classification*, London, Allen and Unwin, 1951, p. 65.

helpful position for new subjects or idea components of subjects in an array, as well as chain, without disturbing the basic structure of the scheme.

(iv) enable the construction of a class number in a faceted scheme for classification for any possible subject, by connecting the isolates from different facets with the aid of indicator digits.

(v) enable the provision of a unique class number for any specific subject (an existing one or likely to come up): the capacity of a faceted classification to provide unique class numbers for any specific subject is, to a great extent, due to the use of indicator digits. Thus, homonyms can be avoided.

(vi) indicate the nature of the facet of the number following it: in *Colan classification*, indicator digits such as \leftarrow , $:$, \rightarrow perform such a function.

(vii) provide relief to the eye, as these digits help to break the number into parts, and

(viii) serve as an aid to memory

It may be added that indicator digits do not denote any subject or idea component of a subject. This means that they do not perform the concept representation function. In other words, they do not carry out any semantical function, though they do, however, serve a syntactical function (showing grammatical function)

3DDC

Dewey decimal classification (11th edition, 1922) used the zero (0) and the double zero (00) to connect form divisions with a class number. Due to the lack of a variety of indicator digits, DDC has not been able to take full advantage of facet analysis. As a result, it has not been able to provide class numbers for many compound and complex subjects. The indicator digits used in the 18th edition of DDC are given in the next table.

EXAMPLES FROM DDC 18:

385.0981	Railroad transportation in Brazil
510.1	Philosophy of mathematics
332.1028	Data processing in banking
361.003	Encyclopaedia of social welfare work
530.02462	Physics for engineers
552.00151	Application of mathematical principles to petrology (rocks)
350.001	Bureaucracy in public administration

TABLE 20.1
USE OF INDICATOR DIGITS IN DDC (18th EDITION)

Symbol	Name	Function	Remarks
0	Zero		These are standard subdivisions which are never used alone, but used as needed with a number taken from the schedules. The standard subdivisions are always introduced by putting down as many zeros as are required to distinguish the use of Standard subdivisions from the subject subdivisions, and also to put a class number constructed in this way in its correct place immediately after the heading to which it is applicable. These are also standard subdivisions which are never used alone, but used as required with a number from the schedules. These indicate relationships between two subjects. A decimal point is placed following the third digit of a class number.
00	Double zero	Synthesis of notation function, allowing division by two or more principles (characteristics)	
000	Triple zero		
09	Zero nine		
009	Double zero nine		
0009	Triple zero nine		
015		Relational indication function	
019			
024			
	Decimal point	Ease in writing, reading and remembering a class number.	

4 UDC

UDC has provided a large variety of indicator digits. Therefore, it has been able to make provisions for constructing numbers for many compound and complex subjects, besides those which have already been enumerated. The use of Indicator digits has also enabled UDC to become a "synthetic" scheme for classification rather than a "purely analytic" one. That is why UDC is called an almost faceted scheme of classification.

In UDC, the use of an indicator digit indicates that the component number following it is either an auxiliary subdivision number, or a number got by device. The following are the indicator digits adopted by UDC:

+/: [] :: =(0 . . .) (1/9) (=...)
 " . . . " .00-0-0.0' (apostrophe)

Of the above indicator digits, the plus (+) and stroke (/) signs are anteriorizing digits, because these endow the preceding host class number with an ordinal value immediately less than that of the concerned host class number. The rest of the digits are posteriorizing digits. In addition UDC uses point (.) as an indicator digit.

Of the various indicator digits available in UDC, the following are meaningful digits:

=(0 . . .) (1/9) (= . . .) "1/9"-0-0

Plus (+) is used to connect two or more separated (non-consecutive) numbers, when no single comprehensive number exists. Its use should be avoided because it is difficult to index such combinations in a satisfactory manner.

EXAMPLES:

622+669	Mining and metallurgy
539.1+621.039	Nuclear science and technology
58+631.52	Botany and plant breeding

Stroke (/) sign is used to denote a range of concepts which, taken together, go to form a broad subject or branch of knowledge, when no single comprehensive number exists. It joins the first and last of a series of consecutive UDC numbers.

EXAMPLES :

22/28	Christianity
592/599	Systematic zoology
624/628	Civil engineering

Colon (:) is used to connect any two or more UDC numbers representing related concepts of approximately equal value, to:

(a) divide a subject directly to achieve genus-species relationship

(b) attach foci taken from different facets

(c) indicate phase relationships.

Colon (:) is the most used synthetic device but it is rather an imprecise device because it is used for different purposes with different meanings.

EXAMPLES:

- | | |
|---------------------|--|
| (a) 624.21 : 625.1 | Railway bridges |
| 624.21 : 625.74 | Road bridges |
| (b) 675 : 331.82 | Working conditions in leather industry |
| 622.33 : 331.2 | Wages in coal mining industry |
| 373.51 : 371.212 | Grammar schools admissions |
| 371.3 : 342.7 (100) | Method of teaching of human rights |
| 338.964 : 629.118.3 | Bicycle small scale industry |

(c) For phase relationships see Chapter 21.

Bracket [] may be used to achieve intercalation and algebraic grouping.

The normal means of subdivision is with the aid of a colon (:). But if the aim is to change the facet order, then bracket is used. Changing of the facet order is called intercalating.

Let us examine the following examples:

- | | |
|------------------|--|
| 33 : 622.33 | Economics of coal mining |
| 331 : 622.33 | Labour in coal mining industry |
| 331 : 622.34 | Labour in metal mines |
| 331 : 622.35 | Labour in quarries |
| 331.2 : 622.33 | Wages in coal mining industry |
| 331.881 : 622.33 | Trade unions in coal mining industry |
| 331.882 : 622.33 | Employers' federations in coal mining industry |

In the above examples, grouping is by kind of problem. Take labour problem. In the above approach documents dealing with labour problems would come together. As a result documents dealing with different kinds of problems in coal mining industry would get scattered. But, if the aim is to bring together everything on coal mining industry under the general heading economics, then we may use bracket to achieve the desired result. This has been illustrated below:

- | | |
|-------------------|--|
| 33 [622.33] | Economics of coal mining industry |
| 33 [622.33] 1 | Labour in coal mining industry |
| 33 [622.33] 1.2 | Wages in coal mining industry |
| 33 [622.33] 1.881 | Trade unions in coal mining industry |
| 33 [622.33] 1.882 | Employers' federations in coal mining industry |

In the example 33 [622.33] 1 the first part of the number, that is 33 represents economics and 1 stands for industry, which is a secondary

aspect. It may be added that use of bracket for intercalation was never officially approved by FID.

Second use, which is an approved one, is for algebraic grouping. This may be used to avoid ambiguity as given below:

686.1+655.42(05)	Book binding, and, periodicals about bookselling
[686.1+655.42](05)	Periodicals about book binding and book-selling
[294 : 22/28](540)	(Influence of Hinduism on Christianity in India)
[294 : 22/28](540)	(Influence of Hinduism on Christianity) in India
[027+069](48) "1979"	(Libraries and museums) in Scandinavia today

In case, two numbers are joined by means of + or :, and if such a combined number is followed by a form division, then this might lead to confusion because a form division can be considered to belong to both the numbers or the second number. In order to avoid ambiguity, [] is used. Stroke (/) performs a similar function. Say 22/28 is always read as a unit before the symbol colon (:) representing relationship is taken into consideration.

Double colon (::) is used to indicate subordination. Previously bracket [] was used for the same purpose.

Let us consider the following example:

5: 37 Scientific education

This means that the entry be given in the catalogue under the above class number but an additional entry may be given in the catalogue under the number 37 :: by reversing the number. Once the classifier has prepared the original class number, cycling becomes a purely mechanical job, which can be carried out by a clerk or a machine. In case, we do not intend to reverse the class number because the second part may be a subsidiary one. In other words, we may not wish to reverse the relationship in the catalogue because education may be a subordinate subject in the library/information centre of our concern. When relationship involves a subordinate concept not requiring a separate entry by reversal, then colon (:) may be replaced by double colon (::). Thus the number would be written as 5 :: 37

It may be noted that the following indicator digits have been described in Chapter 17:

= (0...) (=...) 00 -0 - .0' (apostrophe)

The indicator digits like ". ." and (1/9) have been dealt in Chapters 18 and 19 respectively.

5 CC

The concept of the indicator digit has evolved through various stages. In the first edition of *Colon classification (CC)*, Ranganathan used the term "connecting apparatus," which included the colon (:) and the zero (0). Ranganathan considered the function of the colon "like that of the bolts and nuts in a Meccano set."⁴ The colon (:) was used for the formation of compound subjects and with the help of 0 (zero) a class number for complex subject was formed. In the first edition of CC, the colon was the most important indicator digit. In fact, it was this symbol which provided this scheme an analytico-synthetic character. It was due to the significance attached to the use of the colon that the scheme itself was named *Colon classification*. Even today the colon continues to play an important role. In the second edition of CC, he continued to use the term connecting apparatus. However, the dash (—) was added as an additional indicator digit. This digit was used for combining two or more class numbers (i.e. isolate numbers) taken from one and the same "standard unit schedule." This was called the "auto-bias device." In the 6th edition of CC (1960), it was renamed "super-imposition device." Later, it was referred to as "speciator device."⁵

In the third edition of CC, these symbols were renamed as connecting symbols. In this edition, the dot (.) was added as new symbols for repenting phase relations. In the fourth edition, the symbols continued to be called connecting symbols. In this edition, <—>, <—, >—, were added as new symbols. In the fifth edition, the symbols were called connecting symbols. The arrester) and the starter (, were added as new symbols. In the sixth edition no new indicator digits were added. However, in the reprint of the sixth edition in 1963, the inverted comma (') was added. It was meant to indicate the time facet. The term connecting symbols continued to be in use.

The third edition of *Prolegomena to library classification* (1967) adopted the term connecting digit. Ranganathan defined a connecting digit as "any digit in a class number prefixed to a facet number other than the basic number."

Latter on, this term was replaced by the indicator digit, and seems to have been accepted, being used in the 7th edition. In this edition,*

⁴SR. Ranganathan. *Colon classification*, 2d ed., Madras, Madras Library Association, 1939, p. 1.12.

⁵S.R. Ranganathan, "Compound isolate and compound basic subject: evolution of the concept through forty years." *Library Science*, 7, 1970, pp. 1-32.

TABLE 20.2

USE OF INDICATOR DIGITS IN UDC

Symbol	Name of sign	Used to	Ordinal value in relation to other digits in the notational system					Remarks
1	2	3	4	5				
+	plus or and	indicate aggregates consisting of two or more topics	+ / : ::= (0...) (1/9) (= ...) '...' .00 .0 -1/-9 .0' (apostrophe) Note: No filing order has been officially prescribed for ; : (double colon). However, it may be filed immediately after:	Plus is used to connect two or more separated (non-consecutive) numbers, when no single comprehensive number exists,				
/	slash or stroke	join the first and last of a series of consecutive UDC numbers	(colon). Square bracket [..] does not affect filing order; therefore; it may be completely ignored in filing	used to denote a range of concepts which, taken together, go to form a broad subject or branch of knowledge, when no single comprehensive number exists				
:	colon or relation	connect any two or more UDC numbers representing related concepts of approximately equal values, to: (a) divide a subject directly to achieve genus-species relationship	Point (.) merely serves as a visual aid. This is also an indicator digit	used for specific kinds of synthesis in the context of particular subjects and to join numbers taken from anywhere in the schedules. Used to show relationship between two subjects. Thus colon is used for phase relation and facet device. However, there is no provision for indicating different levels of phase relation,				

1	2	3	4	5
		(h) attach foci taken from different facers		
		(c) indicate phase relationships achieve algebraic subgrouping when two or more main UDC numbers are linked by a plus sign or colon to denote a complex concept which is, as a whole, either related to another by colon, or modified by a common or special auxiliary		square brackets [] or () on typewriters may be used in place of colon for intercalation and algebraic grouping
	[] bracket			
		fix the order of any two (or more) component main UDC numbers in a compound number, especially when UDC is used in a computer-based or mechanical information system		the purpose of subordination served by [] has been given up, more or less. Now :: (double colon) is being used for subordination
	:: double colon			
	= equals	introduce the common auxiliaries of language, which denote the language or linguistic form of a document whose subject is represented by a main UDC number		
		denote common auxiliary of form		use of common auxiliary of form should not be confused
	(0...) brackets nought			

with common auxiliaries of Place. It distinguishes documents according to their physical or bibliographic form or form of presentation. Here the subject is represented by main UDC number and a common auxiliary of form is attached to it, so that the documents belonging to the same subject get arranged further by the form of auxiliaries.

common auxiliaries of race and nationality are useful for representing races not confined to any one political unit. These are derived from those of language. UDC has made a separate provision for prehistory. These common auxiliaries of time do not indicate the date of publication or issue of a document. These should also not be confused with general historical presentation (091) dealt in table for common auxiliaries of form.

- (1/9) brackets one indicate the geographical range to 9 of the subject denoted by the preceding main UDC number
- (= . . .) brackets indicate racial or ethnic aspects of a subject represented by the preceding main UDC number
- " . . ." Double quotation marks specify the date, period or other time aspects of a subject represented by main UDC number

1	2	3	4	5
.00	point nought nought	Indicate the most general points of view from which a subject may be considered and suffixed to main UDC number		these should not be confused with main UDC numbers 001/ 009
-0	hyphen nought hyphen	introduce common auxiliaries of materials and persons introduce special auxiliaries sub- divisions, which are usually more general than the point nought series, and also to indi- cate geographical range of the subject denoted by the preced- ing main UDC number		these are applicable through- out the scheme -1/-9 series listed under 62 (ex- cept -3) are applicable to the whole of 62/69. -has also been used for zones, orientation, groupings, spheres, etc., in geo- graphical divisions
.0	point nought	introduce special auxiliary sub- divisions, which tend to be more specific in meaning with certain exceptions		many of the point nought auxiliaries are applicable only to a restricted section of the UDC
apostrophe		denote contraction of notation and as a sign introducing a series of special auxiliary sub- divisions		it may be used, where indicated by the UDC
point		serve purely as a visual aid		points are inserted usually after every third figure. When intro- ducing .00 and .0 auxiliaries or for mnemonic purpose the posi- tion of a point might vary but does not affect filing.

"&=+ have been added as new symbols. The symbols* " ← have been assigned anteriorizing value.

Ranganathan was influenced by the ideas of DDC and other schemes of classification. He succeeded in bringing out progressive refinement in the concept of indicator digits. From the first to the third editions of CC, the concept was not described in explicit terms. Its application was also not clear enough. Ranganathan added new indicator digits from time to time. The concept also became clearer with the passage of time. The ordinal values of these digits have been provided, and occasionally changed to achieve the preferred helpful sequence. As a result, CC has been able to provide for different levels and types of phase relations (intra-array, inter-subject and so on). This has also enabled CC to use facet analysis to a greater extent, which has taken it nearer to becoming a freely faceted analytical-synthetic scheme for classification. The first to third editions (version 1 of CC) were rigidly faceted. The fourth to sixth editions (version 2 of CC) were almost freely faceted. The seventh edition (version 3 of CC) will be a freely-faceted one. These versions are related to "uses of different indicator digits for diverse kinds of facets." From the first to third editions, the number of indicator digits available for use were limited, thereby causing rigidity. For example the class number for "designing in electrical engineering" was D66 : : : 4, which caused a cluttering of colons. This happened due to rigid-facet formula. It became possible to break down such a rigidity due to the availability of additional indicator digits in later editions. This shows the importance of the role of indicator digits in the growth and development of CC.

EXAMPLES OF SHELF ARRANGEMENT ACCORDING TO CC6:

a47	Bibliography of reference books
aN3	Generalia bibliography brought upto 1930s
k56,L	Encyclopaedia Britannica
m44, N37	Hindu Herald
n56, M	Statesman's year book
z44	Indology
1	Universe of knowledge
2	Library science
20aY	Library science and sociology
2.8'N	Libraries in Australia in 20th century
2:51	Library classification
2:51M	Dewey decimal classification

TABLE 20.3
USE OF INDICATOR DIGITS IN VARIOUS EDITIONS OF CC

Edition Number (Year of publication)	Symbol	Used to indicate					Remarks
		1	2	3	4	5	
First (1933)	0 (zero) : (colon)			Bias number device Colon device	abcdefghijklmnopqrstuvwxyz; 12345 6789ABCDEFGHIJ KLMNOPQRSTU WXYZ		The symbols were named as connecting apparatus for bias number device and colon device.
Second (1939)	0 (zero) : (colon) — (dash)			Bias number device Colon device Auto-bias device	abcdefghijklmnopqrstuvwxyz; —12345 6789ABCDEFGHIJ KLMNOPQRSTU WXYZ		The symbols were named as connecting apparatus for bias number device, colon device and auto-bias device. In this edition, "—" (dash) was added.
Third (1950)	0 (zero) .(dot)			Biasing phase, Comparison phase, influencing phase and relation phase	abcdefghijklmnopqrstuvwxyz; —12345 6789ABCDEFGHIJ KLMNOPQRSTU VWXYZ		The symbols were named connecting symbols. In this edition, "." (dot) was added as a new symbol. ".c" ".d" ".e" were used for the comparison phase, influencing phase and relation phase respectively. Relation phase covers other kinds of relations which may be recognized. ".:" was used for connecting
	: (colon)			Connecting of the parts			

of a class number belonging to two consecutive facets or for tool phase/aspect phase
Auto-bias device

—(dash)

Fourth (1952)

+ (backward arrow)	Interval of time	a b c d e f g h i j k l m n p q r s t
→ (forward arrow)	Future time	u v w x y z ↔ 0 . ; : - 1 2 3 4
0 (zero)	Biasing phase, comparison phase, influencing phase, relation phase	5 6 7 8 9 A B C D E F G H I
	Time and space facets	J K L M Δ μ N O P Q R S Z
		T U V W X Y Z

. (dot)

: (colon)

Energy facet, tool phase and aspect phase

; (semicolon)

Matter facet

. (comma)

Personality facet

- (hyphen)

Auto-bias device

) (arrester)
Put at the end in the subject device number
Interval of time

+ (backward arrow)

Fifth (1957)

) ↔ 0 . ; : - a b c d e f g
h j k l m n p q r s t u v w x
y z 1 2 3 4 5 6 7 8 9 A B C
D E F G H I J K L L λ

the parts of a class number belonging to two consecutive facets and tool phase/aspect phase 'g' was applied for tool phase. In tool phase, the connecting symbols where colon (:) or colon nine(:9). "If, however, the 'oci of the facet of the first phase which is prescribed by its facet formula to follow the facet after the tool phase should be added begins with a capital letter then connecting symbols is "g"

The symbols were named connecting symbols.

In this edition ↔ → ; , were added as new symbols. '0' (zero). '0c' (zero c), '0d' (zero d), '0f' (zero f) were used as biasing phase, comparison phase, influencing phase, relation phase respectively. '↔' (backward arrow) was assigned anteriorizing value

The symbols were named connecting symbols. In this edition 'λ' (arrester) and 'λ' (starter) were added as new symbols.

'0a', 'ob', 'Oc', 'Od' 'Og' were used to represent general, bias, comparison, difference and influencing phase relations respectively. 'Oj', 'Ok', 'Om', 'On', 'Or' were used to represent general, bias, comparison, difference and influencing intra-facet relations

M Δ μ NOPQRSZUV
WXYZ (

Future time

→ (forward arrow)

0 (zero)

Phase relation and intra-facet relations

· (dot)

: (colon)

; (semicolon)

· (comma)

- (hyphen)

Time and space facets

Energy facet

Matter facet

Personality facet

(a) Auto-bias device

(b) Favoured focus isolate

Put at the beginning in the subject device number

Put at the end in the subject device number

Interval of time

→ (forward arrow)

0 (zero)

· (dot)

: (colon)

; (semicolon)

· (dot)

: (colon)

; (semicolon)

Phase, intra-facet and intra-array relation

Time and space facets

Energy facet

Matter facet

) → 0 . : ; - a b c d e f g h j
k l m n p q r s t u v w x y z 1 2
3 4 5 6 7 8 9 A B C D E F G H
I J K L M ^ N O P Q R S T
U V W X Y Z (

The symbols were named as connecting symbols. Any number followed by a Roman small or an arrow gets precedence over the original number because small letters and arrows have been given anteriorising value, Σ was left unchanged inadvertently. It was meant to be represented by SZ.

• (comma)
-(hyphen)

Personality facet
(1) Suprimposition
device
(2) Favoured focus
isolate

((starter)

Put at the beginning
in the subject device
number

Sixth reprint
(1963)

(inverted
comma)

Time facet

)←→0' . . . ; - , a b c d e f g h
j k l m n p q r s t u v w x y z l
2 3 4 5 6 7 8 9 A B C D E F G
H I J K L M Δ N O P Q R S
Σ T U V W X Y Z (

• (inverted comma) to indicate
time facet was added. Σ was
left unchanged inadvertently. It
was meant to be represented by
SZ.

Seventh edition

• (asterisk)
" (double
inverted
commas)

Agglomerates

Anteriorizing isolate re-
presenting common
isolate facet (referral
document)

← (back-
ward arrow
) (arrestor)

Range of time (back-
ward)

Packet notation when
taken together with a
starter (e.g. isolate
number derived by sub-
ject device)

& (amper-
sand)
' (single

Phase relation facet
Time facet

• " ←) & ' . . . ; - , = + → a b
c d e f g h j k m n p q r s t u v
w x y z 0 1 2 3 4 5 6 7 8 9 A B C
D E F G H I J K L M N O P Q
R S T U V W X Y Z (

Roman small lattes l l o have
been excluded to avoid confu-
sion with digits l(one) 0 (zero).
• " & = + are the new indica-
tor digits.

• " ← have been assigned an-
teriorizing values

• (asterisk) has been postulated
as an empty-emptying digit
with anteriorizing quality. It
has been adopted for agglome-
rate device meant for assigning
numbers to agglomerates. Thus
it would enable interpolation
of new basic subjects.

*(inverted

comma)

.(dot)

:(colon)

;(semi-

colon)

*(comma)

-(hyphen)

= (equal to)

+(plus)

→ (forward

arrow)

((starter)

Space facet

Energy facet

Matter facet

Personality facet

Speciator Kind 1

Speciator Kind 2

Used for connecting abbreviated components of a multinomial, while applying alphabetical device.

Future time

Packet notation when taken together with an arrester (e.g. an isolate number derived by subject device)

-(hyphen) has been used for connecting speciator of Kind 1 (conventional speciator). This has been used to indicate second or later component of compound isolate/compound basic subject.
 = (equal to) has been used for attaching the speciator of Kind 2 (i.e. non-conventional speciator or special component Kind 2).

2:51M6	Universal decimal classification
2.51N3	Colon classification
2;44:6	Circulation of newspapers
22	Public libraries
234:81	Book selection in a university library
B2	Algebra
B62:3	Differential plane geometry
C3:21;5	Velocity of sound in water
C53:3	X-ray spectra
C9B7:58	Scattering of cosmic rays
CN2,5:33	Band spectra according to wave mechanics
YObL	Sociology for doctors
YaN3	Bibliography on sociology brought upto 1930s
Y'N←M	Development of sociology since nineteenth century
Y'N→	Future of sociology
Y'N	Sociology in the twentieth century
Y31:7:7	Rural development
Z	Law
(:f)	Research methodology
(:g)	Criticism technique
(r)	Administrative report technique
(P)	Communication theory
(X)	Management

6 BC

In the first edition of BC, (' (apostrophe) the comma (,) and hyphen (-) were used as indicator digits. The symbols & and % were introduced in the final volume of the first edition of BC. These indicator digits (& and %) were used very rarely and were withdrawn later on. The comma was used extensively as a facet indicator (facet link within a class). The hyphen was used as a general-purpose link for phase relations.

In the second edition of BC, retroactive notation has been employed within each homogeneous class (but not between classes). The advantage of such a notation is that it does not require different types of symbols for connecting devices. The examples are given below to serve as illustration:

	<i>BC (edition 1)</i>	<i>BC (edition 2)</i>
Clothing industries	UVC	UVC
Buildings	UVC, E	UVC B
Equipment	UVC, E	UVC C
Personnel	UVC, G	UVC D

Therefore, in the second edition, indicator digits such as the comma and hyphen have been replaced by two basic types of characters (letters and numbers). However, there are two instances where the hyphen and comma may be employed profitably. In case the library adopts a policy of multiple entry in its classified catalogue, the hyphen can be used to separate the constituent facet terms. In UDC, the colon is applied for a similar purpose. There are a few classes in BC2, which may require alphabetical device to represent names of persons. Here, a comma may be used instead of a numeral.

In the second edition of BC, digits 2, 3, 4, 5, 6, 7, 8, 9 have been used as indicator digits. Digits 2 and 3 are used for common form subdivisions. Digits 4 to 9 are used for common subject divisions. Digit 7 has been adopted to connect the time facet. Digit 8 indicates that the space facet follows it. Digit 9C is used for comparison relationship. Digit 9J has been used for the influencing relationship. Similarly 9E, 9F, 9G, 9H and 9K represent other relations.

, (Comma) is recommended for use of alphabetizing class-marks for names of persons. This is used rarely.

7 CONCLUSION

The role of indicator digits in any faceted scheme is extremely important. In *Colon classification*, till the time the number of indicator digits was limited, the scheme had a great deal of rigidity. This rigidity broke down when additional indicator digits were made use of. This change, with other improvements, is likely to make this a freely-faceted one.

The use of indicator digits at the notational plane helps in meeting the challenge of the multi-dimensionality of a growing universe of subjects. In addition, these digits break the block in the form of a class number into sub-blocks. As a result, the eye would find it more convenient to pick up a class number in a single sweep, and also, it would become more helpful to remember a class number for a short duration.

The introduction of indicator digits taken from punctuation marks and mathematical symbols introduces some complexity in a scheme. Therefore, BC2 has introduced letters and Arabic numerals. This approach seems to be useful, but there is need for further investigation so that full benefit could be got out of it.

FURTHER READINGS

- G. BHATTACHARYYA, "Classifying by UDC and by CC: A comparative study," *Annual DRTC Seminar*, 9, 1971, paper CB.
- M.M. KASHYAP, "Study of the progressive use of the indicator digit device in Colon Classification," *Annals of Library Science and Documentation*, 22, 1975, pp. 120-132.
- A. NEELAMEGHAN, "Colon Classification, Edition 7: Schedule of basic subjects," *Library Science*, 10, 1973, paper P.
- S.R. RANGANATHAN, "Development in the use of digits in colon classification," *Library Science*, 6, 1969, paper A.
- Universal Decimal Classification*, Abridged English edition (3rd edition, 1961), London, British Standards Institution, 1961, pp. 10-25.

Chapter 21

PHASE RELATION

One of the modes of formation of subjects in the universe of subjects is called loose assemblage. There are three kinds of loose assemblage, namely, loose assemblage 1, loose assemblage 2 and loose assemblage 3. Loose assemblage mode of formation is concerned with mutual relation and is represented by phase relation in library classification. Corresponding to three kinds of loose assemblages, we are able to obtain three levels of phase relations such as 'inter-subject phase relation', 'intra-facet phase relation' and 'intra-array phase relation.' Every library classification scheme for macro-thought embodied in books has to provide for the phase relation.

1 DDC

In the first edition of DDC (1876), there was no provision for phase relations. In the fourteenth edition of DDC (1942), provision was made available for 00 viewpoint division (such as the speculative, economic, organization and personnel viewpoint divisions) and 0001 relation (to be divided like the main classification).

According to the 17th edition of DDC (1965): "Class an analytical work dealing with Shakespeare's influence on Keats with Keats" (v. 1, pp. 29-30). There is also no provision to connect the number for Keats and Shakespeare. As a result, there will be no representation of Shakespeare or his influence in the class number prepared in this manner.

*In the 18th edition of DDC (1971), there is a provision for phase relation. Under standard subdivisions, 024 denotes "works for specific types of users." It may be remembered that a decimal point is always added following the third digit of any number constructed in this manner.

EXAMPLES:

515.302453	Differential calculus for physicists
510.02462	Mathematics for engineers
530.0182	Application of Statistical method in physics
020.0184	Application of operations research to library science

2 UDC

In this scheme, the ':' (colon) is used to represent the indicator digit for phase relation. However, UDC does not distinguish the different kinds and levels of phase relations. It may be added that the colon is also used to represent a facet relation.

EXAMPLES:

General relation between physics and chemistry	53:45
Statistics for physicists	311:53
Comparison between Fabian socialism and national socialism	335.72: 335.76
Difference between simple marine worms and earthworms	595.141: 595.142
Influence of Hinduism on Buddhism	294.3: 294.51
Effect of pollution on marine life	57(26): 614.77
Genetical effects of radioactivity	575: 539.16
Influence of geography on history	39:91

3 LC

Phase relations are provided by means of enumeration. These are often given under the heading "General subject." This may be interpreted as special aspects of a general subject. In some cases, such provisions lead to cross-classification. However, no specific instructions are available for constructing a particular level or kind of phase relation.

EXAMPLES:

ND	PAINTING
History	
49	Early works (to 1800)
50	General works
53	General special

e.g., Comparisons of ancient and modern painting

N FINE ARTS

General works

7420 Early works (to 1800)

7425 Treatises, 1800-

7428 General special

e.g., Comparisons of ancient and modern art

4 BC

According to Mills, in BC1 "The hyphen (-) . . . is now generally used as a phase link, comparable with the UDC colon".¹ In BC2, provision for phase relations has been made on an extensive scale, as given below:

(a) Relations with other subjects:

6T Comparison

6W General influence, effect

6U Exposition

6X Influence by another subject

6V Author's viewpoint

6Y Influencing another subject

(b) Relations with other subjects:

9C Comparison with another subject

9G General influence, effect

9E Exposition through another subject

9J Influence by another subject

9F Author's viewpoint

9K Influencing by another subject

Note: 6T/6Y is used if a place/time concept features in the primary phase.

5 CC

Ranganathan has all along recognized the concept of loose assemblage in relation to the universe of subjects. Therefore, in the beginning, he introduced the word "phase" to describe the relationship between basic or compound subjects. This was a restricted application of the concept of phase relationship. We find the evidence for this in the first edition of *Colon classification*.

¹J. Mills, *Modern outlines of library classification*, London, Chapman & Hall, 1959, p. 144.

In the first edition of *Colon classification* (1933), the scheme provided bias number device. It was intended to bring together "such of the books in a class as are written with a special bias to some other class or from a special point of view that can be associated with some other class, or for the use of special class of readers whose primary interest of study is in some other class, or as have some other special relation to some other class . . ." ² This relationship was called the phase relation. If we look carefully into the application of phase relation as prescribed in the first edition, then we can come to the conclusion that it was a restricted application of the concept of phase relation being confined only to one kind of relationship, that is the bias relation. It was the only relation provided in the scheme. The digit 0 (zero) was prescribed as an indicator digit.

EXAMPLES:

S0T	Psychology applied to education
R 40N	Ethics in relation to fine arts
B280T	Statistics for teachers
D0F	Engineering biased to technology

The second edition of *Colon classification* (1939) provided for two phase relations. Digits "0" (zero) and ":" (colon) were prescribed as indicator digits. Actually, the ":" (colon) was used for the subject device. In 1942, influence relation was recognized and an indicator digit z8 was prescribed for. Later z8 was replaced by "0d" (zero d). In 1949, the tool phase was recognized and the indicator digit ":" (colon) was used.

The third edition (1950) recognized the following phase relations:

Nature of relation	Phase relation
Biasing	0
Tool	: OR :9
Aspect	:
Comparison	.c
Influencing	.d
Relation	.e

From the above table it follows that in the third edition, different digits were prescribed to represent different kinds of phase relations.

EXAMPLES:

Engineering biased to technology	D0F
Engineering applied to technology	F : D (tool phase)
Geopolitics	W. dU

²S.R. Ranganathan, *Prolegomena to library classification*, Madras, Madras Library Association, 1937.

Legal medicine

L : Z (aspect phase)

The fourth edition (1952) followed the practice of the third edition. In 1954, it was decided to accept the use of the packet notation for the subject device. Thus, engineering applied to technology was given the class number F : (D)

The fifth edition of *Colon classification* (1957) recognized two levels of relationships, such as phase relations and intra-facet relations:

Nature of relation	Phase relation	Intra-facet relation
General	a	j
Bias	b	k
Comparison	c	m
Difference	d	n
Influence	g	r

In the sixth edition of *Colon classification* (1960), three levels of relations, called phase relation, intra-facet relation and intra-array relation were recognized. Within each level, five kinds of relations were isolated. These relations are given below:

Nature of relation	Phase relation	Intra-facet relation	Intra-array relation
General	a	j	t
Bias	b	k	u
Comparison	c	m	v
Difference	d	n	w
Influencing	g	r	y

In 1967, it was decided to isolate tool phase relation and it was allocated '0e' (zero e) as indicator digits. This relation takes place when one subject is applied for the purpose of studying or development of another subject. This is a revival of the tool phase, which was provided in the third and fourth editions of *Colon classification*.

51 Present Position

We may recognize three kinds of loose assemblage as given below:

Assembling together of two or more subject (basic or compound)

—Loose Assemblage 1

Assembling together of two or more isolates taken from one and the same schedule—Loose Assemblage 2

Assembling together of two or more isolates taken from one and the same array of order higher than one, in one and the same schedule—Loose Assemblage 3

First assemblage gives rise to complex subject, second leads to complex isolate of kind 1 and third leads to complex isolate of kind 2. Corresponding to these, we get three levels of phase relations such as "inter-subject phase relation," "Intra-facet phase relations," and "intra-subarray phase relation." Inter-subject is relation between two subjects. Intra-facet is relation between two isolates of the same facet belonging to the same subject. Intra-array is concerned with relation between two isolates of same array (obviously the facet and subject would be the same). Within each level, six kinds of phase relations have been recognized. These are general relation, bias, comparison, difference, tool and influencing relations.

The table given below lists the levels and kinds of phase relations:

<i>Nature of relation</i>	<i>Inter-subject phase relation</i>	<i>Intra-facet phase relation</i>	<i>Intra-array phase relation</i>
General	a	j	t
Bias	b	k	u
Comparison	c	m	v
Difference	d	n	w
Tool	e	p	x
Influencing	g	r	y

It may be noted that the Indicator digit between the class number and the digit representing the phase relation is "&" (ampersand). In the sixth edition, '0' (zero) was the indicator digit for phase relation. Now it has been replaced by '&'.

We already know that phase relation is an assemblage of two or more subjects (basic or compound) or isolates. "Each component in the assembly is called a "phase". They are called "Phase 1," "Phase 2," etc., as determined by their sequence in the assemblage (*Prolegomena*, p. 358).

In the next few pages, rules for inter-subject phase relations have been discussed. The same rules are equally applicable for intra-facet phase relation and intra-array phase relation.

511 General Phase Relation

The general relation is "a phase relation of more or less comprehensive or non-descriptive kind between the two phases."³ The sequence

ence of phases hardly matters in general phase relation. But for the sake of consistency, *Colon classification* has prescribed the sequence of phases to be the same as the sequence of component phases in the sequence of classes, isolates or arrays, whichever is found applicable.

The class number for "Physics in relation to chemistry" would be C & aE. Here, C has been made Phase 1 because it comes earlier in the sequence of classes than E, "&" is an indicator digit for the phase relation, "a" stands for general relation.

512 Bias Phase Relation

This is a "phase relation indicating that the exposition of phase 1 is biased towards phase 2; that is, the exposition specially attuned to the needs of a specialist in the subject or the isolate or the array isolate forming phase 2, either by selection or the arrangement of the topics, or by emphasis, or by the standard of exposition, or by the examples selected, or by other means."¹ In the bias phase relation, Phase 1 is called the biased phase, Phase 2 is named the biasing phase.

"Psychology for teachers" would get the class number S&bT. Here, psychology has been made Phase 1, because this is a book on psychology, written especially for the use of teachers. If such books are not distinguished from ordinary books, then these will get mixed up. In case a teacher requests for a book on psychology, a book on psychology written for teachers can be brought to his notice.

513 Comparison Phase Relation

In this phase, comparison is made between two subjects. The subject whose class number is the earlier class number is treated as the first phase.

The class number for "Botany compared with zoology" would be I & cK. Here, botany has been made the first phase because the class number for botany has less ordinal value than that for zoology.

514 Difference Phase Relation

In this phase, the difference is expounded between two subjects. The subject whose class number is an earlier class number is treated as the first phase.

¹S.R. Ranganathan, *Colon classification*, New Brunswick, N.J., Graduate School of Library Service, the Rutgers, the State University, 1965, p. 56.

²*Ibid.*, p 96.

The class number for "Difference between botany and agriculture" would be I & dJ. Botany has been treated as the first phase because the class number for botany has less ordinal value than that of agriculture.

515 Tool Phase Relation

In this phase, one subject is applied for the study or development of another subject. The subject under study is treated as the first phase and the subject used as a tool is considered as the second.

The class number for "Application of mathematics to engineering" would be D & eB. Engineering, being the subject of study, has been placed as the first phase. Mathematics is a tool here; therefore, it has been treated as the second phase.

516 Influencing Phase Relation

In this phase relation, the influence of one subject on another is expounded. The subject being influenced is considered as the first phase. The second phase is called the influencing phase.

The class number for "Influence of geography on political science" would be W & gU. Here, political science is the subject being influenced; therefore, it has been treated as the first phase, and geography is regarded as the second phase.

EXAMPLES FROM CC6 FOR INTER-SUBJECT PHASE RELATION:

I0aK	Relation between botany and zoology
W0aX	Relation between political science and economics
I0bK	Botany biased to zoology
B28 ObC	Statistics for physicists
L0bZ	Medical jurisprudence
S0b2	Psychology for librarians
X:90bYZ	Labour economics for social workers
I0cK	Botany compared with zoology
E9G 0c G:3	Biochemistry compared with physiology
B850dCN2	Difference between wave function and wave mechanics
I0dK	Difference between plant life and animal life
K0gI	Influence of botany on zoology
W0gU	Geopolitics (influence of geography on politics)
O152, 20g O111	Influence of English literature on Hindi drama

Note: Above relation should be taken as inter-subject relation because form facet is missing in second phase. In case, the title is 'influence of English drama on Hindi drama', then we are allowed to

use intra facet relation because in both phases, form phase occurs.

EXAMPLES FROM CC6 INTRA-PHASE RELATION:

X:5.5.45 0j 53	Trade relation between India and France
X.44 0j 73	Economic relation between India and USA
X5.44 0j 56	Commercial relation between India and Great Britain
Z, 40 j5	Relation between torts and crimes
Q:0j4	Relation between Hinduism and Buddhism
L:20k3	Physiological anatomy (Anatomy biased to physiology) (in medicine)
L:20m3	Morphology compared with physiology (in medicine)
X5.80k 1N48	Commonwealth preference in Australia's commerce
Q20m 4	Hinduism compared with Buddhism
2:51 M9 0m51 N3	Comparison between UDC and CC
B91 0m 42:68	Comparison of the constitution of earth and venus
CN1 0m N2	Comparison of quantum physics and wave mechanics
V44. 1 0n 21:3	Difference between functions of President and Prime Minister (India)
Z, 4 0n 5	Difference between torts and crime
E:2 0n 3	Difference between analytical chemistry and physical chemistry
Q2 0n 4	Difference between Hinduism and Buddhism
L:2 0n 1	Difference between morphology and physiology (in medicine)
0152 0r 111,2	Influence of English drama on Hindi drama
2:51N3 0r 51M9	Influence of UDC (1896) on CC (1933)
Q6 0r 4	Influence of Buddhism on Christianity
L:2 0r 3	Influence of physiology on morphology (in medicine)
X:53.44 0r 73 'N6	Influence of US tariff on Indian tariff brought up to 1960s

EXAMPLES FROM CC6 FOR INTRA-ARRAY PHASE RELATION:

221 0t2	Relation between district and city libraries
V44,31 0t2	Relation between Lok Sabha and Rajya Sabha (India)
T67 0t8	Relation between education for deaf and blind
S:740t5	Relation between character and temperament

S:521 0t3	Relation between feelings of laughter and joy
X.4411 0t3	Economic relation between Tamil Nadu and Karnataka
Y31 0t5	Relation between rural folk and city folk
Y52 0t3	Aristocracy in relation to middle class
Y41 0t9	Relation between professional class and working class
221 0v2	Comparison between district and city libraries
Y31 0v5	Comparison between rural folk and urban folk
T67 0v8	Comparison between education for deaf and blind
S:521 0v3	Comparison of feelings of laughter and joy
B941 0v3:68	Comparison of the constitution of venus and mars
Y41 0v9	Professional class compared with working class
Y31 0v5	Rural class compared with city folk
Y52 0v3	Aristocracy compared with middle class
Y31 0w3	Difference between rural folk and urban folk
Y41 0w6	Difference between absolute and limited monarchy
T67 0w8	Difference between education for deaf and blind
S:74 0w5	Difference between character and temperament
S:521 0w3	Difference between feelings of laughter and joy
Y52 0w3	Difference between aristocracy and middle class
Y31 0y3	Influence of rural folk on urban folk
S:74 0y5	Influence of character on temperament
3521 0y3	Influence of feelings of laughter on joy
032 0y1	Influence of Tamil literature on Malayalam literature
Y53 0y2	Influence of aristocracy on middle class

Note: Above phase relation is used for isolates belonging to the same array and in the second phase all digits of the isolate number except the last digits are omitted to shorten the class number.

EXAMPLES FROM CC7 FOR INTER SUBJECT PHASE RELATION:

Relation between botany and zoology I & aK

Relation between political science and economics W & aX

Numerical solution of differential equations biased

to metallurgists B33:l & bF191
 Botany biased to zoology I & bK
 Statistics for physicists B28 & bC
 Botany compared with zoology I & cK
 Biochemistry compared with physiology E 9 G & c G:3
 Difference between plant life and animal life I & dK
 Application of physics to chemistry E & eC
 Application of mathematics to engineering D & eB
 Application of psychology to education T & eS
 Geopolitics (Influence of geography on politics) W & gU
 Influence of botany on zoology K & gI

EXAMPLES FROM CC7 FOR INTRA-FACET PHASE RELATION:

Relation between Hinduism and Buddhism Q2 & j4
 Morphology biased to physiology L; 2 & k3
 Hinduism compared with Buddhism Q2 & m4
 Morphology compared with physiology (in medicine) L; 2 & m3
 Difference between Hinduism and Buddhism Q & n4
 Difference between morphology and physiology L; 2 & n3
 Influence of Buddhism on Christianity Q6 & r4
 Influence of physiology on morphology L; 2 & r3

EXAMPLES FROM CC7 FOR INTRA-ARRAY PHASE RELATION:

Relation between rural folk and city folk Y31 & i5
 Aristocracy in relation to middle class Y52 & r3
 Professional class compared with working class Y41 & v9
 Rural folk compared with city folk Y31 & v5
 Aristocracy compared to middle class Y52 & v3
 Difference between rural folk and city folk Y31 & w5
 Difference between aristocracy and middle class Y52 & w3
 Influence of city folk on rural folk Y31 & y5
 Influence of aristocracy on middle class Y53 & y2

Note: For converting above examples to CC6, replace & by 0 (zero) and ; (semi-colon) by : (colon). Tool phase does not find a place in CC6 because it is not recognized as a phase relation.

6 LAW OF PARSIMONY

The provision of a phase relation in schemes for classification provides a solution for loose assemblage (a mode of formation of subjects in the universe of subjects). *Colon classification* provides for intra-facet phase relation. This eliminates the need for repeating the

entire number for the host class in the second phase. Q6 & r4 denotes influence of Buddhism on Christianity. Here, host class Q has not been repeated. Similarly, economy is achieved in intra-array phase relation. Y31 & w5 represents the difference between rural folk and city folk. Taken separately, rural folk and city folk are denoted by Y31 and Y35. Thus in the class number for the phase relation Y3 has been omitted. This leads to economy. Therefore, we can see that intra-facet and intra-array phase relations satisfy the law of parsimony.

7 CONCLUSION

Different schemes of classification have made a provision for phase relations. Treatment of phase relation in different schemes other than *Colon Classification* is inadequate. *Colon Classification* is the only scheme which has made an elaborate provision for phase relations. BC2 has also made a good provision. In CC, six kinds of phase relations have been recognized. There is a need for intensive investigation to examine these relations, and also to determine new phase relations, which may be found useful.

FURTHER READINGS

- S.R. RANGANATHAN *Colon classification*, New Brunswick, N.J. Graduate School of Library Service, Rutgers the State University, 1965, sections K, M72, N2.—*Prolegomena to library classification*, 3d ed., Bombay, Asia Publishing House, 1967, Section PE2, PE3, PK, 5D, TE2, XF 33.

Chapter 22

BOOK NUMBER AND COLLECTION NUMBER

I BOOK NUMBER

11 *Ultimate Class*

The first step in classifying the universe of books is to place each in the ultimate class to which it may belong. "Ultimate class of the subject of a book—that is, the class of the smallest extension, in the preferred scheme for classification, in which the book can be placed" (*Prolegomena*, p. 503). Take the case of a particular ultimate class such as statistics. In a library, there may be many documents belonging to the same particular ultimate class. In other words, there would be many documents having the same class number, say B28 (CC6). There would be need to individualize such documents. The documents belonging to the same ultimate class can be subdivided on the basis of appropriate characteristics. A subject as a basis for further subdivision cannot be used for this purpose. The characteristics to be used can be the name of the author, year of publication, language, form of exposition or medium of expression, number of volumes, and so on.

12 *Canon of Book Number*

In view of the above, Ranganathan formulated the canon of book number. According to this canon, "a scheme for book classification should include a scheme for book numbers in order to individualise the documents having the same subject as their ultimate class and to mechanize their preferred arrangement among themselves" (*Prolegomena*, p. 503). Thus at a point where the class number is unable to individualize the books, the job is taken over by the book number. There are varying practices which have been adopted by classificationists in this regard.

13 Colon Book Number

Colon classification makes use of a facet formula to construct the book number. The same is based on the concept of facet analysis, and provides for possible characteristics which are "likely to arise in the expression of an idea in forming a work and also the characteristics likely to arise in embodying a work in the form of a book" (*Prolegomena*, p. 507). The experience indicates that this formula is able to meet possible contingencies.

The facet formula for book number prescribed by CC, is given below:

[L] [F] [Y] [SN]. [V]—[S]; [C]: [EVN]

The symbols used above are explained below:

L=Number for the language of exposition, to be taken from the schedule of language isolates

F=Number for the form of exposition, to be taken from the form schedule

Y=Number for year of publication, to be taken from the chronological schedule

SN=Serial number, beginning with 1 for the second book received in the library or spotted out for inclusion in the bibliography, as appropriate (the serial number is used so as to distinguish between the different books belonging to the same ultimate class and also having the same language and form numbers)

V=Number for the volume, taken from the book itself.

S=Number for the supplement, to be taken from the book itself.

C=Number for copy (this is a serial number. The second copy will get "1" and the third copy will get "2").

EVN=Evaluation number is used for pseudo-classics. Pseudo-classic is a pedestrian work—that is, a work not fit to be treated as a classic—provoking associated works—such as, evaluations or parodies itself (*Prolegomena*, p. 501).

131 Conventions

The facet formula appears to be too long, but experience shows that if economy measures are adopted, in more than 90 per cent books and periodicals the book number would merely consist of the year number only. The CC year number is three-digited. Thus, the CC book number would usually be three-digited.

Ranganathan suggested the concept of favoured facet number. This leads to economy in the length of a book number. The conventions regarding use of the favoured facet number are given as follow:

(i) In case the book is in the favoured language of the library, the language number can be omitted from the book number. The favoured language is the one in which the library possesses the largest number of books.

(ii) The language number can be omitted from the book number of a volume of a periodical, the assumption being that the class number for a periodical shall include the number of its country of publication, which will normally indicate its language. This will not hold for a country like India, which has more than one language.

(iii) Language number should be omitted from the book number of a book in literature, unless the language of the book differs from the language of the literature—the reason being that the class numbers in the basic subject literature include the number for the language of the literature. A similar convention is applicable to books on linguistics. However, the language number cannot be omitted if the language of the book differs from the language being studied.

(iv) The form number can be omitted in the book number of a book in prose, because prose is the form of exposition in the majority of books.

(v) The year number is a compulsory part of the book; therefore, it cannot be omitted.

132 Examples

<i>Characteristics</i>	<i>Book number</i>
1674AD	K74
1977 AD	N77
1977 Volume 1	N77.1
1977 Volume 2	N77.2
1977 Volume 3	N77.3
1977 Volume 3, Supplement 1	N77.3-1
1977 Copy 1	N77
1977 Copy 2	N77; 1
1977 Copy 3	N77; 2
Evaluation of a pedestrian book published in 1977	N77:g
1977. Second book of the year	N771
1977. Third book of the year	N772
Practical. 1977	v N77
Verse. 1977	w 1N77
Bengali. 1977	157 N77
Bengali. Practical. 1977	157 v N77
Bengali. Verse. 1977	157 w1 N77

Note: In the above examples, class number has been assumed to be C4 Heat. The above book numbers have been prepared according to CC6 book number scheme. English has been taken as a favoured language and prose considered as favoured form of exposition. The digits used, arranged in the ascending sequence according to their absolute values, are: twenty-four Roman capitals omitting I and O; twenty-three Roman smalls omitting i, l and o; the punctuation marks such as dot, hyphen, semicolon and colon; and the ten Indo-Arabic numerals.

133 Scatter of the Different Editions of a Book

Let us assume that the first edition of a book is published in 1957, and the second edition appears in 1965; then, the two book numbers shall be N57 and N65. As a result, the two editions shall get scattered. In order to bring these together, "the numbers of the years of publication of the successive editions may be used as if they were copy numbers" (*Prolegomena*, p. 510). Thus, the first edition will get the book number N57, and the second will get the book number N57; N65.

134 Different Editions of CC

From the first to the third edition, CC provided the form of exposition as a part of the class number. CC must have been influenced by DDC in this regard. But the language of exposition was given under the book number. However, it was in 1950, when the concept of optional facets was accepted, that it was decided to shift isolates belonging to the form of exposition from class number to book number. This was implemented in the 4th edition of CC (1952).

14 Author Number (Dewey)

Melvil Dewey described the construction of the book number through individualization according to the name of author. He favoured "translation systems by which a name is represented by its initials, with remaining letters translated into numbers, e.g. Freeman, F85."¹ The experience shows that alphabets serve a useful purpose in individualizing the book number. But introduction of numerals seems to be difficult to understand. Dewey also described three other methods of constructing book numbers, such as special author tables, time numbers and accession order. He discussed the merits of all these

¹Melvil Dewey, *Dewey decimal classification and relative index*, 18th ed., New York, Forest Press, 1971, vol. 1, p. 94.

four methods. DDC did not develop the book number as an integral part of the scheme of library classification. This becomes clear from the fact that the form of exposition has been provided as a part of the class number itself.

15 Cutter Book Number

C.A. Cutter, in his *Expansive classification*, described a system of book numbers based on individualization by the name of the author. The system is similar to that of Melvil Dewey.

EXAMPLES:

Abbot	Ab2
Aldridge	A12
Beard	B34
Schneider	Sch 57
Smith	Sm51
Swain	Sw1

16 Cutter-Sanborn Three-figure Author Table

Charles Ammi Cutter devised a scheme for book numbers. At present, the most commonly used version of the original by Cutter is entitled *Cutter-Sanborn three-figure author table*,² altered and fitted with three figures by Kate E. Sanborn. It is a popular scheme, used with DDC.

The table consists of three or more initial letters from a surname, or a surname itself and a three-digit number. However, letters such as J, K, E, I, O and U are represented by two-digit numbers. The arrangement is alphabetical, but S and the vowels have been given at the end of the consonants.

A sample from the table is given below:

Bem 455	Chandl
Ben 456	Chandler, M.
Benc 457	Chanl
Bend 458	Chann
Bendo 459	Chant

In the above table the numbers in the centre are applicable to letters in both adjoining columns. In order to apply the table, find the letter group nearest to the surname of the author. Add the initial letter to the same. In case the surname of the author (or part of it) fits between two numbers, then prefer the first number as listed in

²Charles Ammi Cutter, *Cutter-Sanborn three-figure author table*, Swanson-Swift revision, Chicopee Falls, Mass., H R. Hunting, 1969.

the table. To this, a work mark or work letter can be added to get an individualizing call number for each work. The work mark is added after the cutter number.

The book number for *Higher than Himalayas* by James Ben would be B456h.

17 Biscoe Book Number

W.S. Biscoe worked out a scheme of book numbers in 1885. It was called the Biscoe date-table. It is based on individualization by the year of duplication.

The Table worked out by Biscoe is given below:

A	BC	O	1880 to 1889 AD
B	1 to 999 AD	P	1890 to 1899 AD
C	1000 to 1499 AD	Q	1900 to 1909 AD
D	1500 to 1599 AD	R	1910 to 1919 AD
E	1600 to 1699 AD	S	1920 to 1929 AD
F	1700 to 1799 AD	T	1930 to 1939 AD
G	1800 to 1809 AD	U	1940 to 1949 AD
H	1810 to 1819 AD	V	1950 to 1959 AD
I	1820 to 1829 AD	W	1960 to 1969 AD
J	1830 to 1839 AD	X	1970 to 1979 AD
K	1840 to 1849 AD	Y	1980 to 1989 AD
L	1850 to 1859 AD	Z	1990 to 1999 AD
M	1860 to 1869 AD		
N	1870 to 1879 AD		

A Biscoe book number consists of a Roman capital as the first digit, followed by a single-digit numeral. Thus, W9 will represent 1969 AD. Till the twentieth century, the length of the book number will be two-digit, but for years beyond that, the book number will have to be three-digit.

In case there are two or more books published in the same year belonging to the same ultimate class, then a Roman small can be added after two digits. However, it does not have a provision for taking care of additional copies, different volumes of the same book, forming language groups among the books belonging to the same ultimate class, forming separate groups for each of the forms of exposition, and so on.

18 UDC

Characteristics such as language of exposition and form of exposition have been provided as a part of the class number. These should have been given under the book number. Thus, there is a mix up of

book number with class number. Besides, the number of isolates provided are limited in number.

It is suggested that UDC should make provision for the book number along the lines of CC.

2 COLLECTION NUMBER

It is not necessary for a library to arrange all the books in a single sequence, strictly according to class numbers. Shelving is affected by their size and format. It would be a wastage of space if octavo books and pamphlets were to be arranged along with books and pamphlets in folios or quartos. Take the case of oversized books. These should be placed in a separate classified sequence. Similarly, older books may also have to be kept separately. Apart from books, problems are posed by other categories of documents, such as micro-films, gramophone records, micro-cards and so on.

Depending upon the requirements of a library, its documents can be grouped into different collections. Grouping of documents into collections can be done "on the basis of the peculiarities of their gross bodies, or their rarity, or service exigency to facilitate use by readers" (*Prolegomena*, p. 514).

21 Collection by Unusual Gross Body

Modern libraries collect a variety of materials, including those having unusual gross body. Such materials may include film roll; film strip; micro card; micro-film; micro-fiche; ceiling book; gramophone record; speaking books; braille book and so on. Experience shows that all documents having a similar gross body should form a distinct collection, because these cannot be shelved with ordinary books. These collections can be named after the species of documents contained in each. Thus, we can have a film-roll collection; film-strip collection, micro-card collection and so on.

22 Collection by size

Materials such as pamphlets, giant folios and miniature books, due to the nature of size, cannot be kept along with ordinary books. All documents belonging to the same category should form a separate collection. Each collection can be named after the name of species, such as pamphlet collection, miniature book collection and so on. Documents within each collection will be arranged among themselves

by their class numbers.

23 Collection by Rarity

Rare collection is given special attention by a library. It is essential that a separate collection be maintained for such documents under close access. Such material may include rare and costly books, incunabula, manuscripts, books consisting of plates on loaded paper, crumpled and worn-out books (which may have to be preserved due to rarity), rolls and so on. It may be noted that characteristics such as those according to size and those according to rarity can overlap. For instance, a miniature book would be abnormal in size and, at the same time, it may be a rare one. In such a case, collection of miniature books would have to be created as a part of the rare book collection.

24 Collection by Service Exigency

As described earlier, collections may be formed according to unusual gross body, or size. Here, the need would arise due to physical necessity. Very often, a separate collection may be formed to provide prompt service so as to satisfy the laws of library science.

The following are the kinds of collections which may be formed for prompt service;

- (i) Reading-room collection, consisting of ready reference works.
- (ii) Departmental collection in university and college libraries, consisting of documents required frequently.
- (iii) Departmental collection in a special library system, consisting of documents required frequently.
- (iv) Departmental collection in a public library organized on the basis of departments.

Note : A departmental collection may be located in a separate room or building. Take the example of a university; it may have departmental libraries outside the central library. Thus, the departmental collection in physics may be located in the department of physics. In large public libraries, separate rooms are provided for different collections. Thus, there may be separate rooms for art books and for sports books.

(v) Textbook collection in academic libraries, consisting of books prescribed for courses of study.

(vi) Topical collection, consisting of documents of topical interest. During a festival, at the time of a special event, during a course of lectures, and so on, a topical collection may be organized to meet

the topical interest at that time.

25 Kinds of Collections

Ranganathan recognized three kinds of collections; the permanent collection, the quasi-permanent and the temporary collection. Reading-room collections and departmental collections of a public library would be permanent ones. The textbook collections of academic libraries and departmental collections of academic and special libraries are often quasi-permanent in nature. A textbook collection changes with the change in curriculum. By its very nature and purpose, a topical collection is a temporary one. In case of permanent and quasi-permanent collections, separate marks should be given on the spine of the book, and also in the catalogue entries, to facilitate their location. In books belonging to a topical collection, a mark should be put on date label indicating the date on which the collection is to be dismantled.

26 Collection Number

The collection number of a book is a mark, which indicates the collection to which it belongs. It is added to the class number cum book number of a book. It is not required for documents included in all kinds of bibliographies. It is not needed for documents in a national bibliography. It is also not permanent in all cases.

The collection number should be provided in a library catalogue and in the documents possessed by a library. This will be found helpful in the location and replacement of such documents. However, in the case of a main collection and a temporary one, there is no need to add a collection number.

A scheme for collection numbers, based on Ranganathan's, ideas is given below:

Nature of collection

Main collection

Temporary collection

Film strip

Gramophone record

Undersize

Oversize

Collection number

No number

No number (put a mark on the date label indicating the date on which the document should go to its permanent place)

FS

GR

Underline the book number

Overline the book number

<i>Nature of collection</i>	<i>Collection number</i>
Abnormal	Underline and overline the book number
Worn-out book	Encircle book number
Rare book	RB
Reading room	RR
Textbook (physics)	TC } The second digit re-
Textbook (chemistry)	TE } presents the subject,
Textbook (law)	TZ } taken from CC. The examples are illustrative
Physics department	CD } The first digit repre-
Chemistry department	ED } sents the subject, taken
Law department	ZD } from CC. The examples are merely illustrative

It may be added that the collection number scheme is formulated and implemented by maintenance section. This section maintains control through the shelf register.

27 Canon of Collection Number

"A scheme for book classification may be provided with a schedule of collection numbers to individualize the various collections of special documents to be formed on the basis of the peculiarities of their gross bodies, or their rarity, or service exigency to facilitate use by readers" (*Prolegomena*, p. 518). The scheme of the collection numbers based on physical peculiarity can be used in bibliographies also. The collection number is not required in a national bibliography. In a special documentation list brought out by a library for its clientele, the collection number would be found useful.

28 Schemes of Classification

CC appears to be the only scheme which has a specific provision for collection numbers. The scheme adopted by CC6 has been described in chapter 04 of the scheme. It may be pointed out that UDC has provided a few collection numbers under the schedule of common auxiliaries of form. Some of these are given below:

- (024) Books for particular kind of user, irrespective of scope.
- (04) Brochures. Addresses. Theses. Letters. Articles. Reports. Abstracts. Notices.
- (084) Graphic, pictorial representations. Illustrative material.
- (085) Special kinds of documents. Objects as documents.

3 CALL NUMBER

In a close access library, a call number is used by the user to call for a book. Perhaps the term "call number" might have originated from this use. The call number denotes the exact relative position of a document in a library. Each document is placed on the shelf in a position relative to other documents. It may be noted that in early libraries, the position of documents was fixed relative to shelves, that is, a fixed location system was followed. But in modern libraries, the position of a document is decided in relation to other documents. This provides an element of flexibility in arranging documents.

In a scheme like CC, the call number of a book individualizes it. In some of the schemes this may not be true, because more than one book may be allotted the same call number.

The call number generally consists of class number, book number and collection number. According to the canon of distinctiveness, "In a scheme for classification, the class number, the book number, and the collection number, together forming the call number, should be written quite distinct from one another" (*Prolegomena*, p. 520).

31 *Metaphysical Analogy*

According to Ranganathan, we may apply the metaphysical analogy to the universe of documents. We are able to get the following equation:

Book or document in general = Soul + Subtle body + Gross body

32 *Idea Plane*

Soul = thought content

Subtle body = medium of expression embodying the thought

Gross body = physique embodying the expressed thought

33 *Verbal Plane*

Soul = subject

Subtle body = language or other medium and form of exposition

Gross body = material in which the work is embodied

34 *Notational Plane*

Soul = class number

Subtle body = book number

Gross body = sequence number of collection number

Thus, call number = class number + book number + collection number.

It follows that a scheme for library classification should distinguish between three components of a document (namely, class number, book number and collection number), and should make a separate provision for each.

The above description can be illustrated in the form of the following Table 22.1.

TABLE 22.1

<i>Plane/Category</i>	<i>Soul</i>	<i>Subtle body</i>	<i>Gross body</i>
Idea plane	thought content	medium of expression embodying the thought	physique embodying the expressed thought
Verbal plane	subject	language or other medium and form of exposition	material in which the work is embodied, covering nature, size shape of material as physical matter
Notational plane	class number	book number	collection number

35 Functions of a Call Number

A call number performs a variety of functions, as given below:

(i) When a user requests for a document, the call number enables the librarian to locate the document immediately,

(ii) A document on return after use can be put in its proper place, and

(iii) A new document acquired by the library is classified and can be put in its proper place among documents dealing with the same subject. In case the new document is the first one on a given subject, it can be placed near the documents dealing with a related subject.

Class number, book number and collection number are all necessary for arranging documents on shelves, and also in a library catalogue. However, in documentation lists or in a national bibliography, the collection number may be omitted. Even a book number can be dropped, if the documents covered belong to the same language, same form of exposition and same year of publication. That is to say, the class number would be found sufficient. In such a case, entries for documents belonging to the same ultimate class can be arranged alphabetically by the heading (which may be the author, editor, compiler or title, and so on).

36 Method of Separation of Components

The components of a call number can be written either horizontally or vertically. When it is written horizontally (say on the date label or in the entries of the library catalogue), then sufficient space should be left between each component. CC (edition 6) has suggested that a double space should separate the book number from the class number. The collection number may be written above the book number.

EXAMPLE:

LD

L2 113N57

While writing the components of the call number vertically, the collection number should be placed at the top, followed by the class number and book number, which should be placed at the end.

EXAMPLE:

LD

L2

113N57

4 CONCLUSION

The call number consists of three parts: class number, book number and collection number. The class number is that part of the call number which is essential in all cases. The book number can be omitted under certain conditions. However, the collection number is required in fewer cases, and is necessary only in a library catalogue or in libraries. It is because of the above reasons that many of the schemes of classification do not provide for the book number and the collection number. The collection number has been practically neglected by all the schemes, except *Colon classification*.

FURTHER READINGS

- S.R. RANGANATHAN *Prolegomena to library classification*, 3d ed., Bombay, Asia Publishing House, 1967, parts U and V.
BOHDAN S. WYNAR, *Introduction to cataloging and classification*, 5th ed., Littleton, Colo., Libraries Unlimited, 1976, pp. 277-280.

Chapter 23

GENERAL VERSUS SPECIAL CLASSIFICATION

0 DEFINITIONS

The general classification scheme is one which is designed to cover all the subjects in the universe of subjects.

The special classification scheme is the one designed to cover the subjects going with a specific basic class or any other host class. The field of specialization may be any one of the following: astronomy, astrophysics, microbiology, forestry, Indian constitution, Indian democracy, Indian philosophy, international relations, English poetry, plant anatomy, human nervous system, political thought, and so on. A scheme may be designed to cover any one such field of specialization. Such a scheme may be called a special classification scheme. The field of specialization may be referred to as a host class.

1 REASONS FOR MAKING A SPECIAL CLASSIFICATION

There are many reasons claimed for making a special classification. Some of these reasons are:

(i) Lack of coextensiveness: most general schemes do not provide enough details required for dealing with micro-documents in documentation.

(ii) Lengthy class numbers: most general schemes provide lengthy class numbers for complex subjects to be dealt with.

(iii) Special requirements or special point of view: general schemes are designed to take into consideration the majority point of view. Therefore, these are not able to fully meet the special requirements of a particular special library or information centre.

(iv) Lack of flexibility (provision for new subjects without disturbance of the preferred sequence): very often, general schemes lack flexibility to a certain extent.

(v) Lack of helpful sequence: very often, a general scheme may not be able to achieve optimum helpfulness in the arrangement of documents or entries.

2 THREE APPROACHES TO SPECIAL CLASSIFICATION

Broadly speaking, we may identify three different approaches to special classification schemes. These are given below:

(i) We may prepare a fully autonomous special classification. Such a scheme may be independent of any general scheme.

(ii) The special classification scheme may be prepared so that it is autonomous for special subject(s), and dependent upon general classification for allied subjects. Such a scheme is not fully autonomous.

(iii) The special classification scheme may be designed in such a way that it is dependent upon a general classification. It may be an extension of the general scheme. Such an approach may be called the do-all classification approach.

3 FULLY AUTONOMOUS SPECIAL SCHEME

There are some people who favour autonomous special schemes which are independent of any general scheme. According to Dobrowalski, "Experience shows that, among documentation centres, those which function best have a classification specially devised for their use, independent of encyclopaedic classifications, which we will call an "autonomous classification." A special autonomous classification is better adapted to the documentation collected by the centre, and to the functions which classification must provide in documentary tasks."¹ He also believes that 200 to 300 special autonomous classifications can be provided for special disciplines distinguished by reasonably well-defined characteristics. He rightly claims that such schemes would provide a superior helpful order within a given field of specialization.

¹Zygmunt Dobrowalski, "Analysis of classification systems" in International Study Conference (Elsinore) (1965), *Proceedings*, Copenhagen, Munksgaard, 1965, p. 66.

4 NOT FULLY AUTONOMOUS SPECIAL SCHEME

A special classification scheme may be prepared so that it is autonomous for special subject(s) and dependent upon general classification for allied subjects. Such a scheme is not a fully autonomous special scheme.

This approach takes advantage of general classification for allied subjects. This would lead to some saving in the efforts of a classificationist, as well as a classifier. A classificationist need not worry about allied subjects because these will be taken care of by the general scheme. As and when changes take place in the universe of subjects, a good general scheme would try to incorporate those changes as far as feasible within the framework of the scheme. However, it is desirable that the species of notation used for a first-order array, in a not fully autonomous special scheme and general scheme, should be different, or a symbol may be used to distinguish between the call numbers prepared according to the two schemes for classification.

5 DO-ALL CLASSIFICATION

According to Ranganathan,² a special scheme may be designed in such a way that it is dependent on a general scheme. As such, it will become an extension of the general scheme. Ranganathan was of the view that we should have a do-all classification, which can meet all the requirements of special classification in different subjects irrespective of their extension as well as depth of intension.

A do-all classification needs to be developed. It should be a freely-faceted scheme for classification, based on a dynamic theory of library classification worked out by Ranganathan and his school of thought. Such a scheme should be designed so that it becomes possible to develop any region of such a scheme to any desired depth to meet the actual as well as anticipated requirements of documents.

Colon classification is being developed as a do-all classification. A large number of depth schedules have been produced for different fields of specialization as an extension of the general scheme.

²S.R. Ranganathan, "General and special classification," *op cit*, p. 89.

51 Advantages

A freely-faceted scheme for classification can be developed as a do-all classification. Then special classification can be designed as an extension of such a scheme. A do-all classification scheme can have the following advantages:

(i) If such a scheme is developed at various points or regions to serve the requirements of documentation, then it should be possible to provide coextensive class numbers.

(ii) According to Ranganathan, the class number of a special subject of interest can be replaced by the hyphen (-) or the zero (0). The ordinal value of such a digit can be fixed, so that the first position can be secured for documents in the special subject and its subdivisions. As a result, the length of the class number will also become short.

(iii) It is not fully correct to accept the assumption that a general classification is not able to serve the special requirements or special point of view. There are devices made available in different schemes of classification, which can be adapted for the purpose. A do-all classification of the freely-faceted type should be able to serve special requirements in a satisfactory manner. Some of the suggestions in this regard are stated below:

Needs of area specialists can be met with the help of subject entries in the catalogue. Behind the area card, main entries on that area may be arranged (*i.e.*, classified pocket may be created in an alphabetical sequence). These cards may be placed separately, or with the alphabetical index, or a favoured collection can be formed in a specialist library, for the areas of specialization as well as the catalogue may bring materials together, area-wise, to serve the special requirements.

(iv) By its very nature, a freely-faceted scheme is likely to have a good provision for incorporating new subjects in its proper places without disturbing the helpful sequence.

(v) We know that the majority of specialists specialize in specific subjects. A general classification always attempts to bring material on a specific subject and its subdivisions together at one place. Of course, it is true that a general scheme may not always be able to offer optimum helpfulness in the arrangement of documents or entries.

(i.) In case fully autonomous special schemes are prepared to meet local requirements or conditions, it would prove to be too costly and time-consuming. Revisions of such schemes to keep these up-to date

would prove to be a very difficult job. If a do-all classification is employed, then much effort can be saved because the same common isolates, normative principles, notation, notational techniques and so on can be used. Here, once the guidelines have been developed, these can be used for different special schemes.

Designing a special scheme is not easy. Not everybody is capable of undertaking such an assignment. If somebody undertakes such a job, he would have to take many decisions on his own, unlike in the do-all classification.

(vii) Use of the do-all classification can take us further towards standardization and cooperation.

(viii) In the do-all classification, it is easy enough for a user to shift from general classification to depth classification, because of the same scheme.

(ix) Coding for machine retrieval would be less costly for the do-all classification. In case of fully autonomous schemes, as many codes would be needed as the special schemes used.

From the above, it should be clear that the "do-all" classification approach is the best one. If such an approach is achieved with the help of a freely-faceted scheme for classification, guided by a dynamic theory of library classification, then the result would be highly satisfactory. However, the foundations of the existing general schemes of classification are weak enough. In most of them, it is not always possible to have further expansion without disturbing the existing classes. Some of them do not individualize each class number, thus leading to a lack of coextensiveness.

6 CONCLUSION

At present, we need a "do-all" classification, which should be able to provide enough details required for documentation, make provision for incorporating new subjects in their proper places without disturbing the preferred helpful sequence, and should not be complicated in its use. *Colon classification* is making an attempt towards this direction. As no fully satisfactory "do-all" classification scheme is available, autonomous schemes will continue to be designed till we are able to achieve one.

FURTHER READINGS

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Chapter 24

HISTORY OF LIBRARY CLASSIFICATION

0 INTRODUCTION

The history of classification is mainly the history of attempts towards the organization of human thoughts. For four to five thousand years, philosophers have been interested in the classification of ideas, that is, knowledge classification. The early philosophers were the first to study the problems of classification of knowledge. Each school of philosophers made an attempt to provide a philosophical system of knowledge of its own. The approach of the philosophers was to group ideas according to their degree of mutual relationship. Further they also arranged these groups in a helpful sequence, as preferred by each. Some of these early schemes of knowledge classification are available even today. It may be added that the interest of philosophers in knowledge classification was theoretical in nature, and also largely speculative.

The history of human thought can be divided into a series of cultural epochs. It has been found that each new epoch needs a new scheme of classification, because "an organization of knowledge which fits the philosophical temper of Greeks does not suit the mythological cosmologies of Babylon, the rushing life of the Renaissance, or the industrial 19th century. Indeed, the better fitted a classification is to a given epoch, the less suitable will it be for any other epoch."¹ That is why such a large number of schemes of knowledge classification were produced during different epochs of history, and in various cultural groups. Each scheme represented the state of the universe of knowledge of that period. The scheme of a given period was based on what was known, and on the trends in the developments at that time.

¹B.C. Vickery, *Classification and indexing in science*, 2nd ed., London, Butterworths Scientific Publications, 1959, p. 158.

1 LANDMARKS IN KNOWLEDGE CLASSIFICATION

As pointed out earlier, the philosophers were greatly interested in studying the mutual relations between ideas, and also the sequence of ideas. This led to a large number of schemes of knowledge classification. These were mainly prepared for their mental satisfaction, without keeping in view their application for the arrangement of documents in a helpful sequence to serve the requirements of the users. Of course, some of the philosophers must have been interested in arranging broad subjects in a helpful sequence, but they did not provide enough detail to serve the purpose of libraries.

A number of schemes of knowledge classification were produced, which did not make an attempt to place the application of a discipline after the discipline on which it might have been based. Such schemes² appeared mostly before the nineteenth century. A study of the schemes shows that these had Aristotelian influence, used the subjective approach, where grouping was often meaningless, and followed dichotomy and trichotomy. Some of these leading schemes were:

Vedic classification of India (Vedic period) (socio-centered)

Greek classification (utility-centered)

Scholastic classification of Mediaeval Europe (university-centred)

Baconian classification (1605) (psychology-centred)

Kant's classification (1781) (based on primitive human instinct)

Hegel's classification (1812) (influenced by Greek triad)

A number of schemes of knowledge classification were formulated, mostly during the nineteenth century, which made an attempt to provide place for the application of each discipline after the discipline which forms its basis or foundation. Thus, a pure discipline was put before its application. Of these various schemes, Hobbes's classification was formulated in 1651. Some of these leading schemes were :

Hobbes's classification (1651)

Comte's classification (1830) (serial classification)

Ampere's classification (1834-1843) (serial classification)

Spencer's classification (1864) (serial classification)

11 Vedic Classification

The earliest of the known schemes of knowledge classification is the

²The description of the history of schemes of classification as provided here, is based on Ranganathan's *Prolegomena to library classification*, 2nd ed., London, the Library Association, 1957, part 7.

Vedic one. This scheme is implied in the *Upanishads*. It divided the universe of ideas into four groups, called *dharma*, *artha*, *kama* and *moksha*. These terms correspond to the four fundamental values. It is considered that any universe, including the universe of ideas, can be grouped in the first order array on the basis of these four fundamental values. The sequence of these groups corresponds to the four different stages through which an individual or a society passes. Thus, Vedic classification is socio-centred.

Dharma is supposed to include those subjects, which are concerned with the maintenance of human society as an organized one. These subjects correspond to modern subjects of law, theology, ethics and sociology.

Artha includes those subjects which are concerned with social well-being. These subjects correspond to the modern subjects of history, political science, economics and the applied sciences.

Kama includes those subjects which arise "out of the fulfilment of the involuntary creative urge in man, and/or for the enjoyment of the result of such creation. A work of this group has generally an elevating effect on its readers."³ These subjects correspond to the modern subjects of literature, fine arts and the pure sciences.

Moksha includes those subjects which involve individualism par excellence. These subjects are necessary, so that subjects in other groups can be enriched and raised to a higher level, whereby they are able to meet social requirements. That is why *moksha* includes subjects such as philosophy and spiritual experience. Philosophy enables us to achieve an understanding of the universe by means of the intellect. This leads us to overcome the troubles of life. As a result, one is able to acquire peace of mind. Spiritual experience assists one, with the help of intuition, to apprehend the universe in its totality. This leads one to a state of bliss.

12 Greek Classification

Greek classification is said to have developed from the time of Plato. Plato's scheme constituted logic, physics and ethics. However, the scheme of knowledge classification put forward by Aristotle is regarded as a representative of the Greek schemes. He divided knowledge into three groups, such as theoretical philosophy, practical philosophy and productive arts. The first aimed at knowledge for its own sake. The second aimed at knowledge as a guide to conduct, and the third aimed at knowledge used in making useful or beautiful subjects.

The subjects included in theoretical philosophy are logic, metaphy-

sics, mathematics and physics. Practical philosophy covered ethics, political science and economics. Productive arts consisted of applied science, including useful arts. This grouping shows that this scheme was utility-centred.

For about two thousand years, the schemes of knowledge classification mainly adopted the pattern put down by Aristotle.

13 Scholastic Classification

Scholastic classification of Mediaeval Europe is said to have taken shape after Greek classification. Scholastic classification is the scheme of knowledge classification based upon the practices and traditions prevailing in the mediaeval universities of Europe. This scheme was thus university-centred.

This scheme divided the universe of ideas into three groups, namely, trivium, quadrivium and the third group. In trivium, the dominant subjects were linguistics, dialectics and rhetoric. The dominant subjects in quadrivium were arithmetic, geometry, astronomy and music. The dominant subjects in the third group were theology, metaphysics and ethics.

14 Baconian Classification

Francies Bacon (1561-1626) examined the universe of ideas as it existed at that time. On the basis of his study, he produced a new scheme of knowledge classification. This scheme appeared in his *Advancement of knowledge* (1605), and is considered to be psychology-centred. It seems that trivium and quadrivium influenced Bacon, but the influence is not very apparent.

In his scheme, he divided the universe of ideas into three successive groups, namely history (emanation from memory), poesy (emanation from imagination), and philosophy (emanation from reason).

In history, the dominant subjects were geography and history. The dominant subjects included in poesy were fine arts and literature. Philosophy included the rest of the subjects.

Baconian classification influenced, directly or indirectly the later schemes over a long period of time. We can notice the influence of this classification on the array of main classes of DDC, as well as that of UDC. Both these schemes follow the system known as the inverted Baconian system. The relationship between DDC and Baconian classification is clear from the Table 24.1.

³Genesh Bhattacharyya and S.R. Ranganathan, "From knowledge classification to library classification," in J.A. Wojciechowski, ed., *Conceptual basis of the classification of knowledge*, Munchen, Verlag Documentation, 1974, p. 121.

Classificationists from Francis Bacon onwards attempted to find a new rational system so as to replace the one by Aristotle. They made use of traditional fields of study in existence at that time, as the basis for their scheme. They made an attempt to achieve a rational grouping of the disciplines.

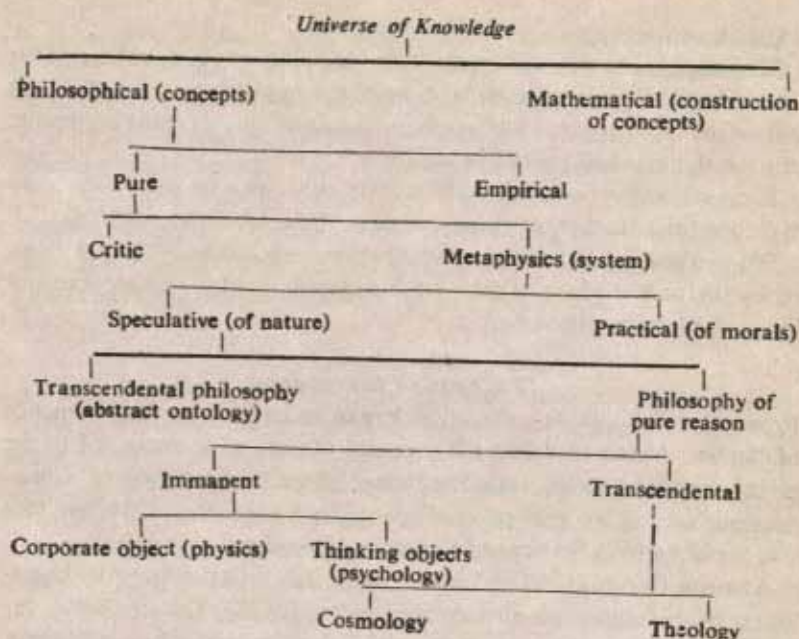
TABLE 24.1

	<i>Bacon's outline (1605)</i>		<i>Harris's outline (1870)</i>	<i>Dewey's outline (1876)</i>
Mental Faculties	Emanations	Inverted order		
Memory	History Natural Civil	Philosophy	Science Philosophy Religion Social and political science Natural sciences and useful arts	General works Philosophy Religion Sociology Philology Science Useful arts
Imagination	Poesy Narrative Dramatic Parabolic	Poesy (that is, art of poetry)	Art Fine arts Poetry Pure fiction Literary miscellany	Fine arts Literature
Reason	Philosophy Divine Natural Human Theology	History	History Geography and travel Civil History Biography Appendix Miscellaneous	History Biography Geography and travel

15 Kant's Classification

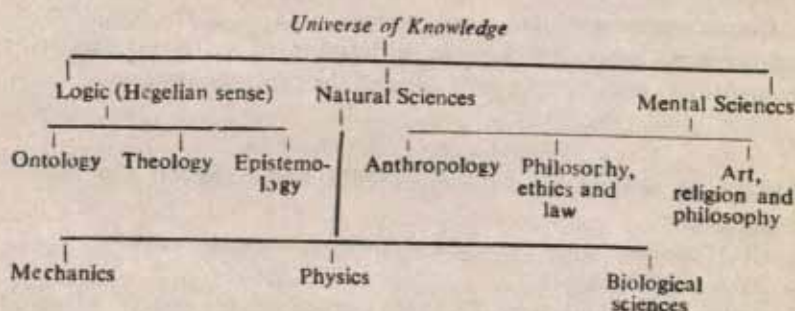
Immanuel Kant (1724-1804), in his *Critique of pure reason* (1781) has described his dichotomic scheme of knowledge classification. This is based on the approach that a given universe of entities can always be divided into two groups on the basis of primitive human instinct. According to this instinct, we can say about anything that either "this is A," or "this is not A."

The scheme of Kant's classification is given as follows:



16 Hegel's Classification

George Wilhelm Friedrich Hegel (1770-1831) described the triadic scheme of knowledge classification in his *Logic* (1812). This scheme seems to have been influenced by the Greek triad. The scheme is given as follows:



17 Hobbes's Classification

Thomas Hobbes (1588-1679), described his scheme of knowledge classification in his *Leviathan* (1651). He divided knowledge into the following two groups:

- (i) Mechanics, engineering, architecture, navigation, and

(ii) Acoustics, music.

His approach was different from the other philosophers of his time. He put a pure discipline before its application. He did not follow the socio-centred approach, or the university-centred approach, or even the psychology-centred approach.

Each successive step should include either two or only two subdivisions (dichotomy), or three and only three subdivisions (triad).

His method of knowledge classification seems to have been followed by the philosophers of the 19th century onwards, who worked out his method in greater detail.

18 Comte's Classification

From the 19th century, attention began to be paid to the sequence of classes. About this time the pressure of natural sciences led to the giving up of the socio-centred sequence of the Vedic system of classification, as well as the psychology-centred sequence of Bacon. This was replaced by a concept of the serial dependence of subjects.

Auguste Comte (1798-1857) put forth his serial system of knowledge in his *Cours de philosophie positive* (1830). He arranged the subjects in the sequence of mathematics, astronomy, physics, chemistry, biology and social physics. Comte claimed that in this sequence, each subject is virtually an application of the preceding one. In other words, each of these main classes are such that they are dependent for their development upon the use made of the preceding one. Such a system of knowledge classification has been referred to as a serial classification.

Comte's scheme started a controversy regarding the question of dependence. After this scheme, a number of serial systems were brought out, each finding fault with all the previous systems.

191 Ampere's Classification

Thomas Hobbes, in his *Leviathan* (1651), had suggested the following sequence:

- (i) Mechanics, engineering, architecture, navigation, and
- (ii) Acoustics, music.

Andre Marie Ampere (1775-1836) worked out his system of serial classification in his *Essai sur philosophie...* (1834-43) as given below:

Physics, engineering; geology, mining; botany, agriculture; zoology, animal husbandry, medicine.

Ampere's system was more thorough than the previous systems.

Here, applied sciences have been placed next to the fundamental sciences on which these are essentially dependent. As compared with Hobbes's system, Ampere interpolated the useful arts and applied sciences next to the fundamental disciplines on which they were considered to be dependent. It is interesting to note that Ranganathan's *Colon classification* follows the same sequence as that proposed by Ampere. Therefore, it should not be surprising that Ampere's classification is considered as the best serial scheme produced by philosophers of the nineteenth century.

192 *Spencer's Classification*

Herbert Spencer (1820-1903) formulated another serial scheme, which was described in his *Classification of sciences* (1864). His sequence of subjects is given below:

Logic, mathematics, mechanics, physics, chemistry, astronomy, geology, biology, psychology, and sociology.

Ampere's classification is considered more helpful than that of Spence's classification. But Herbert Spencer is regarded as the first philosopher who made an attempt to put forward a theory of knowledge classification, which could provide guidelines with regard to the designing of a scheme of knowledge classification.

2 LANDMARKS IN LIBRARY CLASSIFICATION

The schemes of classification prepared by philosophers were based on speculative and theoretical considerations. These schemes were also broad, and did not provide enough detail. They were not meant for the arrangement of documents on a shelf in a helpful sequence.

The schemes of library classification formulated during the last one hundred years have been designed to arrange the documents on a shelf in a helpful sequence. Certain schemes have been worked out in great detail, so that even micro-documents can be classified to achieve class numbers coextensive with the specific subject of the documents being classified. In addition, these have provided individualizing ordinal numbers for the mechanization of the preferred sequence of documents on the shelf. As schemes of library classification are meant for the classification of documents, these are concerned with the subjects which have been, or shall be, the matter of documents. On the other hand, schemes of knowledge classification deal with ideas.

The important feature of twentieth century library classification schemes has been their empiricism. Theory was neglected too long in the past. But it has gained importance during recent times. A major development of the twentieth century has been the analytico-synthetic approach to classification. The credit for this should go to S.R. Ranganathan.

In order to meet the growing demands of the universe of subjects, different species of library classification have been prepared to meet the requirements in different periods of history. This has led from enumerative schemes to freely-faceted versions. This has been a process of evolution, which has undergone various stages of development, such as:

Purely enumerative classification scheme (e.g., Rider's *International classification*, LC). It may be noted that RIC came out much later than LC.

Almost enumerative classification scheme (e.g., DDC, Brown's *Subject classification*).

Almost faceted classification scheme (e.g., UDC, BC1)

Fully but rigidly-faceted classification scheme (CC1, CC2, CC3).

Almost freely-faceted classification scheme (e.g., CC4, CC5, CC6)

Freely faceted scheme (CC7)

From the middle of the sixteenth century to the middle of the nineteenth century, the decimal integer notation was used. This served the purpose. The Brunet scheme (1809) was one such scheme based on the decimal integer notation. It had a provision for 10^4 classes, which was able to meet the requirements. In 1876, when the first edition of DDC came out, it adopted the decimal fraction notation and used the relative location system.

Expansive classification (1893) was an enumerative classification, but it used the mixed decimal fraction notation, which gave it a broad base. UDC started coming out in parts from 1899. It is an almost faceted scheme. The subject schedules of *Library of Congress classification* have been published since 1901. J.D. Brown's *Subject classification* (1906) is an enumerative scheme. The first edition of Ranganathan's *Colon Classification* appeared in 1933. It broke new ground, providing for a faceted approach. The first edition of *Bibliographic classification* appeared in 1935. Till this time, the schemes had been formulated without the aid of an objectively stated theory of library classification. This was due, perhaps, to the fact that by that time, the pressure of the universe of subjects was not enough to warrant basing the schemes on a fully developed theory of library

classification. A static theory was found good enough to meet the challenge. Such a theory was more or less descriptive of the practices followed by the different schemes of classification existing then.

As the universe of subjects became increasingly dynamic, and proliferation began to take place in an unanticipated manner, it began to be felt that there was a need to prepare freely-faceted schemes of library classification based on a truly dynamic theory of library classification. A fairly dynamic theory was described in the third edition (1967) of Ranganathan's *Prolegomena to library classification*. The seventh edition of CC is being based on this dynamic theory. This will possibly result in a freely-faceted scheme for library classification.

21 Brunet Scheme

The Brunet scheme had much influence, and was used widely. A scheme was used by Paris booksellers and French bibliographers since the seventh century. J.C. Brunet revised the same and published it in his *Manuel du libraire et de l'amateur des livres* (1809).

The scheme of classification used by Bibliotheque Nationale (Paris) is based on Brunet's classification, Brunet's scheme also influenced the classification system in the British Museum Library. The scheme by Brunet was in heavy use in France, especially for the arrangement of bibliographies, booksellers' stocks and private collections. The scheme has many limitations. It had a provisions for 10⁴ classes. The notation is mixed, but combersome as well as obsolete. Many of the subjects which are today regarded as full classes have been placed under appendices. Further, it has no index, and is of more or less historical interest today.

22 DDC

Melvil Dewey is the author of *Dewey decimal classification*. The word "decimal" has been in use from the middle of the sixteenth century to the middle of the nineteenth century, and stood for the use of the integral number expressed through the scale of ten. But Dewey used the pure decimal fraction notation. In 1876, DDC was published under the title *A classification and subject index*. . . The 19th edition was published in 1979. Before the DDC came out, libraries used the fixed location for materials. Each document was assigned to a certain location fixed for a given subject. Very often, the shelves were numbered and each document was allotted a specific location on a particular point on the shelf. DDC adopted the relative location system. It uses simple and easy-to-understand notation. The notation

is pure decimal fraction one.

DDC continues to be used by many libraries all over the world. It is being revised continuously, and used for a variety of purposes such as shelf arrangement, arrangement of bibliographies, arrangement of entries in a catalogue, arrangement of private papers, and so on.

23 *Expansive Classification*

Charles Ammi Cutter is the author of *Expansive classification*. This scheme was developed in seven expansions. All six expansions were published in one volume in 1893. The seventh expansion was started later and continued till 1903. The same was published in instalments in the form of folded sheets.

This is an enumerative classification. There is no provision for facet and phase analyses. Little provision exists for auxiliary tables. It uses the mixed decimal fraction notation, using Roman capitals for main classes and Arabic numerals for later arrays. Sometimes, the Roman small letters are allotted for later arrays. The terminology is precise and uses the canon of context.

24 *UDC*

In 1895, following the first International Conference on Bibliography, the newly founded Institut International de Bibliographie (IIB) sponsored a scheme initiated by two Belgians, Paul Otlet (an advocate) and Henri La Fontaine (a senator). By an arrangement with Melvil Dewey, who had just published the fifth edition of DDC (1894), the IIB began expanding the schedules in parts, and in 1905 published the first complete international edition in French entitled *Manuel du Répertoire bibliographique universel*. At present, a variety of editions in different languages are available at a variety of levels. FID is the body which has overall responsibility for UDC.

UDC is used by a large number of libraries around the world. It is used far more than CC or BC, or even LC. There was a time when it appeared that UDC had an uncertain future. But during recent years, certain developments have taken place which have led to some optimism. It has been decided to revise the outline over the period of the next few years, but the process of revision has proved to be too slow.

25 *LC*

The outline of the Library of Congress Classification was determined in 1901, but the scheme took nearly forty years to reach somewhere

near approximate completion. The scheme consists of a series of special classifications, each special classification covering a major class. Each class has been devised by subject specialists on the library staff. The subject schedules have been published by the US Printing Office since 1901. The revisions are made when necessary. Some schedules are already in their fifth edition, and some which are still in the process of development.

The outline of LC closely resembles that of C.A. Cutter's *Expansive classification*, but the scheme was tailor-made for the collections of the Library of Congress.

LC is backed by the full resources of great national libraries of USA. It has good prospects.

26 Subject Classification

James Duff Brown was the author of *Subject classification*. In 1894, Brown presented a new scheme of classification (called the Quinn-Brown classification), formulated jointly with John Henry Quinn before the Library Association (Great Britain). It proved to be inadequate, and an expanded scheme was published by Brown in 1897 under the title *Adjustable classification*. An entirely new scheme was brought out in 1906, under the title *Subject classification*. The second edition of the same appeared in 1914. The third edition came out in 1939.

SC is an enumerative scheme.

SC used mixed notation, using Roman capitals for the first array and Arabic numerals for latter arrays. Very little provision exists for the facet and phase analyses. One auxiliary schedule, called the categorical table, has been provided; this allows for the application of scheduled mnemonics.

SC is the only English general scheme. This scheme was at one time used by quite a large number of libraries in UK. Due to non-revision of the scheme, inadequacies appeared in it, and also because of the use of DDC by the *British National Bibliography*, the scheme is past its heyday. Today, it is of interest mainly because of the theory underlying the scheme.

27 CC

S.R. Ranganathan brought out the first edition of *Colon classification* in 1933. Subsequent editions appeared in 1939 (2nd), 1950 (3rd), 1952 (4th), 1957 (5th) and 1960 (6th). The sixth edition was reprinted, along with an annexure, in 1963. The seventh is being brought out in

parts. The scheme has been adopted by a large number of libraries in India. However, there are very few examples of libraries using it outside the country. It is an astounding tribute to the author, that with comparatively a few libraries (compared to the use of DDC and UDC) adopting his scheme, he has succeeded in dominating the current theory of library classification. CC has proved to be an influential scheme, in the sense that the ideas which form its basis have proved to be revolutionary. Some of these important ideas are: facet analysis, phase analysis, zone analysis, canons of classification, concepts of rounds and levels, empty and emptying digits.

28 BC

Henry Evelyn Bliss was the author of *Bibliographic classification*. The scheme was first conceived in 1908. An outline of the scheme was published in the *Library Journal* in 1910. A condensed version (in extended outline) was published in 1935 under *System of bibliographic classification*. Later it appeared in full between 1940 and 1953. The second edition has been planned in 20 volumes. The individual volumes started appearing from 1977 onwards. This edition is appearing under the title *Bliss bibliographic classification*, and has been prepared by J. Mills and Vanda Broughton with the assistance of Valerie Lang. The revision seems to be promising. It has been revised, keeping in view that it may be applied broadly for shelving and precisely for information retrieval.

3 CONCLUSION

"In classifying this knowledge, the old subjective modes of division have been increasingly—though not yet entirely—abandoned. . . . The restriction of classification to the traditional tree of knowledge has given way to the recognition of categories which introduce relations other than generic. The field of knowledge is multidimensional, terms and concepts are multiply connected."⁴

In early times, libraries were meant for the chosen few, many of whom were scholars. The number of books was few; as a result, each scholar was his own bibliographer as well as librarian. The number of subjects was limited and new subjects appeared after a long interval of time. Therefore, library classification was a simple process.

⁴B.C. Vickery, *op. cit.*, p. 187.

A purely enumerative classification scheme was able to serve the requirements regarding the shelf arrangement of documents.

At present, the number of micro- and macro-documents is large; the number of subjects is also large, and the subjects exist in varied relationships. New subjects are appearing constantly. This is because the universe of subjects has become increasingly dynamic. This would require a freely-faceted scheme for library classification to be able to face the onslaught of the universe of subjects.

A study of the history of classification indicates that a given scheme can best be suited to meet the onslaught of the universe of subjects at that time, and not later. The universe of subjects has become increasingly dynamic, so that for a scheme to be successful, it must be based on a dynamic theory of library classification, as well as be revised constantly to keep pace with growing knowledge. Present-day schemes also have to deal with an increasing amount of detail.

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Chapter 25

COMPARISON OF MAJOR SCHEMES OF CLASSIFICATION

0 NEED FOR COMPARISON

Generally speaking, DDC, UDC, LC, CC and BC are considered as the major general classification schemes. A comparative study of these schemes would enable one to determine their strengths and weaknesses, which would help in acquiring a proper perspective. In this chapter, a comparison of the schemes has been made on the basis of a set of criteria.

1 LIBRARY-BIBLIOGRAPHICAL CLASSIFICATION

Mention may be made of another general scheme called the Library bibliographical classification (in Russian, the abbreviated name is BBK). It is compiled and published at the Lenin Library (Moscow). The complete edition is in thirty volumes (1960-68). Besides that, an abridged edition (1970-75) composed of six volumes as well as another one-volume edition are also available. Thus, keeping in view the requirements of large, medium and small libraries, different editions have been brought out. The first language is Russian and it has also been translated into German.

BBK is based on the "principles of Marxism-Leninism." The complete edition consists of 45,000 classes, 4,400 special auxiliaries, and 2,400 general and geographical subdivisions.¹ Letters of Cyrillic alphabets are used for disciplines. However, decimal numbers have been allocated for the subdivisions of disciplines. The notational system consists of:

¹Ingetraut Dahlberg, "Major developments in classification," in *Advances in Librarianship*, vol. 7, 1977, p. 66.

TABLE 25.1
2 COMARISON OF SCHEMES

	DDC	UDC	LC	CC	BC
Year of first issue	1876	1905 (first complete international edition in French was published in 1905. However, UDC was originally issued in 35 parts under the title <i>Classification bibliographique decimale</i> from 1899 to 1905).	1901 (separate sections have been published since 1901).	1933	An outline of the scheme was published in 1910. Condensed version (in extended outline) was published in 1935. Complete version appeared between 1940 and 1953.
First language Available editions	English	French/German	English	English	English
	The latest edition is 19th edition (1979) (full edition) and 11th edition (1979) (abridged edition). The full 19th edition is in three volumes.	Available in full editions, abridged editions, medium editions, editions of special parts, selection or excerpt editions in various languages, 3rd edition (revised 1961) is the latest abridged English edition of UDC. Full editions consist of fascicules.	J.P. Immroth has listed 84 physical volumes of schedules, covering revisions, together with available indexes. The scheme consists of 31 volumes covering 21 main classes.	The latest edition is sixth edition (1960). It was reprinted with amendments in 1963. CC7 is on the way, a few schedules have already appeared in <i>Library Science</i> .	The new edition is being published part by part since 1977. Abridged edition is also available.

Two law schedules K (Law, General) and KE (Law of Canada) were completed in 1976. Tables are being developed for Latin American law (KG-KHV) and German Law (KKC). Work has been started on French law (KKJ). There is no abridged edition.

Species of classification for subjects	Almost enumerative scheme for classification.	Almost-faceted scheme for classification.	Enumerative scheme for classification.	First to third editions but rigidly faceted schemes for classification.	Fourth to sixth editions (including reprint of 6th edition) were almost freely-faceted schemes. Seventh edition is going to be a freely faceted one.
Species of classification for subjects	Almost enumerative scheme for classification. DDC 19 has made greater effort than earlier editions towards faceted approach. Thus it is moving towards becoming almost faceted scheme.	Almost-faceted scheme for classification.	Enumerative scheme for classification.	First to third editions but rigidly faceted schemes for classification.	Fourth to sixth editions (including reprint of 6th edition) were almost freely-faceted schemes. Seventh edition is going to be a freely faceted one.

BC1 is an almost faceted scheme for classification because Bliss failed to appreciate the need for strict classification. However, in BC2, an attempt has been made to make it a faceted classification.

DDC

UDC

LC

CC

BC

DDC largely provides schedules of compound classes, a few schedules of compound classes, isolates and special isolates that is, largely gives ready-made class numbers.

UDC provides a schedule of compound classes. In addition to a few schedules of compound classes, isolates and special isolates have also been given.

LC provides mostly schedules of compound classes.

CC provides a short schedule of basic classes as well as isolates for each facet in different basic classes plus common isolates. There-fore the class numbers have to be constructed to be constructed as these are not readymade ones.

Theory

It is guided by implicit principles but some general principles have been given in the introduction to the scheme.

It is guided by implicit principles leading to many subjective decisions, instead of objective ones based on explicitly stated principles. Some of the general principles have been stated in the introduction to the abridged edition.

It lacks a sound theory. It has been tailor-made for the vast collection of the Library of Congress. It is based on the literary warrant available in the library, which it is primarily supposed to serve. It aims to create convenient

Theoretical principles, on which BC is based, have been explained in his *Organization of knowledge*. These have also been provided in the introduction to BC1 and BC2.

The scheme is

sequences of groups based on a of books rather than sound theory groups of subjects. The seventh edition of CC is Thus, knowledge in being published books is given prime importance. It also which will con- takes into considera- form to Ranga- tion the use of books nathan's theory in the Library of far more than Congress. did the previous editions.

It consists of BC2 consists of schedu- les of common isolates, called auxiliary schedu- les, and schedules for different classes. Each common isolates of class has its own index. In BC2, an attempt has been made to avoid listing compound sub- jects as far as feasible within the framework.

It consists of aseries of special classifica- tions. Each major class has been pub- lished separately, and is to be consi- dered almost inde- pendent of other classes. Each class has its own form with respective basic subjects, divisions, as well as an index.

The following is The list of classes, a list of selected taken from BC2, is basic subjects given below:

2/3 Generalia
4/9 Phenomena

The abridged edition consists of main tables, several auxi- liary tables and an index. Tables of auxiliaries include distinctive schedules of com- mon isolates. Main tables also contain a few schedules of special isolates. These special isolates are found mixed with different kinds of isolates. The full edition has been developed and geographical divisions, as well as an index.

The field of know- ledge has been divi- ded into 20 classes, with an additional class for general a Generalia

Parts of the Scheme

DDC consists of auxiliary tables, classi- fication sche- dules and an index. The classification enu- merate subjects but most of them are com- pound subjects, along similar lines.

The field of knowledge has been divided into the follow- ing classes:

0 Generalities
1 Philosophy

Main classes

000 Generalia	2 Religion. Theology	works. The Letters	study	A Philosophy
100 Philosophy	3 Social sciences	I, O, W, X and Y	u Area study	AM Mathematics
200 Religion	4 Philology Linguistics.	have been left for	01 Information	AY Science and
300 Social sciences	Languages	future use.	science	technology
400 Linguistics	5 Mathematics and Natural sciences	A General works.	2 Library Science	B Physics
500 Pure sciences	6 Applied sciences.	Polygraphy	3 Book Science	C Chemistry
600 Applied sciences	Medicine. Technology	B Philosophy.	8 Management	D Astronomy
700 Fine arts	7 The arts. Recreation.	Religion	science	DG Space science
800 Literature	Entertainment. Sport, etc.	C Auxiliary sciences of history	A*Z Sciences (natural and social)	DH Earth Sciences
900 History	8 Literature.	D History—General and old world	A Natural sciences	E Biology
DDC follows the inverted Baconian order.	9 Geography. Biography, History	E-F History: America	B Mathematics	F Botany
	The order of the main classes is the same as that of DDC.	G Geography	C Physics	G Zoology
		Anthropology	D Engineering	H Anthropology
		folklore	E Chemistry	J Education
		etc.	F Chemical technology	K Social sciences
		H Social sciences	G Biology	L History
		J Political Science	H*Z Earth Sciences	P Religion (alternative is Z)
		K Law	I Botany	Q Social welfare and administration
		L Education	J Agriculture	R Political Science
		M Music	K Zoology	S Law
		N Fine arts	L Medicine	T Economics
		P Language and literature		U Technology, useful arts
				V Arts, finearts

Q Science
 R Medicine
 S Agriculture, plant and animal industry
 T Technology
 U Military science
 V Naval science
 Z Bibliography and library science
 The order of the main classes is arbitrary, to some extent. It is based on the one used by C.A. Cutter in his *Expansive classification*.

M Useful arts
 MZ Mysticism and Spiritual experience
 N Fine arts
 O Literature
 P Linguistics
 Q Religion
 R Philosophy
 S Psychology
 T Education
 U Geography
 V History
 W Political Science
 X Economics (Macroeconomics)
 Y Sociology
 Z Law

W Philology; language and literature
 Z Religion, occult, morals (alternative is P)
 The above outline is based on "scientific and educational consensus."
 For local variation, provision of alternatives has been made.

The order adopts grouping such as the humanities, social sciences, science and technology. In some schedules, related subjects have been

In the arrangement of basic classes, first we proceed from abstraction to concreteness. Next, centre is

	DDC	UDC	LC	CC	BC
			put together in the same group, such as language and literature; geography and anthropology; philosophy and religion.	to allocated to mysticism and spiritual experience (knowledge received through intuition). After this we move from naturalness to artificiality. CC is a serial system, therefore applied sciences have been placed after fundamental sciences or sciences on which they are dependent.	
Length of the base	The base is restrictive	The base is restrictive due to its inheritance from DDC.	The base is quite broad.	CC has an extremely broad base.	The base is very broad.
Later arrays	Guiding principles to "implement canon of science"	Guiding principles to implement canon of science, as enumerated by natural, accidental,	For grouping of topics within a class	Guiding principles are applied to arrangement of array	Guiding principles have been applied to arrangement of array

helpful sequence as enumerated by Ranganathan have been violated at times.	Ranganathan, are violated at times and artificial arrangements are used depending upon the needs of the subjects.	Sequence of array isolates so as to satisfy canon of helpful sequence. The guiding principles are followed by CC strictly.	Sequence of (i) isolates, (ii) facets in a compound subject, (iii) compound subjects going with the respective basic subjects, all conform to a common pattern.	Sequence of array isolates in BC2.
Natation (a) Pure/ mixed	Pure (but use of alphabets is permitted as an alternative to systematic arrangement in a few places).	Mixed, Essentially, UDC uses Indo-Arabic numerals.	Mixed (CC takes all advantages of using mixed notation).	Mixed

	DDC	DDC	LC	CC	BC
(b) Species of digits	10 Arabic numerals, (a dot is put after the first three digits to provide relief to the eye). At certain places, use of Roman and smalls is permitted, if desired.	26 Roman caps (a 26 Roman smalls put 10 Arabic numerals Punctuation marks such as " "(hyphen) ; ' (decimal point in the beginning omitted and decimal point is usually put after every three digits as a visual aid) Mathematical symbols such as () parentheses [] brackets	26 Roman caps 10 Arabic numerals A dot (.)	CC7 uses the following notation: 24 Roman caps (excluding I and O except for basic class numbers) 23 Roman smalls (excluding 'i' 'o') 10 Arabic numerals Punctuation marks such as "(double inverted commas) ' ' ; ' - Mathematical symbols such as + () Improved digits such as	BC1 uses the following: 26 Roman caps 26 Roman smalls 9 Arabic numerals excluding 0 Some punctuation marks such as ' (comma) ' (apostrophe) Mathematical symbols such as (% Improved digits such as & * Note: % & were withdrawn later, in BC1 itself

(c) Indicator digits	0.	+; [] : ; = (0 . , .) (1/9) (= . . .) " " " .00 0-1/-9 0 ' (apostrophe) . Note: UDC allows use of : or [] or ()				* + & -> "" (double inverted commas) ' (inverted comma) : ; ", following: = + -> (BCI uses the following: & (comma); ' (apostrophe). BC2 uses the following: (uses in special circumstances) 2 3 4 5 6
(d) Decimal fractional Length of class number	Decimal fractional Long	Decimal fractional Long	No decimal fractional Short			Decimal fractional Because of a large base of the notational system and also due to provision for any number of facets determined at the idea plane, usually length of class number is smaller than UDC and DDC.	Decimal fractional Short due to large base, retroactive notation and non-hierarchical notation.
(e) Read, write and remember Facet analysis	Easy No provision,	Comparatively difficult Partial facet analysis	Easy for those who are familiar with Roman letters No provision			Comparatively difficult Easy	Maximum use BCI does not make

	DDC	UDC	LC	CC	BC
Phase analysis	Some provision is available.	The phase analysis is provided but at times the same device is also used for the facet analysis.	Some provision is available.	Very good provision for phase analysis in phase analysis.	much use of facet analysis. But BC2 has made good use of it. Very good provision for phase analysis in BC2.
Mnemonics	Provision for scheduled mnemonics.	Provision for scheduled mnemonics.	No provision for scheduled mnemonics.	Makes provision for scheduled mnemonics. The only scheme to provide for semi-mnemonic mnemonics.	Makes provision for scheduled mnemonics.
Local variation	Few provisions available.	There is plenty of scope for local variation.	No provision.	There are plenty of ways provided to achieve local variation.	Provides for local variation in many places.
Devices	Employs a number of devices for construction of a class number not readily provided.	Employs a number of devices for construction of a class number.	Usually employs gap device, alphabetical device and enumeration device.	Uses maximum number of devices. This leads to a high degree of autonomy to a classifier.	Employs a number of devices such as alphabetical device, subject device, enumeration device, facet device, phase device, gap device and

Terminology	Terminology is biased towards USA.	Terminology is rather verbose and does not take full advantage of the canons of context and enumeration. Terminology has been greatly improved in the recent issues of UDC fascicles.	Terms used for headings are precise and explicit, being chosen by authorities in various fields. Sometimes, definitions have been provided to indicate the sense in which headings have been allocated. Terminology shows national bias towards USA. It takes full advantage of the canons of context and enumeration.	Provides only fundamental constituent terms. Terminology is precise and brief, taking full advantage of the canons of context and enumeration.	Terms are precise and brief to a great extent especially first specification. In BC1, sometimes scope notes have been provided to indicate the sense in which headings have been allocated
Strong classes	Area of special interest to the English speaking world.	Science and technology are strong.	Social sciences and humanities. The humanities in general and literature in particular are more exhaustive than other schemes.	CC6 is strong in areas of special interest to Indian libraries such as Indian religions, Indian philosophy, Indian classics and sacred books. Space isolates pertaining to India have been given	Social sciences in BC1 are well provided. Schedule for education in BC1 is extremely good. Not possible to say about BC2 as it is still being published. Schedule for education in BC2 is very well done.

DDC	UDC	LC	CC	BC
Weak classes	Life sciences as well as subjects of special interest to the non-western world (such as eastern religions, eastern philosophy, and so on). Attempt is being made to improve subjects of special interest to non-western world.	Social sciences and humanities are weak. Auxiliary tables are not up to the mark.	Science and technology. Science and technology are weak in CC6.	in greater detail. It is not possible to say about CC7. Science and technology are weak in BC1.
Book number Index	No organic book number. DDC provides a relative index, in which all related divisions of the universe of sub-	No organic book number. Abridged English edition contains a detailed index at the end. Each fascicle has a separate index.	No Organic book number. Most classes have an index but there is no comprehensive index to the scheme as a whole. However, <i>LC subject</i> of classification.	Meagre provision for book number in BC1. As BC2 is a faceted classification, the index to the schedules lists only the simple terms used in their facets without their

jects regarding a given subject are brought together under one heading. DDC has a large index, because it has to index compound subjects, and the number of compound subjects is quite large.

Chain procedure

Terminology not suitable for chain procedure.

Terminology not suitable for chain procedure

Terminology not suitable for chain procedure

Terminology fit for chain procedure.

In BC1, terminology not suitable for chain procedure. However, BC2 is better fitted in this respect.

Bias

Scheme is biased to West. In its recent editions, it is trying to remove this bias.

Scheme is biased to West.

Scheme is biased to USA.

Scheme gives detailed treatment to subjects of interest to Indian libraries.

Scheme gives BC2 is biased to British libraries.

Revision

DDC 19 contains a substantial amount of revision.

The revision lays emphasis on providing up-to-date and detailed schedules for indexing of micro-thought, are carried out on

Minor modifications and additions, in the form of new details, keeping in view

CC7 is going to be a major revision, incorporating the latest ideas in developments in

BC2 is a major revision, incorporating the latest ideas.

Headings can be used as an index. An index to the scheme was published by the US Historical Institute in 1974.

It is required to index only fundamental concepts, terms, which are limited in number. The same is equally true for CC7. In CC7, a separate index has been provided to each basic subject.

compounds. In BC2, each volume has been provided with a separate index.

DDC	UDC	LC	CC	BC
<p>The scheme is being used for shelf arrangement, catalogues, indexes, bibliographies, documentation lists, and so on. It has also been used in computer-based information retrieval systems.</p>	<p>Revisions and relocations are done quite frequently and also on a large scale. The abridged English edition has not been revised since 1961.</p>	<p>on extensive basis. But relocations and reconstruction of classes are avoided. The changes, expansions of various classes and developments are reported in <i>Additions and changes to the Library of Congress classification</i>. Revision of LC is balanced and quite satisfactory.</p>	<p>the theory of library classification.</p>	<p>The BCI is being used mainly for shelf arrangement, catalogues, and so on.</p>
Use	<p>The scheme is being used for shelf arrangement, catalogues, indexes, bibliographies, documentation lists, and so on. It has also been used in computer-based information retrieval systems.</p>	<p>The scheme is being used for shelf arrangement.</p>	<p>The scheme is being used for shelf arrangement, catalogues, indexes, bibliographies, documentation lists and so on.</p>	<p>The BCI is suitable for classification of macro-documents. BC2, be</p>

libraries, such as school and public libraries.

Some fascicules of the full edition are not deep enough for documentation work, but deeper than required for book level. However, many of the fascicules brought out recently are considered useful for documentation work.

ro-documents.

ing developed, is considered to be useful for shelf arrangement and information retrieval.

A number of schedules are available for classification of micro-documents. Most of the classes have to be covered as yet.

Abridged Bliss Classification (1967) is available for school libraries.

Number of users

The Number of users is about 25,000, covering over 100 countries.

There are 1400 libraries in the United States, and 200 in other countries which are using it.

In the Russia, its use in scientific and technical libraries was made compulsory.

The number of libraries using it amount to about 2500. Very few libraries outside India are using it.

About 90 libraries are using the scheme. These users are mainly academic and special libraries. Most of them are from British Commonwealth.

28 Russian capital letters

23 Russian small letters

English caps and small letters

Roman numerals

10 indo-arabic numerals

Punctuation marks < > " ' — , : *

Mathematical symbols + / = ()

Certain symbols used in UDC have also been adopted (for example, a period, after every three Arabic numerals, has been prescribed). It has made provision for common auxiliaries of form race, nationality, language, place and time. It has also provided for special auxiliaries enumerated under certain classes as done in UDC. BBK has borrowed many principles as well as certain schedules from UDC. Parts of the common auxiliary for geographical divisions from UDC have also been incorporated. It follows the structural notation, except where "add note" has been added. The revision of the scheme is being carried out on continuous basis. The additions and corrections to the scheme are issued by the Lenin Library on regular basis.

BBK is used by the over a hundred libraries in USSR. It is also being used in Vietnam, Czechoslovakia and Bulgaria. There is every likelihood that its use will increase in communist countries. The scheme is totally based on Marxism-Leninism ideology, therefore, non-communist countries are not likely to adopt it.

3 CONCLUSION

In the selling of products we know that a good product will generally dominate the market sooner or latter. But this is not exactly true for a library classification scheme. Here, there are certain additional factors which determine whether or not a given library classification scheme will be adopted.

A scheme, which is strongly entrenched will continue to be used even if a better one makes its appearance. Of course, the scheme being used should have a powerful and influential organization looking after it, so that there is reasonable assurance that it will be revised to a reasonable extent. In addition, if the scheme is used in centralized indexing and abstracting services, and also its numbers appear on printed catalogue cards, these will then prove to be strong factors in its support. There is an inherent tendency in human beings

to continue with a method or way of doing something and feel strongly against any change. It is also true that there are difficulties in reclassification, which go against any change of scheme.

There is no doubt that CC7 and BC2 are in many ways superior to DDC, UDC and LC, but later schemes are strongly entrenched, to the extent that CC7 and BC2 cannot hope to displace them.

DDC has many faults, and it has also been criticized severally, but it will continue to survive and thrive. There is perhaps no challenge to it with regard to public and college libraries. The use of decimal notation is the most important reason for its world-wide usage. The organization looking after it is a large, powerful and an influential one. It is being used in many bibliographies, on printed catalogue cards, in MARC tapes and so on. These add to its advantages.

Sarah K. Vann has described the enduring characteristics of DDC. These are: "Its order of disciplines (subjects), its use of the universally known Arabic notation, its decimal structure which permits intercalation of related concepts and varying levels of specificity, its sustained program of revising and up-dating and its availability in full and abridged editions."² Other characteristics which have made DDC viable are:

1. Its pragmatic or realistic development now conjoined with a *posteriori* molding of a philosophic design, notably purification of the concept of hierarchical subject relationships.
2. Its adaptability for use in libraries of various sizes and kinds because of its hierarchically expressive notation which permits varying degrees of inclusiveness and exclusiveness with its decimal structure.
3. Its adaptability both for conventional (manual) shelf or classed catalogue analysis and also, through its meaningful notation, for retrieval through mechanization and computerised systems.
4. Its thrust towards an international perspective both in depth of analysis and in adaptability of application.
5. Its endorsement and encouragement of translations.
6. Its use by central bibliographic services and the subsequent availability of classification numbers for specific titles.³

UDC has certain basic shortcomings in its structure. There are internal contradictions and vaguenesses in its schedules. It consists of a collection of specialized classifications which do not form a uni-

²Arther Maltby, ed., *Classification in the 1970s; a second look*, London, Clive Bingley, 1976, p. 227.

³*Ibid.*

fied system. Very often, it is unscientific in its methods. The principles underlying UDC have not been described explicitly; as a result, many decisions taken by classifiers are subjective in nature. Only general principles have been listed by UDC. In recent years, attempts are being made to put it along modern lines.

LC is backed by the full resources of great national libraries in USA. Therefore, LC is likely to maintain its hold, in spite of the inherent weaknesses of the scheme. The scheme also has its plus points. LC call numbers appear on printed catalogue cards, on proof slips of the printed cards and on magnetic MARC tapes and so on. The schedules of LC are regularly revised. It has a large vocabulary base, which can be used for a variety of purposes.

CC7 is a scientific scheme, being guided by objectively applicable principles. It is a great improvement over CC6. It is certainly superior, in many ways, over other general schemes, but it has received severe criticism due to its complex notational system. However, *Colon Classification* has given a great impetus to research on classification.

There is the lack of an abridged edition. The changes to be incorporated are given in *Library Science with a Slant to Documentation* and *DRTC Annual Seminar*. However, there is a need to bring out a regular bulletin for the purpose. CC7 has taken too much time to appear. This has given a setback to the adoption of *Colon classification*. DRTC does not have enough resources, and is not a powerful organization, wielding influence. It has to compete with well-established schemes. Had the National Library (in Calcutta) adopted it, it would have proved to be a boon.

BC2 has many merits. It is great a improvement over BCI. Schemes like DDC, LC and UDC are well entrenched; therefore, not many libraries are going to adopt it. At present, about 100 libraries are using it. The Bliss Classification Association is looking after this scheme. The financial resources of this organisation are limited as compared with organization responsible for DDC, UDC and LC. As we know, the survival and thriving of a scheme depend largely upon the influence of its sponsoring body. In this respect, BC2 is in a disadvantageous position. The future of this scheme will depend upon the reception given to BC2, and its ability to win over new users.

FURTHER READINGS

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NORMATIVE PRINCIPLES: A COMPARATIVE STUDY

0 INTRODUCTION

For a long time there has been an over-emphasis on empiricism and, as a result, the theory of classification did not receive enough attention. It is only during the last few decades that the need was felt for a greater orientation to theory. The value of theory is being realized increasingly. There is often a tendency on the part of practising librarians to look down upon a theory as merely something which cannot be put into practice, serving only as an ideal to be achieved. It must be understood that a sound theory is always a practical one.

The normative principles of classification have been recognized for a long time, and have proved to be highly useful. These have provided a scientific basis to the field of classification. The framers of classification schemes and classifiers have been making their use in varying degrees. These principles can serve many purposes, as stated below:

(i) These can serve as the basis of a scheme for classification, leading to a scientific approach. As such, a scheme should be designed keeping in view the guidelines provided by normative principles. These principles are also useful for a remodelling of the existing schemes;

(ii) Critical study of a given scheme can be carried out with the help of these principle;

(iii) The principles can be very helpful for the purpose of comparing different schem for classification;

(iv) Interpretation of the rules and schedules of a scheme can be done with their help;

(v) These can provide guidance to a classifier in the day-to-day work of classification;

(vi) These are helpful in developing a theory, and also provide a scientific basis to theory.

Significant contributions were made by the following persons to the theory of library Classification:

Ernest Cushing Richardson

James Duff Brown

E. Wyndham Hulme

W.C. Berwick Sayers

Henry Evelyn Bliss

Shiyali Ramarita Ranganathan

Richardson is known as the first person to have made a systematic attempt to formulate a theory of library classification—and in as early as 1901. Brown was able to anticipate modern theories of preparing class numbers by means of linking together numbers representing basic concepts. Hulme is well known for his principle of literary warrant. Berwick Sayers is known as the first grammarian of library classification. His theory is based on classical (long established) approach. Bliss is well-known for his principle of scientific and educational consensus. His theory indicates that he was able to anticipate modern theories in certain aspects. Perhaps his theory is the last significant one to appear before the appearance of modern theories. Ranganathan provided a modern approach to the theory of library classification. He went ahead of the others, by extending the principles formulated by various theoreticians and evolving an excellent terminology of his own.

Theories evolved by Richardson, Brown, Hulme and Sayers were static theories, because these mainly consisted of a description and critical explanation of the practices followed in the then existing schemes of library classification. Theories put forward by Bliss and Ranganathan (given in his first edition of *Prolegomena to library classification*) were almost static. The dynamic theory began to take shape, after 1949. Ranganathan's second edition of *Prolegomena to library classification* (1957) is considered as the first book on the dynamic theory of library classification. The third edition of *Prolegomena to library classification* (1967) contains an advanced version of dynamic theory.

In this chapter, an attempt has been made to study the normative principles evolved by various authors (E.C. Richardson, J.D. Brown, E.W. Hulme, W.C. Berwick Sayers, H.E. Bliss) in the light of the ones formulated by S.R. Ranganathan.

I ERNEST CUSHING RICHARDSON

Ernest Cushing Richardson is known to have been the first person to have made a systematic attempt to formulate a theory of classification—in as early as 1901. This appeared in his *Classification, theoretical and practical* (1901). This is considered an outstanding work on the general principles of library classification, and had a great influence. The ideas of Richardson influenced Bliss and Berwick Sayers a great deal.

II Criteria

Richardson's criteria, along with comments, are given below:

(i) It should follow, as nearly as possible, the order of things. A properly classified library is perhaps the nearest thing that there is to a microcosm. A human mind which knew all things might be more perfect in this regard, but in reality no one can or does keep all things in mind, as a library does. It must, therefore, follow the order of complexity, or of history, or, if you please, of evolution.

Comments: Order of complexity, order of history and order of evolution correspond to the principles of increasing complexity (or decreasing complexity), the principle of later in time (or earlier in time) and principle of later in evolution (or earlier in evolution). The above mentioned principles are based on the assumption that there is a true order of things. A scheme of book classification should follow such an order.

(ii) It should be carried out to the minutest detail.

Comments: Perhaps the intention was that a classification scheme should attempt to provide coextensive class numbers.

(iii) It should be provided with a notation, which will allow for indefinite subdivision, using mixed symbols, but with a predominant decimal base.

Comments: Provision for indefinite subdivision will satisfy the canons for a growing universe, but a predominantly decimal base will lead to a short base.

(iv) It should be provided with a detailed and specific index.

Comments: This criterion does not contribute to theory, but is concerned with ease of use.

(v) The value of such a system is increased in direct ratio to the generalness of its use.

Comments: This criterion is not very clear.

2 JAMES DUFF BROWN

James Duff Brown formulated two schemes in the 1890s. Both proved unsuccessful. The first one was produced in collaboration with John Henry Quinn. This scheme was known as the Quinn-Brown classification and was presented before the Belfast meeting of the Library Association in 1894. It was found to be inadequate. Therefore, in 1897, another scheme, entitled the *Adjustable classification* was produced. His third scheme, entitled *Subject classification*, was published in 1906. Its second and third editions appeared in 1914 and 1939 respectively.

Brown adopted the "one place" theory. Thus, he selected basic "concrete" themes and attempted to group documents around them. Subjects such as flowers, human body, women, ships and so on are considered as concretes. If the subject is flower gardening, then we would put it under flower, which is a concrete. In case the subject is the treatment of the human body, then human body is regarded as a concrete and the documents would be grouped under it. The selected concrete themes serve as magnets, which attract many concepts, which ought to have been distributed under different disciplines. This approach ignores the difference in context between concepts such as ship-transport and ship-building. Both will be grouped under ships, which is a concrete.

Brown advocates the linking of science and the application of theory. He suggested that each topic be placed as near as possible to the science on which it is based. Technology should go with pure science. Pure and applied chemistry should come together. Electricity should go with electrical engineering. These examples led to a satisfactory result. But in Subject classification, certain subjects brought together seem to have been unjustified. For example, principles of heat and work of fire service have been put together, which will be found unhelpful. Brown's approach aims to satisfy the "principle of filiation sequence."

3 E. WYNDHAM HULME

Hulme did not bring out any scheme of classification in published form. He is the author of *Principles of book classification*.¹ He put

¹E. Wyndham Hulme, *Principles of book classification*, London, the Library Association, 1950.

his ideas into practice with his deputy at the Patent Office Library.

He recognized the following principles:

Principle of collocation

Principle of coordination

Principle of relativity of class

Principle of literary warrant

Principle of collocation refers to "the bringing together of the like material in bulk with a view to the economy of its subsequent distribution and consumption."²

According to Hulme, "Strictly speaking coordination is a linear plotting of the shelf order of book classes. Its function is to arrange classes in the order of their common subject matter with a view to economizing distances to be travelled in passing from one class to another."³

The principle of relativity of class says that provision should be made for alternative places.

According to the principle of literary warrant, the peculiarities of published literature may occasionally reflect the grouping of subject matter. Such peculiarities may not be noticed through the theoretical analysis. In such cases, the classification schedules should be designed to fit with published literature (and, if possible, also the potential one). Hulme thus sought rather convenient sequences of various groups, considering them groups of books and not groups of subjects. Thus, he did not strictly follow the scientific order of subjects. This is certainly a useful idea. It will avoid an over-theoretical approach, which lays more attention than necessary on the concept of classifying knowledge (abstract), thereby neglecting actual literature, including, if possible, potential literature. It will enable a classificationist to provide isolates for only those subjects on which documents exist.

Comment: Hulme failed to recognize some of the important principles of subordination, gradation by speciality and maximal efficiency. According to Bliss, "The principles on closer scrutiny prove neither valid nor applicable."

Richardson believed that a map of knowledge adopted to fit the needs of books might neglect their "literary warrant." Thus, historically, the ideas of Hulme are a natural antithesis of those of Richardson.

Hulme is well-known for his principle of literary warrant. Ranga-

²*Ibid.*, p. 1.

³*Ibid.*, p. 20.

nathan incorporated this principle in his theory of library classification. He applied it in arranging crops in *Colon classification*. The *Library of Congress classification* shows the application of this principle with regard to the development of some of the details. A term is not enumerated in the schedule until literature has not appeared on the same.

Hulme's ideas were greatly neglected. Some of his leading ideas have now been included in the modern theories, and E.A. Savage and J. Metcalf have paid tribute to him.

4 W.C. BERWICK SAYERS

Sayers brought out a theory of library classification on the basis of a comparative study of the then existing schemes of classification. He tried to interpret and systematize the ideas of other theoreticians. Sayers is called the first grammarian of library classification. However, he did not design any scheme for library classification.

Sayers' *Canons of classification* appeared in 1915. In 1918, the *Introduction to library classification* was first published as an elementary work on the subject, followed, in 1926, by the first edition of *Manual of classification* (Edition 2, 1944; Edition 3, 1955; Edition 3, reprinted with corrections, 1959).

Sayers uses the word "canon." He has enumerated 29⁴ canons, dividing them into six categories—namely, definitions, division terms, book classification, notation and book classification scheme. Let us discuss some of these canons.

41 Definitions

This provides definitions of classification, subject of classification, general classification, class, scheme of classification, the order.

Comments: Ranganathan does not refer to definitions by the name of canons, unlike Sayers.

42 Division

The dividing process must be gradual... "separating things according to degrees of likeness" and its result is to keep things nearly related as near together as the material permits.

The use of characteristics must be consistent at each stage of

⁴W.C. Berwick Sayers, *Manual of classification for librarians and bibliographers*, 3rd rev. ed., Andre Deutsch, 1959, pp. 79-82.

division, one principle of division being exhausted before another is introduced.

Comments: Ranganathan uses the word "characteristic," and the above canons are referred to as canons for characteristics. The above canons have been called the canons of filiation sequence and the canons of consistency.

43 Terms

Terms must be unambiguous. They may be technical or popular.

Terms should be used with a consistent meaning in every act of classification.

Comments: Ranganathan refers to the above canon as canons for terminology. The first canon has been named the canon of context.

44 Book Classification

Book Classification must be general, inclusive of all matters that are, have been, or may be the matter of books.

It must be capable of expansion, in order that without dislocation it may admit new subjects or new subdivisions or new aspects of old ones.

It must be equipped with:

(i) A Generalia class to accommodate books too general for inclusion in any single class; for example, general encyclopaedias and journals.

(ii) Where the general characteristic of the scheme is arrangement by subject, it must have form classes for the arrangement of books which are most usefully placed under the forms in which they are written; for example, fiction, poetry, drama and orations.

(iii) Systematic schedules for the discrimination of the forms in which subjects are presented; for example, the *theory*, or history, or bibliography of a subject (e.g., history of botany).

(iv) A notation which shall provide a symbol for every class-term (or group of class-terms where a heading consists of several terms).

Comments: The first section says that book classification should be "inclusive of all matters." Obviously, it will provide for the generalia class, form classes, subject classes and so on. However, later sections provide the specific details which should be included under "all matters."

(v) An index. . . .

Comments: An index adds to the usefulness of the scheme. It should not be made a canon.

21. It must be uncritical in its terms for subjects, and in classing a book, any placing that implies criticism of it is inadmissible.

Comments: The above canon has been named the canon of reticence.

45 Notation

23. The notation may consist of any symbols that are capable of marking all the parts of a scheme. It should, however, be (a) brief, (b) simple, (c) flexible, and (d) mnemonic.

Comments: Quality (a) can be represented by the canon of relativity, (b) refers to simple notation, but Sayers' preference seems to be for a mixed notation. However, the mixed notation cannot be as simple as a pure notation, and (c) quality means adjustability and expansibility. If the notation is flexible, the scheme of classification will be in a better position to satisfy the canons of the growing universe at the notational plane.

46 Book Classification Scheme

27. A classification scheme is printed in columnar schedules in the order of the precedence of subjects. . .

28. The printed table should be prefaced by an introduction, explaining the methods and use of the scheme, with tables showing outlines of the main classes and the main divisions so that the order and compass of the scheme are seen easily, and tables of the systematic schedules.

Comments: The above (27 and 28) are mere directions to a classificationist. These cannot be regarded as canons.

29. A classification scheme needs continuous study and revision, of that it is maintained in currency with knowledge. Schemes in general use are likely to be kept so because they come under the scrutiny of regular application.

Comments: Revision, to maintain currency with knowledge, will satisfy the canon of currency.

From the above, it follows that some of the ideas have wrongly been referred to as canons. Each canon should have been given a specific name, as was done by Ranganathan. The set of canons developed by Sayers is based mainly on the precepts of classification enunciated by various other writers. However, Sayers should be given credit for synthesizing the canons into a theory.

5 HENRY EVELYN BLISS

Bliss's first important work was *Organization of knowledge and the system of the sciences*.⁵ In it, he described the scientific, philosophical and logical basis of bibliographical classifications. He studied the various methods of organization in nature, society, and intellectual occupations, and came to the conclusion that arrangements in classification, subject catalogues and other bibliographical services should be consistent with the scientific and educational consensus. He expressed the view that such a consensus is relatively stable. His next work, *Organization of knowledge in libraries and the subject approach to books*,⁶ described his theory of classification. His theory is almost static. It also included an outline of his scheme for classification. The scheme was conceived and broadly described in 1910. It appeared later, in 1935 in extended form, under the title *A systems of bibliographic classification*.⁷ It appeared in full edition between 1940 and 1953.⁸ A new edition is planned in 20 volumes. Eight volumes have already come out.

Bliss inherited some of the ideas of Richardson. However, he gave new strength to these ideas due to his scholarship and detailed study of the philosophical systems existing then. He described the theory of classification earlier than he did his scheme. Therefore, he was able to revise his theory at the time of preparing his scheme. He spent too much time on studying the various schemes of library classification as well as philosophical systems, with the result that he started designing his scheme too late in his life. Bliss also tried to establish a scientific and educational consensus on his own—which is too big a job really, for any one individual. He did succeed in anticipating the modern theories of library classification, but did not live to see them well established. His influence was far-reaching, and it would not be wrong to say that Bliss strongly influenced a whole generation of librarians.

Bliss uses the word "principle." He describes principles "as gene-

⁵Henry Evelyn Bliss, *Organization of knowledge and the system of the sciences*, N.Y., Henry Holt, 1929.

⁶——, *Organization of knowledge in libraries and the subject approach to books*, New York, Wilson, 1933 (3rd ed., 1939).

⁷Henry Evelyn Bliss, *System of bibliographic classification*, New York, Wilson, 1935, (2nd ed., 1936).

⁸——, *Bibliographic classification, extended by auxiliary schedules for composite specification and notation*, New York, Wilson, 1940-53, four volumes in three.

realizations, generalized statements, of constant essential relations in definite recurrent actions or conformities in processes and methods. These are more general and comprehensive than rules or precepts." He lists 32 principles. A summary of these is provided in his *Organization of knowledge in libraries*.⁹ We shall discuss the important ones.

51 Scientific and Educational Consensus

According to Bliss, it is through the processes of science (in a broad sense), and of education, that human knowledge is ultimately affected and its results systematized. Therefore, he was of the firm view that in designing and revising a scheme of classification, we should take into consideration how a subject is studied and practised. Bliss came to this conclusion on the basis of methods of organization in nature, society and intellectual occupations.

Consensus (or agreement in opinion) refers to a relative agreement as to what the major classes of knowledge should be recognized, what should be their scope, and the essential relations between them. As there cannot be complete agreement in these matters, Bliss suggested the provision of alternatives in the areas of disagreement. This will take care of adjustments.

According to Bliss: "More closely a library classification reflects the consensus, the more stable, flexible and efficient it will be." His attempt to seek consensus has enabled him to achieve a sound basic structure for his scheme, called the *Bibliographic classification*.

52 Subordination

Subordination of the special to the general.

Comments: This corresponds to Ranganathan's canon of decreasing extension.

Gradation by speciality.

Comments: There are certain subjects which depend upon the findings of other ones. In this respect, those which are dependent are more specialized than the subjects from which ideas are borrowed. This refers to the dependence of special sciences on the general sciences. As chemistry, for an explanation of many phenomena, is dependent on physics, similarly, astronomy depends upon chemistry and physics. As earth is one of the planets, geology depends on astronomy. Similarly, biology depends on physics and chemistry for many of the concepts. According to the above principle, dependent

⁹Henry Evelyn Bliss, *Organization of knowledge in libraries*, 2nd ed., New York, Wilson, 1939, pp. 37-46.

subject should follow (often coordinate) topics on the findings of which they have to rely upon. This principle is similar to the principle of serial dependence propagated by Comte, the French philosopher. Ranganathan has named this the concept of increasing concreteness.

53 Collocation

Collocation involves the bringing together of closely related subjects.

Comments: Bliss has carefully applied the principle of collocation in his scheme. For example, he brought together only those pure and applied sciences which were likely to be sought together by a majority of the users. Ranganathan refers to this as the canon of filiation sequence.

54 Alternative Location

The consensus is only relative (comparable). Complete agreement is not always possible. There has to be a provision for alternative places or alternative locations to the maximum. This would be the case in classification for a special collection. Alternative location is an important feature of BC. Bliss was anxious to accommodate his scheme to meet the requirements of large minority viewpoints within a consensus. He recognized that for certain subjects there may be two or more possible locations in the sequence of classes equally acceptable. For example, photography can be placed with technology or with the arts. Economic history can be subordinated to economics or history.

Alternative location is not the same as alternative treatment or arrangement. Alternative treatment or arrangement is provided for in nearly all schemes. This happens for biography in most of the schemes. *Bibliographic classification* (original edition) has provided four alternative arrangements for the literature class.

55 Notation

Notation is correlative and subsidiary. It should not determine order. Brevity is vital, if the scheme is to remain reasonably simple. The synthetic principle may be used for economy, leading to simplicity of structure and convenience of use.

Comments: Bliss rightly regarded notation as correlative and subsidiary. He said that notation should not determine order. As a result, the notational plane would be expected to carry out the findings on the idea plane. He tried to achieve the synthetic principle by

means of general and special systematic schedules and utilized many devices to achieve brevity of class numbers in his scheme.

6 S.R. RANGANATHAN

6.1 Introduction

The first edition of Ranganathan's *Colon classification* was published in 1933. It did imply the use of canons and laws, but these had not been applied in an explicit manner. Ranganathan studied the reactions of the users regarding the arrangement of books on shelves, based on the first edition of *Colon classification*. He also examined the principles implied in the schemes of library classification, such as the *Dewey decimal classification*, *Expansive classification* by C.A. Cutter, *Library of Congress classification* and Brown's *Subject classification*. As a result, he was able to formulate a set of canons and develop a new terminology, which led to the formulation of a theory of library classification. The same was published in his *Prolegomena to library classification* (edition 1, 1937). The 28 canons described in this work helped him rationalize his *Colon classification*. He incorporated these ideas in the next edition of *Colon classification* (edition 2, 1939).

Slowly, Ranganathan's influence began to be felt. By 1950, radical changes had taken place in the approach to library classification, mainly due to the ideas put forward by him. His faceted approach began to be recognized. His ideas started spreading beyond the confines of this country.

The second edition of *Prolegomena to library classification* came out in 1957. This is considered as the first known book on the dynamic theory of library classification, and was a great advance over the previous one. The number of canons were increased to 35. The postulational approach to classification, along with 21 postulates and 11 principles, made its appearance in this edition. Ranganathan's thinking became clearer because the work of classification was attempted at three planes. The concept of zone analysis was conceived in a clear manner. All said and done, it was a great improvement over the first edition.

The third edition of *Prolegomena to library classification* (published in 1967, but released in October 1968), was a great advancement. It was completely rewritten, recast and revised work. It contained 11 laws, including the laws of library science, 43 canons (15 for idea

plane, four for the verbal plane, 21 for the notational plane and 3 canons for book classification); 13 postulates, four principles for facet sequence and 18 principles for helpful sequence.

The following table indicates the progress from the first edition of *Prolegomena* to the third edition.

TABLE 26.1

<i>Edition</i>	<i>Basic laws</i>	<i>Fundamental laws</i>	<i>Canons</i>	<i>Principles</i>	<i>Postulates</i>
First (1937)	Law of parsimony	nil	28	nil	nil
Second (1957)	Law of parsimony	nil	35	11	21
Third (1967)	Law of parsimony 5 other basic laws	Five laws of library science	43	22	13

62 Normative Principles

According to Ranganathan the theory should be based on normative principles. Normative principles have been postulated by him at various levels as given below:

<i>Level</i>	<i>Name of normative principle</i>
Basic process of thinking	Basic laws (these are invoked only when two or more laws of library science or canons of classification lead to conflicting or different but appearing to be equally valid decisions).
Library science	Fundamental laws (these are applicable only to library science and its subdivisions are normally invoked only when two or more canons of classification lead to conflicting or different but appearing to be equally valid decisions).
Classification	Canons (these conform to the laws of library science. These are normally invoked only in the design of a scheme for classification).
Helpful sequence in array	Principles (these are normally used only in the design of a scheme for classification).

Work of classifying Postulates and principles for facet sequence (these are used in the practical classification of subjects. They guide the work of classifying. The postulates are also used in the design of a scheme for classification).

Experience shows that a scheme designed on the basis of canons, principles for helpful sequence in array, principles for facet sequence and postulates, is in a better position to face the onslaught of the universe of subjects, and also has a longer life than a scheme merely based on the canons.

According to Ranganathan, each scheme must follow the same set of canons and laws. But each scheme may follow different sets of principles and postulates. A scheme of classification corresponds to a mathematical model. Different models can be designed by merely varying a combination of principles and postulates. *Dewey decimal classification* or *Colon classification* represent such models.

621 Basic Laws

Laws of interpretation

- Law of impartiality
- Law of symmetry
- Law of parsimony
- Law of local variation
- Law of osmosis

622 Fundamental Laws

Laws of library science are fundamental laws. There are five laws of library science. These are listed below:

- First law : Books are for use
- Second law : Every reader his book
- Third law : Every book its reader
- Fourth law : Save the time of the reader
- Fifth law : Library is a growing organism

683 Canons

6231 Canons for Work on the Idea Plane

Canon of differentiation

Canon of relevance

Canon of ascertainability

Canons for characteristics

Canon of permanence

Canon of concomitance

Canon of relevant succession

Canon of consistent succession

Canons for succession of characteristics

Canon of exhaustiveness

Canon of exclusiveness

Canon of helpful sequence

Canon of consistent sequence

Canons for array

Canon of decreasing extension

Canon of modulation

Canons for chain

Canon of subordinate classes

Canon of coordinate classes

Canons for filiation sequence

6232 Canons for Work on the Verbal Plane

Canon of context

Canon of enumeration

Canon of currency

Canon of reticence

6233 Canons for Work on the Notational Plane

Canon of synonym

Canon of homonym

Canon of relativity

Canon of uniformity

Canon of hierarchy

Canon of non-hierarchy

Canon of mixed base

Canon of pure base

Canon of faceted notation

Canon of non-faceted notation

Canon of coextensiveness

Canon of non-coextensiveness

Basic canons for notation

Canon of general mnemonics

Canon of alphabetical mnemonics

Canon of scheduled mnemonics

Canon of systematic mnemonics

Canon of seminal mnemonics

Canons for mnemonics

424 *Theory of Classification*

Canon of extrapolation in array
Canon of interpolation in array
Canon of extrapolation in chain
Canon of interpolation in chain

Canons for growing
universe

6234 Canons for Book Classification

Canon for book number
Canon of collection number
Canon of distinctiveness

624 Principles

The following is the list of principles for a helpful sequence:

Principle of later-in-time
Principle of later-in-evolution
Principle of spatial contiguity
Principle of bottom-upwards
Principle of top-downwards
Principle of left to right
Principle of right to left
Principle of clockwise direction
Principle of counter-clockwise direction
Principle of periphery to centre
Principle of centre to periphery
Principle of away-from-position
Principle of increasing quantity
Principle of decreasing quantity
Principle of increasing complexity
Principle of canonical sequence
Principle of literary warrant
Principle of alphabetical sequence

625 Postulates and Principles for Facet Sequence

6251 Postulates

Postulate of fundamental categories
Postulate of basic facet
Postulate of isolate facet
Postulate of rounds for energy
Postulate of rounds for personality and matter
Postulate of rounds for space and time

Postulate of level
Postulate for facet sequence
Postulate of first facet
Postulate of concreteness
Postulate of facet sequence within a round
Postulate of facet sequence within last round
Postulate of level cluster

6252 Principles for Facet Sequence

Wall-picture principle
Whole-organ principle
Cow-calf principle
Actand—action—actor—tool principle

63 Conclusion

Ranganathan's theory, described in this work, is mainly based on the third edition of *Prolegomena to library classification*. His theory is based on normative principles. He has succeeded in providing a scientific basis and firm footing to the theory of library classification. As a result, he was able to systematise the study and practice of classification.

Ranganathan came into the field late, and benefited from the writings of Richardson, Cutter, Hulme, Brown, Sayers, Bliss and so on. He had the opportunity of improving his theory, by experimenting for a period of 40 years. He formulated *Colon classification*, to which he applied his theory. He tested his theory with the help of normative principles. He brought forth a technical terminology of his own and did not hesitate to borrow it from others. In addition, his Brahmanic and mathematical background gave him a logical and clear mind.

It is an astounding tribute to Ranganathan, that with comparatively a few libraries (compared with UDC and DDC) adopting his scheme, he succeeded in dominating the current theory of library classification. His theory has enabled us to face the onslaught of the universe of subjects with courage and hope. He also succeeded in creating a school of thought, which is likely to carry forward the ideas of the master.

FURTHER READINGS

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Chapter 27

REVISION OF MAJOR SCHEMES OF CLASSIFICATION

0 INTRODUCTION

At present the number of subjects is large, and the subjects exist in varied relationships. New subjects keep on appearing from time to time. The universe of subjects has become increasingly dynamic. A given classification scheme can be best suited to meet the onslaught of the universe of subjects at that time. But not later to the same extent. Due to increasingly dynamic nature of universe of subjects, it becomes essential that a scheme is revised constantly to keep pace with growing universe of subjects. For this purpose, a scheme needs to be institutionalized. The survival of the scheme will largely depend upon the health of the institution looking after it.

1 DEWEY DECIMAL CLASSIFICATION

The three bodies entrusted with DDC are Forest Press, the Decimal Classification Editorial Policy Committee and the Library of Congress. A bulletin, entitled, *Decimal classification additions, notes and decisions* is issued to subscribers between the editions, though on an irregular basis. This covers changes which are going to be incorporated in the schedules as soon as possible. Thus, it keeps the users of DDC well informed about the changes.

The new editions are published approximately every six to seven years. The nineteenth edition appeared in 1979. An abridged edition is available for small libraries. Eleventh abridged edition of DDC appeared in 1979.

The standard (fifteenth edition) of DDC came out in 1952. It was criticized a great deal, because it did not adequately meet the requirements of its users. However, it was a brave attempt to moder-

nize the scheme. The standard (fifteenth revised editon) appeared in 1953. This too did not receive good response, as the tables had been reduced and the index found inadequate. The revised edition also had a restructured relative index.

DDC16 (1958) was the first edition to appear as a result of cooperation between Decimal Classification Editorial Policy Committee and the Library of Congress. This edition was well appreciated by the users. It retained the traditional pattern of the scheme, left out most of the earlier relocations as well as restored many of the details which had been dropped in the earlier edition.

DDC17 (1965) was in two volumes. It had the following features:

- (i) Reasonable amount of revocations.
- (ii) New schedule for 150 (psychology).
- (iii) Form divisions were renamed standard subdivisions.
- (iv) Area table was placed separately as an auxiliary.
- (v) "Add to" instruction replaced the "divide like" instruction.
- (vi) Index to DDC17 (1965) was poorly conceived; therefore, the revised one appeared in 1967.

On the whole, DDC17 continued on the traditional pattern. As mentioned above, it had some new features also.

DDC18 (1971) appeared in three volumes. The new features of DDC17 were developed further. The revision from 17th to 18th has been substantial. It is a good improvement over the earlier editions.

Some of the features of DDC18 are given below:

(i) It incorporated new subjects, especially in the scientific fields. Many subjects which did not find a place in earlier editions have provided for in it.

(ii) It provided more provisions to serve the requirements of foreign users. This was an attempt towards making the scheme an international one.

(iii) It introduced "flexibility of notation beyond the use of artificial digits to the use of established numbers with unofficial meanings."

(iv) The traditional pattern was disturbed in certain fields such as law and mathematics. A total recasting of these schedules was done.

(v) The number 999 was made free, "so that 'extra-terrestrial' subjects can be accommodated.

(vi) Many relocations were carried out to achieve a superior helpful sequence. In all, there were 396 relocations. There were fewer relocations in this edition than there were in DDC17.

A relocation represented "an adjustment in the schedules resulting

in the shifting of a topic between successive editions from one number to another." (DDC18, vol. 1, p. 31.) The aim was to achieve a helpful sequence.

DDC19 appeared in 1979 in 3 volumes. The latest edition has been updated to keep pace with the growing universe of subjects. It represents a consolidation of efforts towards revisions and additions carried out in DDC17 and DDC18. It is an improvement over earlier editions.

Some of the features of DDC19 are given below:

(i) There is "more recognition of the possibilities of subdividing various subjects according to more than one characteristic, and there are more notes establishing the order in which the classifier is to consider or combine those characteristics" (DDC19, Vol. 1, pxxi).

(ii) Greater provision for notes of explanation and instruction.

(iii) Greater commitment to international use and value.

(iv) 301-307 sociology has been recast from former 301. Political process has been recast from the numbers 324 and 329 (enables avoiding notational bias in favour of United States political parties). Area notation 41-42 has been revised. In addition new schedules for sociology and political process; a number of other subjects have been expanded.

(v) In addition to relocations in completely revised schedules and tables, there are 340 relocations.

(vi) Rule for use of old numbers relaxed.

(vii) Table 1 (standard subdivisions) provides a table of precedence, enabling one to decide the order of precedence of standard subdivisions, if two or more standard subdivisions are applicable.

According to Forest Press Committee, "20th full edition and 12th abridged edition of the DDC will be published about 1990. With the previously accepted principle of continuous revision of the DDC, phoenix (completely revised) and other schedules with major revisions may be published as separates between editions. New editions, therefore, will cumulate schedules, tables and or indexes published as interim separates. Separately published schedules and tables will be applied, following their publication, by the Decimal Classification Division of the Library of Congress" (*Decimal Classification, Additions, Notes and Decisions*, vol. 4, no. 5, spring 1985, p. 10). This clearly lays down policy of revision.

The revision of DDC is along right lines. The revision is slow because it takes into consideration the interests of a large number of established users. DDC18 recast the schedules of law and mathe-

matics. DDC19 recast the schedules of sociology and political process. Similar treatment should be given to many other subjects (for example, life sciences). The drastic revision of these subjects is an attempt to break away from the rigidity of notational integrity, so as to conform to present-day requirements. During recent editions, DDC has attempted to make a greater use of synthesis. In order to do this successfully, different classes of the scheme should be revised and designed so that synthesis can be used fully and effectively. In DDC18 and 19 there is a greater provision for instructions for the consistent placing of complex subjects. In case synthesis is not possible, instructions have been given regarding the practice to be followed. These lines of development are a healthy sign. Directions have been provided for overseas users to meet the local requirements. This is obviously an attempt to make DDC an international scheme in the true sense. It is certainly attentive to the suggestions of users.

The revision of detail and relocations is rather conservative, as compared to schemes such as CC and UDC. It follows a middle course between notational allocations, keeping pace with the growing universe of subjects.

The scheme is going to survive, in fact prosper very well despite the prophets of doom, who have predicted otherwise. In fact, there has been increasing interest and greater confidence in DDC during the past few years.

2 UNIVERSAL DECIMAL CLASSIFICATION

Any user of UDC is free to send a proposal for revision to an appropriate national body. The national body then forwards it to the Central Classification Committee (CCC). CCC is the FID body responsible for the development, as well as the maintenance of UDC. A request thus forwarded to CCC may result in the original requester to prepare a draft for comment.

The draft is circulated to interested parties by the appropriate national subject committee. At the stage when agreement has been reached, it is forwarded to the international subject committee.

Once the international subject committee approves it, the draft is sent to CCC. CCC studies the draft carefully, to determine whether or not it comes in conflict with existing schedules. Once found satisfactory, it is published as *P notes*.

P notes is a provisional or proposed alteration. It lies on the table

for four months. During this period if no objection is received, the proposal is considered accepted and entered into the master copy.

Every year, *P notes* which have been accepted are cumulated into *Extension and corrections to the UDC*. These are cumulated into series covering a period of three years each. In due course of time, they are incorporated in the various full, medium and abridged editions in several languages. However, in practice, it may be several years before an approved amendment is incorporated.

The revision policy of UDC is given below:

(i) If found necessary, certain sections are made free. This is achieved through merger, reconciliation and rationalization of frozen or redundant sections. These liberated sections are then used for providing new subjects. It may be noted that if a number becomes obsolete, it is reused after ten years (period of starvation).

(ii) To provide for more specialized sub-subjects, new sections are created through the process of "dividing and sub dividing" sections.

The revision policy of UDC is rather slow, due to the cumbersome procedure. It can take as much as ten years for a proposal to be accepted. Two years is the minimum period. However, in a developing subject two years are a long period.

The revision policy is not at all drastic, because of the pressure from its users. However, due to the demands of UNISIST and the challenge of the universe of subjects, UDC is beginning to undergo major changes. It is being revised so that it can be used in information storage and retrieval with computer.

An abridged edition was published in 1961; therefore, it needs to be revised fully to bring it up-to date. In view of this, one has to look into different places to ensure that the most recent schedules are being used. In addition, the problem is that *P notes* may be issued in English, French or German, so that they need to be translated.

The strength of UDC also lies in the revision policy. The users who use the schedules are responsible for drawing up new schedules, and these are scrutinized by subject experts and others. CCC examines the proposals, to look at them from the point of classification.

The revision of UDC, through "freeing of sections" and "dividing and sub-dividing of sections," as described earlier, is a temporary solution. It is cumbersome and lacks a systematic approach. There is no denying the fact that UDC has inherent potentiality, which needs to be exploited fully, the aim being to develop it into a self-perpetuating scheme of classification in the true sense, so that it is able to meet the onslaught of knowledge effectively. It would thus be

able to provide a great deal of autonomy and guidance to a classifier.

The inherent potentiality of indicator digits like the colon (:) and square brackets [] has not been exploited fully. There is a need to examine them carefully, and put them to more versatile use.

It is suggested that UDC make an explicit use of the principle of "unit schedules" consistently, to remove existing confusion and variation interpretation. This will allow for a fuller facet analysis and synthesis. This will reduce the process of dividing and sub-dividing, as done at present through enumeration to the bare minimum, whereby it will ensure autonomy to classifiers and also add to the mnemonic quality of the notational system of UDC. This will make UDC more versatile, and in a better position to meet the requirements of its users.

In UDC, many of the subjects enumerated in the schedules are a mixture of the personality, matter and energy facets. This has added to the inefficiency of the scheme. In order to make explicit use of facet analysis, suggested in the previous para it is essential that the subjects representing "things," "kinds," "parts," "properties," "processes," "operations" and so on are enumerated as "unit schedules," and proper provision made for their synthesis. The unit schedules could be recognized in terms of personality, matter, energy, space and time (the last two facets have already been used in clear terms).

Lloyd has suggested a two-level UDC:

"This might comprise

(a) a broad basic schedule, partially restructured on the lines of (if not the same as) the SRC or BS0. . . and of not more than about 5,000 divisions, to serve as a standard swithing/transfer device, as a broad library shelving/filing scheme and as the framework for:

(b) a detailed schedule for depth retrieval and information exchange, with a greatly elaborated array of general entity facets (also usable independently) and multifarious special facets complementing the broad framework of (a).

If some such solution proves feasible with the broad schedule (a) as a much-pruned version of existing abridged editions and the detailed schedule (b) of about the same scope as the British Medium Edition (BME) but with full facet arrays, UDC central management and up-dating would be much facilitated and the UDC certainly

made more viable."¹

This is a good suggestion, which could be put into practice.

The future of UDC is assured. The scheme has a large following. The organization looking after it has influence at the international level. Also, attempts are being made to revise it so that it can keep pace with the growing field of knowledge. Due to the pressure of its users, it has not been able to achieve drastic revisions as required. Its users are willing to accept only minor changes and adaptations to meet the new concepts, which are considered necessary.

3 LIBRARY OF CONGRESS CLASSIFICATION

Library of Congress Classification is a purely enumerative scheme planned for the classification of the Library of Congress collection. The Library of Congress looks after the development of the scheme.

The scheme consists of 31 volumes covering 21 main classes. J.P. Immroth has listed 84 physical volumes of the schedules, covering all the revisions of 31 volumes together with the indexes available.

Each main class is revised separately, without giving attention to other classes. Cross-references to other classes are given where considered useful.

The process of revision is continuous. As soon as books on new subjects are received, the new places are decided to accommodate these. When considered appropriate, a new edition of a class is published. During recent years, the practice has been to reprint the previous edition, inserting a supplementary table and index, giving additions and changes. Due to this kind of approach, a classifier is always expected to look in two places, so as to ensure that he uses the latest schedule.

The individual schedules are kept up-to-date by including all the changes as soon as they are accepted in *LC classification—additions and changes* quarterly. Later, these additions and changes are incorporated in the new editions of individual schedules. Information about revised editions is noted in the weekly *Library of Congress Information Bulletin*.

Cumulations of editions and changes are available, which greatly reduce search time. These are:

¹Arthur Maltby, ed, *Classification in the 1970s; a second look*, London, Bingley, 1976, p. 115.

Library of Congress classification schedules: A cumulation of additions and changes for 1974-77 . . .

Library of Congress classification schedules: A cumulation of additions through 1973.

The revision is carried on in a continuous basis, and is also extensive regarding modifications and additions of further details. The revision in the matter of relocations and reconstruction of classes is done on a limited scale. Revision is considered balanced and satisfactory by its supporters.

4 COLON CLASSIFICATION

S.R. Ranganathan died in 1972. Therefore, the responsibility for revising CC lies with the Sarada Ranganathan Endowment for Library Science.

The first edition of *Colon classification* was published in 1933. The sixth edition was brought out in 1960. This edition was reprinted in 1963, with certain amendments. Revised schedules for a few basic subjects going with CC7 have already appeared in *Library Science with a Slant to Documentation*. CC is being published in parts. At this rate of revision, it will take many years before CC7 will be completed. The schedules of basic subjects were included in 1973 in *Library Science*, but the schedules of common personality isolates, common matter isolates and common energy isolates have not been finalized.

New editions of the schemes are published at intervals. Each new edition has differed a great deal from its earlier editions. The usual practice has been to discuss the changes involved by means of articles in periodicals. In order to keep the schedules up-to-date, bibliographies, especially subject bibliographies, are examined. As a result, new concepts which are not found in the schedules are noted down. These are incorporated in the arrays with the help of principles of helpful sequence, and appropriate notation is allocated. These changes are reported from time to time in *Library Science* and *Proceedings of DRTC Annual Seminar*. However, no bulletin is issued by DRTC to keep the users well-informed about the changes accepted for incorporation in CC. It is suggested that either a separate bulletin be issued or the last few pages in *Library Science* be reserved for giving additions, notes and decisions.

The fourth, fifth and seventh (based on the schedules which have appeared so far) editions are substantially revised editions. There is

no policy laid down for revision. Major changes have been incorporated in the seventh edition, keeping in view the changes taking place in the universe of subjects. The changes are so enormous that many of the libraries using CC would find it difficult to change over to CC7.

The revision policy of CC has been criticized a great deal. Editions have been brought out regularly but radical changes have been carried out to meet the requirements of the theory of library classification and those of advancing knowledge.

The introduction of a variety of indicator digits has made the notational system increasingly complex. Originally, the hyphen (-) and the colon (:) were the only indicator digits used to separate the facets, but the number of indicator digits used in CC7 is quite large. Other major changes in CC7 include the change of some energy isolates into matter property isolates.

CC7 has turned out to be a freely faceted classification based on a sound theory of library classification. Therefore, it would become easier to revise future editions of *Colon classification*. It becomes possible to revise the schedules for subjects going with particular basic subjects, keeping in view the new developments in those subjects, with least disturbance being caused to the basic structure of the scheme. In fact, any reallocation of isolates will involve change only within a reasonable range of the sequence of subjects. That is, it will not lead to total change involving the shifting of a compound subject from one basic subject to another, which very often happens in an enumerative classification, because an enumerative scheme enumerates compound subjects. In addition, due to the improvement in the methodology used for designing CC, it is in a better position to face the onslaught of a growing universe of subjects.

5 BIBLIOGRAPHIC CLASSIFICATION

Bibliographic classification is maintained by means of the *Bliss classification bulletin*. The *Bulletin* appears annually, and is published by the Bliss Classification Association. During recent years, substantial additions made to BC in scientific and technical fields have appeared in the *Bulletin*, which keeps the users of the scheme well informed.

BC2 has been planned in 20 volumes. A few volumes have appeared already. BC2 has been prepared under the auspices of the Bliss Classification Association. The main force behind the revised edition is J. Mills. Other persons associated with the revision are

Vanda Broughton and Valerie Lang.

Out of 20 volumes of BC2, eight have come out. Each volume has a separate index. Other volumes are expected to come out as soon as completed. A librarian will have to wait till the last volume comes out. One advantage of this approach is that a library need not purchase all the volumes but only those which are of interest to it. Volume 9 covers education and volume 13 deals with social welfare. Therefore, it becomes possible to revise an individual class, as well as issue it in revised form as and when found necessary.

BC2 is a radical revision, along the modern theory of library classification, to achieve a sound structure so that it would be able to sustain itself for a longer time. It is likely that future revisions of BC will not be required as frequently as that of DDC.

BC2 is a fully-faceted general classification scheme. The structure of main classes, as formulated by Bliss in BCI, has remained basically the same but alterations have been carried out, on an extensive scale, within-classes. The original principles and features of BCI which have proved to be sound, have been retained.

The following are the main features of BC2:

Application of facet analysis is used rigorously.

Consideration for literary warrant.

Terms in each class have been grouped on the basis of facets, and within each facet, arranged into specific arrays.

Greater use of non-hierarchical or non-expressive notation. Consistent use of citation order for arranging facets and isolates within arrays.

Reorganization of common isolates on a large scale.

Provision of more alternatives.

Restructuring of certain main classes (Library Science shifted from Z to 7/8).

Provision of a general class for multi-disciplinary studies of phenomena (entities, activities and processes, attributes).

Frequent application of retroactive notation for synthesis (it leads to avoidance of special auxiliary schedules, which were used on a large scale in BCI. It also enables a more detailed classification).

Use of the details and order of several existing special classification schemes (such as business, engineering, medicine, and physics, and BNB supplementary schedules), wherever found helpful. Thus class

¹D.J. Foskett and J. Foskett, *The London education classification : a thesaurus/classification of British educational terms*, 2d ed., University of London, Institute of Education Library, 1974.

J owes a debt to Douglas and Joy Foskett's *London education classification*² (2nd edition, 1974).

The scheme can be broadly applied for shelving documents, and also be used for information retrieval.

The type size used is too small. There is a summary index of places, but no index for auxiliary schedules has been provided. The instructions for the application of scheme leave much to be desired. This is especially true regarding instructions for the synthesis of classes. There are a number of mistakes and misdirections, for which lists of errata need to be issued. The scheme is biased towards British libraries, because in some of the classes more details for materials of interest to British libraries have been provided. For instance, this is the case under QFC/QFM Social security.

From the above, it should be clear that the revision has been radical and carried on in a rational way. It is likely that users of BC would be slow to accept changes. The lines for future revision seem to be well laid down. Perhaps there would be need for less frequent revisions than DDC. It would also be possible to revise each volume individually.

BC2 has many fine features, but it is not going to be adopted by many libraries because schemes like DDC, UDC and LC are well entrenched. It is not going to pose a challenge to these schemes, though it is a superior one. The future of BC would depend upon the reception given to it, and its success in winning over new users for the scheme.

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Chapter 28

EVOLUTION OF NOTATIONAL TECHNIQUES

0 INTRODUCTION

The history of notational techniques is the breaking up of the rigidity of notation. The rigidity of notation has been reduced in stages. However, the process has been quite slow. We have now reached a stage when highly developed notational techniques are available. These have enabled the notational plane to implement the findings of the idea plane in an effective manner. Rigidity or lack of hospitality on the notational plane has inhibited, for too long, work on the idea plane in the past. Due to the rigidity of the notational plane, the design and development of classification schemes were also faulty.

In fact, to a great extent, the history of notation is the history of classification—the reason being that classifiers and classificationists paid too much attention to notation, and the evolvement of notational techniques. This resulted in a neglect of the theory of library classification. Therefore, an examination of literature on library classification shows predominance of discussion about notation, as if notation were the only thing that mattered in classification.

1 EARLY SCHEMES OF LIBRARY CLASSIFICATION

Perhaps till the middle of the 19th century, the number of specific subjects on which books were written was rather small. Therefore, library classification was not much of a problem. At that time, continuous integers were used to represent ideas. A time came when such a system broke down. Thus, the gap notation was adopted.

2 DDC

In 1876, Melvil Dewey found that gap notation was inadequate. He

used integers, consisting of pure notation of Arabic numerals, along with the decimal fraction notation in the *Dewey decimal classification*. The use of decimal fraction notation led to an increase in hospitality in chain. A dot (.) was also used for the sake of convenience. Besides, Dewey also introduced the "others device" to achieve hospitality in array.

When Dewey appeared on the scene, the fixed location arrangement on the shelf was in use. The place of a book was marked and fixed on the shelf. Perhaps he was the first person to get away from the fixed location system of arrangement.

Dewey brought out successive editions to allocate suitable places for new subjects in a helpful order. He was able to find only reasonable approximate places, the drawback being that the chain had been used for expansion along two sides. Many of the facets are frozen.

During the recent editions of DDC, places for many subjects have been reallocated to attain a helpful order.

3 EC

The Expansive classification of C.A. Cutter was developed in seven stages (i.e., seven expansions). It was first published with an index in 1893. It made use of Roman capitals for main classes, providing a longer base. Roman smalls were used in latter arrays. Arabic numerals were used for common isolates. Cutter adopted the decimal fraction notation. There was meagre provision for common isolates in auxiliary tables. The dot (.) was used as an indicator digit for common isolates. However, geographical isolates were connected directly, without an indicator digit.

4 UDC

UDC started appearing in parts in 1899. However, the first complete edition came out in French in 1905.

UDC uses mixed notation. Its base is the same as that of DDC. It is an almost facted classification, often providing for facet and phase analysis. It provides several auxiliary tables and indicator digits such as + / : [] : := (0 . . .) (1/9) (= . . .) " . . . " 00 — 0—0' (apostrophe) to connect facets and phases. It has also adopted the

sectorizing device, and is a great advance over DDC, because it is possible to connect two facets—though DDC also started using a divide-like device later on.

5 LC

The LC schedules were issued from 1901 onwards. Its base consists of Roman caps, and Arabic numerals are used in letter arrays. It uses rigid integral notation, with plenty of gaps. It does not use the decimal fraction notation. The dot (.) has been introduced as an indicator digit.

6 SC

J.D. Brown brought out *Adjustable classification* in 1897. Here, he attempted to provide for the future by leaving gaps (he used a series of ordinal numbers). He replaced it by subject, *classification* because it was not strong for meeting the onslaught of a growing universe of subjects.

J.D. Brown's *Subject classification* took final shape in 1906. Its base consists of Roman caps, though, it also uses Roman smalls and Arabic numerals. It provides one auxiliary schedule, called the categorical table, which reminds one of facet analysis.

It uses the dot (.) as an indicator digit for use with the categorical table, and also the idea of integrative levels. Meagre provision is available for the facet and phase analyses.

7 INDIAN SCHOOL OF THOUGHT

CC1 (1933)

CC1 used the mixed notation. Its base consisted of Roman capitals and 1. However, in the later arrays, Ranganathan adopted Arabic numerals. Roman smalls with anteriorizing values were used for approach materials. CC1 used the octave notation and the decimal fraction notation.

In CC1, isolates in array of Order 1, after the first eight isolates, were generally represented by means of digit pairs, beginning with digit 9 in most cases. Some kind of term was also allocated to refer

to all such extra isolates, and same was placed against the digit 9. This means that subdivisions of 9 were used to individualize the residual isolates (isolates coming after the first eight digits). This was an extension of the "others device" of DDC. This usage of notation was called the octave notation.

In addition to the above, the following devices were employed:

Colon device, geographical device, chronological device, favoured category device, classic device, subject device, alphabetical device and bias number device.

Facet analysis and phase analysis were made use of in CCI. For facet analysis, the colon (:) and the zero (0) were employed for the phase analysis.

The notation in CCI reflected the structure of the scheme, and was also indicative of the kinds of schedules that had been employed.

CC2 (1939)

By the year 1937, a number of cases came up, in which a comprehensive term could not be found for referring to residual classes in the octave notation. In order to overcome this problem, CC2 (1939) postulated 9 as a semantically empty digit, so as to increase the capacity of an array.

The last octave principle and penultimate octave principle were employed.

The delta (Δ) was used to represent spiritual experience and mysticism.

The hyphen (-) was adopted to form superimposed or compound isolates with sub-facets.

CC3 (1950)

Ranganathan recognized different phases.

1951

Separation of the work of design, and development of the scheme at three planes, namely, idea, verbal and notational planes.

Concept of optional facets was developed to remove rigidity in the facet formula. The rigidity of facets often led to a cluttering of connecting symbols (later called connecting digits, and now called indicator digits), which was irritating. (For example class number for designing of electrical engineering would be D66 : : 4)

It was realized that all possible facets of all possible specific subjects can be considered as the manifestation of one of the five fundamental

categories. This led to the removal of rigidity in the order of facets.

Deciding the sequence of facets independently for each subject led to inconsistent results. Thus, it was decided to arrange the facets according to the principle of increasing concreteness. This further led to the concept of rounds and levels.

CC4 (1952)

Different indicator digits, ; : . were employed for five fundamental categories. The dot (.) was used for both space and time facets. Other indicator digits introduced were the backward arrow (\leftarrow) and the forward arrow (\rightarrow).

The concepts of rounds and levels were also used.

The following Greek symbols were introduced:

λ Animal husbandry

β Γ μ ν Σ Partial comprehension of main subjects (now called agglomerate basic subjects.)

1953

D. B. Krishna Rao suggested the concept of zones.

1955

At the suggestion of B.C. Vickery, packets were adopted for subject-devised isolates.

1956

Concept of telescoping facets was accepted.

1957

The second edition of Ranganathan's *Prolegomena to library classification* appeared in 1957. It allocated zones for different kinds of isolates. At the Dorking Conference (1957), Ranganathan described the postulational approach to library classification.

CC5 (1957)

Eta (η) was used to represent mining.

Starter "(" and arrester ")" were adopted to avoid homonyms in the application of the subject device, and the subject device number was regarded as a single digit.

CC6 (1960)

CC6 came out in 1960. It incorporated the following features:

Greek letters were avoided. λ was replaced by KZ, and η was replaced by HZ. In CC5, pharmacognosy was represented by L : 6 and social work by Y : 4 : 6. But in CC6, these were treated as main subjects and denoted by LZ and YZ respectively. In this edition Z was used for two purposes, such as to represent new main subjects and to denote subjects for partial comprehension (later called agglomerates). This was a fault.

1961

Application of zone analysis to space and time facets. The inverted comma (') was suggested as the indicator digit for the time isolate, instead of a dot (.) to overcome rigidity in CC.

CC6 Revised (1963)

The following were the features of the sixth revised edition.

X was employed as an emptying digit, so as to remove the homonym created due to the use of Z for two purposes mentioned earlier. Thus, "KX," "HX," "LX," and "YX" were employed to represent animal husbandry, mining, pharmacognosy and social work, respectively. Mathematical science was denoted by "AZ" (β in CC6) and physical science (T in CC6) by BZ. NZ was inadvertently printed as NX in this edition. Σ (Sigma) was left unchanged, again inadvertently.

Ranganathan found that the use of the same indicator digit (that is, the dot) to connect time and space facets created difficulties. Therefore, the inverted comma (') was suggested as an indicator digit for connecting time facets.

1963

Ranganathan postulated the concept of "emptying digit."

This digit was meant to solve the problem of interpolation between any two consecutive ordinal numbers. It provides a remarkable approach to create infinite hospitality in an array.

Evolved the methodology for designing a depth schedule on the basis of refined techniques and guiding principles.

Evolved the concept of four zones with 40 sectors.

1964

Ranganathan put forward the formation of six zones and 108 sectors by treating z, 9 and Z as empty digits.

1966

Concept of subject bundle (later called cluster).

1967

Postulated T, V and X as emptying digits and U, W and Y as emptying digits for interpolation in an array.

1969

Colon classification, edition 7 (1971): a preview, published in 1969, made the following proposals:

(i) It postulated T, V and X as emptying digits and postulated U, W and Y as empty-emptying digits to interpolate main subjects in the array of main subjects and new countries in the schedule of space isolates. The inverted V (\wedge) was postulated as an empty and emptying digit in the schedules of isolates. The zero (0) was meant to be used as a semantically empty digit as sectorising digit.

(ii) The equal-to sign (=) was postulated as an indicator digit for connecting the abbreviation of the component words of a multinomial term for use in alphabetical device.

The ampersand (&) postulated as an indicator digit for phase relations.

The upward arrow (\uparrow) postulated as an indicator digit for anteriorizing common isolates.

1973

A. Neelamegham and M.A. Gopinath suggested the use of the equal-to sign (=) as an indicator digit for connecting a speciator of Kind 2 (previously called special component). They also suggested the use of a plus (+) sign for connecting the component numbers derived by means of applying device to a multinomial.

Note: In CC7, Z has also been postulated as an emptying digit.

8 BC

Henry Evelyn Bliss is the author of *Bibliographic classification*. The first edition of BC appeared in its complete version between 1940 and 1953, under the title *Bibliographic classification, extended by auxiliary schedules for composite specification and notation*. The second edition is planned in 20 volumes. It started appearing in 1977.

BC1 is a largely non-hierarchical scheme, using decimal fraction notation. It uses mixed notation, consisting of 26 Roman caps, 26 Roman smalls, nine Arabic numerals (excluding '0' zero). The star-

ter, dot, apostrophe, comma and hyphen were used as indicator digits. The indicator digits (& and %) were introduced in the final volume of BCI, and were used very rarely, and later withdrawn.

In BC2, retroactive notation has been employed within each homogeneous class (but not between classes). Here, indicator digits such as the comma and hyphen have been replaced by two basic types of characters (letters and numbers), but there are instances when the hyphen may be employed profitably. BC2 uses digits 2,3,4,5,6,7,8, and 9 as indicator digits.

91 RIDER'S INTERNATIONAL CLASSIFICATION

Uses pure notation, consisting of Roman caps. Provides readymade class numbers. No number is more than three digits. There are explanatory notes, gaps are left for future expansion, as well as the use of indentions to indicate divisions and subdivisions.

Uses non-structural notation (violates the hierarchical pattern).

92 CONCLUSION

The study of the development of notational techniques shows that we have reached a stage when it has become possible to design a scheme in which each compound subject is allowed to determine its facets, and also facet sequence. The facet sequence being determined with the help of guiding principles, there is no rigidity about the number of facets or in the succession of facets. Such a scheme has been called by Ranganathan by the name "freely-faceted classification." *Colon classification* is making an effort to become a freely-faceted analytico-synthetic classification.

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Chapter 29

AUTONOMY AND GUIDANCE TO A CLASSIFIER

1 AUTONOMY FOR A CLASSIFIER

11 What

The classification of a subject involves translating it from natural language into a classificatory language of ordinal numbers. This translation may happen to be coextensive with the original subject, or its extension may be greater than that of the original subject. There is a third possibility—that there may be no suitable number available in the scheme to serve the purpose, because the subject may be a new one.

In case the translation is not coextensive, or no suitable number is available in the scheme for a new subject, the classifier may be expected to construct his own number. The power to construct his own number is called autonomy for a classifier. It means the ability to stand on one's own and be self-reliant as far as possible. Thus he need not wait for the instructions from the classificationist.

12 Why

The universe of subjects is dynamic, and new subjects in various forms are always cropping up. Therefore, the schemes are revised from time to time to make provision for new subjects. The process of revision is rather slow, and as a result the library classification schemes are always found lagging behind new developments in the universe of subjects. As library classification schemes take their own time to provide a suitable place for the new subjects, much time is wasted before the classifier is informed by the classificationist/organization looking after the scheme regarding the place for a new subject. In order to get over the problem of time-lag, a classifier should be provided with the power to construct the numbers for new subjects

on his own. This would enable a classifier to give a number much before the same is provided by the scheme. This power may be provided to the extent found feasible.

13 How

In order to provide autonomy to a classifier, a scheme for classification should make a provision in the scheme, so that a classifier is able to construct his own class numbers for new subjects.

Use of devices (Chapter 14), scheduled mnemonics, seminal mnemonics (Chapter 11) and so on provide autonomy to a classifier.

In case a new subject comes up, it will require the formation of a new isolate, or the sharpening of an existing one. An isolate number coextensive with it will also have to be provided. The use of devices for the purpose will make it possible for a classifier to find a solution without waiting for guidance from the classificationist. In a freely-faceted classification, devices will generally enable the different classifiers working in different places to reach the same isolate idea and isolate number.

Seminal mnemonics should be regarded as a powerful tool, which can provide a high degree of autonomy to a classifier. There are two preconditions for its use. The scheme of classification being used must have employed the concept of seminal mnemonics. At present, *Colon classification* is the only general scheme which uses this concept. Secondly, the classifier should have spiritual insight to be able to perceive an identity of patterns at the seminal level, or possess intuition to perceive an identity of patterns. If these conditions are fulfilled, the classifier would be able to identify a seminally equivalent concept, and allocate a digit(s) with a high degree of probability that the same digit(s) would also be allotted by the classificationist.

Purely enumerative scheme: A purely enumerative classification scheme provides readymade class numbers. It does not provide any autonomy to a classifier. It would not provide any provision for incorporating new subjects. There would also be no provision for expanding a class number, if it is not coextensive with the subject being classified.

A scheme of classification such as the *Rider's International classification* provides a single schedule of enumerated subjects. Of the various subjects enumerated, most are compound subjects. The question of any autonomy does not arise. LC is another example of purely enumerative classification.

Almost enumerative scheme: Dewey decimal classification provides

a long schedule of enumerated subjects, out of which most are compound subjects. Besides, it provides a separate schedule of standard subdivisions covering common forms and modes of treatment as well as schedules for areas, languages, persons; racial, ethnic, national groups; and so on.

The scheme has also made provision for devices (subject device, geographical device and so on). Very often a ready made class number is available, but in some cases class numbers for compound subjects can be constructed with the help of devices and schedules of common isolates.

However, editor's introduction says, "There is little doubt the classifier will have works on subjects for which the schedules and index have provided no place either explicitly or implicitly. He should not make up his own number for such a subject; the next edition could easily place the subject in a different number and use the number he devised for something else . . . He should always stop at the most specific number possible in the schedules, even the it may be only a three-digit number. Then, if the editors supply a more detailed number later, he may use it simply by adding digits to the number originally chosen." (DDC 18, v. 1, pp. 35-6). Thus a limited degree of autonomy is available to a classifier. *The subject classification* is another example of an almost enumerative scheme of classification.

Rigidly faceted scheme: A rigidly faceted scheme includes the almost faceted scheme, the fully but rigidly faceted scheme and the almost freely faceted scheme. A rigidly faceted scheme provides some autonomy to a classifier, though no autonomy is available for making an addition to a scheme of basic classes. Here a classifier is expected to construct the class numbers of subjects through his own effort, but if a "subject presents more facets than those provided for in the facet formula for in the facet structure of the compound subjects going with the basic subject in question, the classifier has no freedom to make the class number coextensive" (*Prolegomena*, p. 451).

UDC is an almost faceted scheme. It provides independent schedules for common auxiliaries of form, language, race and nationality, place, time and point of view. It may be added that all time isolates have not been enumerated and others can be constructed by a classifier on the basis of instructions. This provides autonomy to a classifier. Such autonomy is also available in case of other auxiliaries to a limited extent. For certain basic and compound subjects, it also provides schedules of special auxiliaries. Most of the compound subjects are enumerated; other compound subjects can be formed with the

help of the colon device. The colon device can also be employed to form complex subjects. "When the listed UDC auxiliaries (1/9) are unsuitable for specialist use, an established non-UDC regionalization scheme may be introduced after the asterisk (within the brackets), provided that reference is made to the scheme adopted in a footnote or introduction, e.g., 598.2 (42* . . .) British bird distribution by Vice-counties (Watsonian nos.)" (UDC, p. 13). Similarly, BC1 is also considered an almost-faceted classification. BC2 has become fully faceted. It provides a considerable amount of autonomy to its users.

The first three editions of *Colon classification* (edition 1, 1933; edition 2, 1939; edition 3, 1950) are regarded as Version 1 of the scheme. Version 1 is severely rigid, though fully faceted. In it, short, separate schedules of basic subjects, common isolates and special isolates occurring with different basic subjects are given. Thus, this version is fully faceted. However, the facets going with each basic subject and their sequence are predetermined. As a result, this version is severely rigid.

The fourth (1952) to sixth editions (reprint with annexure, 1963) are regarded as Version 2 of *Colon classification*. This version is considered as an almost freely faceted one. It uses different indicator digits to connect different kinds of facets. It also uses the concepts of rounds and levels. It removed rigidity regarding number and sequence of facets going with a compound subject. But some rigidity remained with regard to the levels of a facet within a round. Thus, this version was not fully freely faceted.

Version 2 of CC does not usually give readymade class numbers, except for basic subjects. Schedules are provided for basic subjects and for isolates in different facets. Class numbers are constructed on the basis of instructions. It may be noted that all isolates in different facets have not been enumerated. Some have been enumerated and others can be constructed by a classifier on the basis of instructions. This provides a great deal of autonomy to a classifier.

Freely faceted classification: A freely faceted classification provides a greater degree of autonomy than other species of schemes for the classification of subjects. There is a great measure of autonomy. A classifier is not restricted by a rigid facet structure. "Whatever facets a compound subject may present, he can provide for all of them in the class number of the subject. In any faceted classification, each enumerated schedule is fairly short. Therefore, picking up the correct facet number for any facet is an easy matter" (*Prolegomena*, p. 451). In case a compound subject brings forth a facet for which no sche-

dule has been provided, then with the help of postulates, canons and principles prescribed by the scheme, the classifier can improvise the schedule.

It may be added that Version 3 of *Colon classification* is under preparation and some of the schedules have already appeared. It is likely to be based on a dynamic theory of library classification, whereby it will tend to become a freely-faceted analytico-synthetic scheme for classification. As a result, it will become possible to provide a helpful place for any new main subject, or non-main basic subject—simple or compound in any facet. This means that a classifier using Version 3 of *Colon classification* would be able to get a great measure of autonomy.

14 A Case for Autonomy

We have already seen that autonomy for a classifier is certainly desirable. But it has to be used rather carefully. A classifier who lacks a proper understanding of the techniques and theory of library classification, applicable to a given scheme, can make a mess of the autonomy given to him. In order to get the best out of a scheme, it is desirable that there be a centralization of cataloguing and classification at the national level. As a result, experienced and well qualified classifiers would be available at the centre, who would be in an excellent position to take full advantage of the autonomy offered by a scheme. In case a freely faceted scheme is used at such a centre it would become possible to achieve greater autonomy.

Autonomy does not mean that he should even ignore external constraints. Thus all the decisions to be taken by him should be governed by the 'given circumstances'.

2 GUIDANCE TO A CLASSIFIER

Let us take up the question of guidance to a classifier, with respect to determining the subject of a document to be classified.

In enumerative classification, postulates, canons and principles of the theory of classification are of no help in determining the subject of a document. However, canons for the verbal plane (the canon of context and the canon of enumeration) can be used, provided these have been followed by the classificationist. In such a case determining the subject would become a matter of trial and error.

In a rigidly faceted classification, guidance is available to a classi-

fier to determine the subject of a document being classified. "The facet formula for the facet structure tells the classifier what isolates he should look for in a compound subject. Moreover, postulates for the idea plane and the canons for the notational plane give him further help. This is in addition to the help given by the canons for the verbal plane" (*Prolegomena*, p. 451).

A freely faceted classification provides greater guidance to a classifier in determining the subject of a document, than does a rigidly faceted classification. This is due to the total effect of the canons, principles and postulates which form its basis.

Postulates are helpful in determining the diverse facets of compound subjects. Principles such as the wall-picture principle, along with its corollaries, help him in arranging the facet terms. Such an approach leads to a consistent arrangement of facets. In addition, canons of mnemonics can be helpful in creating a new focus, or sharpening any focus (it may be within an isolate facet or within a basic facet, or within the totality of all the subjects).

3 CONCLUSION

A scheme which provides devices more freely for the construction of class numbers, as well as separate schedules for common isolates, is able to provide a greater degree of autonomy to a classifier. The availability of guiding principles for the expansion of schedules further adds to the autonomy. A purely enumerative scheme and a freely faceted scheme belong to two extremes. The earlier one provides no autonomy and the latter provides a great deal of autonomy. The greater the autonomy, the greater is the possibility for a scheme to be able to keep abreast of the growing universe of subjects. However, autonomy offered by a scheme must be used very carefully. A classifier who does not have proper understanding of the techniques and theory of library classification regarding the particular scheme can easily misuse the autonomy, leading to chaos.

An enumerative classification is unable to provide guidance to a classifier with respect to determining the subject of the document to be classified. Thus, he will have to follow the method of trial and error. A rigidly faceted classification is able to provide some guidance in this matter. However, due to its very nature, a freely faceted classification is able to provide greater guidance to a classifier than

a rigidly faceted classification. This becomes possible because of the overall effect of postulates, principles and canons, which form the basis of a freely faceted classification.

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Chapter 30

KNOWLEDGE CLASSIFICATION VERSUS LIBRARY CLASSIFICATION

Philosophers have been interested in knowledge classification (classification of the universe of ideas) for nearly four to five thousand years. Their aim was to group ideas on the basis of their degree of filiation. These groups were arranged in a helpful sequence. This resulted in the formulation of schemes of knowledge classification. It is on the basis of knowledge classification that a philosopher organizes his researches into the ultimate realities. It is also through such a scheme that he tries to communicate his ideas to others.

Library classification is concerned with documents, the aim being to arrange these in the most helpful and permanent order. Librarians are interested in the concepts dealt with in documents and not the abstract ones.

A comparative table for knowledge and library classification has been given below:

<i>Knowledge classification</i>	<i>Library classification</i>
Philosopher have been deeply interested in studying the mutual relations between ideas, and also their sequence. This led to the formulation of schemes of knowledge classification.	Librarians are interested in studying the mutual relations between concepts and also their sequence. This has led to the formulation of schemes of library classification.
Schemes of knowledge classification were often produced for their own sake, or for mental satisfaction.	Schemes of library classification have been produced for arranging documents in a helpful sequence, so that these could be retrieved to satisfy the interests of the users.
The philosophers are mainly interested in speculative and theoretical aspects of classification.	Librarians are interested in practical classification, which must be helpful to the users of a library/information centre/documentation centre.
The philosopher have not	Due to explosion of knowledge, there has been

<i>Knowledge classification</i>	<i>Library classification</i>
provided sufficient details.	continued subdivision of subjects to an increasingly minute degree. A present-day scheme of classification is expected to provide for minute subdivisions of each major subject. These subjects are arranged in a helpful sequence on the basis of mutual relationship.
Philosophers did not feel "obliged to carry out the subdivision of any subject to an ever-increasing degree of minuteness, to arrange them helpfully, and to maintain the arrangement consistently. As a result of the latter, they do not appear to have felt the need for representing each subject—major or minor, or tiny—by a system of ordinal numbers, now commonly called "class numbers." ¹	Each subject is provided a distinct class number, so that it can represent the degree of relationship. This means that notation has to be provided in library classification. This is a requirement, which clearly distinguishes library classification from knowledge classification.
Provision is not made for book number and sequence number.	In order to individualize each document provision has to be made for the book number. In a broken sequence, the sequence number has also to be provided as an additional element.
Unlimited hospitality is available in array and chain. There is no problem of interpolation and extrapolation in array as well as in chain.	Due to notational limitations, hospitality in chain and array is limited in most of the schemes of library classification. However, notational techniques have been developed, whereby it has become possible to achieve a tremendous amount of hospitality. This certainly is the case with <i>Colon classification</i> .
Generalia class is not required.	A provision has to be made for the generalia class. It accommodates documents dealing with all or many of the branches of the universe of subjects, but not restricted to any one subject.
Form class is not needed.	A form class has to be provided to accommodate documents, where the main interest is in the form of presentation or literary pattern, such as poetry, drama, fiction, literary essays, letters and so on. In these cases, form is of primary importance and subject has to be ignored.

¹Ganesh Bhattacharyya and S.R. Ranganathan, "From knowledge classification to library classification." In J.A. Wojciechowski, ed., *Conceptual basis of the classification of knowledge*, Munchen, Verlag Dokumentation, 1974, p. 128.

<i>Knowledge classification</i>	<i>Library classification</i>
Common isolate are not needed.	A provision has to be made for common isolates such a dictionary, periodical, encyclopaedia, directory, bibliography and so on. Similarly, a schedule for space and time isolates is a must.
There is no need for an index.	It is essential that a scheme for library classification should have an index.
The philosophers did not feel the need for an elaborate theory of classification.	As the intension of subjects to be classified is increasing, the number of principles required to deal with the universe of subjects is also increasing. The growing universe is expanding in unanticipatable ways and directions. Therefore, the theory of library classification has got to be dynamic to be able to keep pace with the problems appearing at the idea plane. The theory is useful to a classificationist as well as a classifier.
Schemes of knowledge classification have not been influenced in any way by schemes for library classification.	Schemes of knowledge classification have been of some use to librarians towards arranging broad subjects in a helpful sequence. However, librarians have not found these of much help, due to the fact that schemes of knowledge classification not provide a sufficient degree of detail.

From the above, we may conclude that library classification is knowledge classification with necessary adjustments, such as the provision of generalia class, common isolates, form classes, notation, book number, sequence number and so on. These adjustments are essential to allow for the way in which subjects are dealt within the books. There is no limit to these adjustments in terms of number or degree of details. In order to deal with the multidimensional universe of subjects, library classification schemes have now been formulated on a freely faceted analytico-synthetic model. This has proved successful.

Classification of knowledge has been a major problem. "Lately, it has evolved from a philosophical preoccupation into a specialized technique, a species of the general techniques of classification, far removed from philosophical preoccupations and equally ignored by philosophers. At the present time there exist powerful technical models of classification and highly developed classification of various branches of knowledge. What is lacking is a satisfactory general classification of knowledge and an adequate clarification of the philosophical problems underlying such classification. The need for classification is important from the theoretical as well as practical point of view because the general systems of classification of knowledge

depend on theories of knowledge."² In view of this, it is desirable that philosophers and others interested in classification (especially library classifiers and classificationists) should come together to discuss problems of common interest. The study of literature indicates that there has not been a sufficient exchange of ideas between philosophers and specialists, in library classification. There appears to be a gap between the two groups. Both use different approaches and methods, and even their aims are different. One group does not know enough about what the other was pursuing. Communication between two will certainly prove to be of mutual benefit.

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²Jerzy A. Wojciechowski, ed., *Conceptual basis of classification of knowledge*, Munchen, Verlag Dokumentation, 1974, p. 7.

Chapter 31

COMPUTER AND CLASSIFICATION

0 INTRODUCTION

The electronic age started after the Second World War. Computer is a gift of the electronics age. It is versatile machine, which can help mankind in many ways. We must accept it and utilize it to derive maximum benefit. In the present day world, its application adds to status and prestige also. Its strength lies in the removal of mental rudgery and extension of mental power. A computer possesses three important characteristics, namely, speed, accuracy and infallible memory. These lead to intelligent activities.

Potentialities of computer have been realized by librarians to a certain extent. This is apparent from increasing amount of literature appearing on the application of computer. The decades of 1960s and 1970s have witnessed unparalleled growth and development of library automation (application of new technology to the area of professional activity concerned with library and information science). This is also equally true for computer application to libraries. The on-line revolution is beginning to take place in libraries in USA and Europe. Therefore, 1980s shall prove to be a decade of great achievements. We in India cannot remain aloof from these developments.

1 CAPABILITIES OF A COMPUTER

A librarian, who intends to make use of a computer profitably must know as to what it can possibly do and what it cannot do. Therefore, let us try to understand the capabilities and limitations of a computer in general.

A computer possesses the ability to carry out big jobs involving enormous loads, which may prove to be beyond human brains or manual systems.

A computer can store vast amount of data (many thousands of

index references can be coded on a single reel of a magnetic tape).

A computer can search rapidly and efficiently and print out results rapidly.

A computer possesses infallible memory.

A computer is extremely reliable in what it has been programmed to do.

A computer possesses the ability to merge new data quickly into an existing data file or data bank.

A computer can do statistical analysis of words.

The third generation computers are highly sophisticated. These have huge memory, are faster and more capable than earlier computers. The cost per unit has also come down in recent years.

2 LIMITATIONS OF A COMPUTER

In order to apply computers effectively, it becomes essential that, we must realize the limitations of a computer. Some of these limitations are enumerated below:

A computer is considered fairly stupid and it cannot think for itself.

Cost of computer application can sometimes be too high as compared with manual operations.

In order that the scale of operation may become economical as well as efficient, then the information store to be handled must be a large enough.

Often too much time may be needed to prepare the information before it can be found acceptable for the purpose of computer application.

Occasionally principles for retrieval may have to be compromised so that requirements of the machine are satisfied.

If computer time allocated in 'sharing time' is reduced or delayed, then it may lead to a setback in the system depending upon application of a computer.

If the computer breaks down, then the whole system will go out of order.

3 SYNTHESIS OF CLASS NUMBERS

Use of computers for synthesis of class number with a freely faceted

version of *Colon Classification* has been described by A. Neelameghan and S. Venkataraman.¹ This has proved to be encouraging.

4 CLASSIFICATION SCHEDULE MAINTENANCE AND DISPLAY

Preparation of classification schedules for use at international, national, regional or local levels, or for revision purpose is a time consuming job. The first attempt towards schedule maintenance and display were reported in 1963 by Dan Fink for the ABC code and by Malcolm Rigby for the meteorology (UDC class 551.5) schedule and class 55. Both made use of IBM 1401 equipment.

In 1967, Robert R. Freeman put almost all of the Schedules for class 5 (UDC) in a file that could be displayed either in total or in any selected part on a console or, if desired, in printed form and with almost any type-font. By 1970, FID secretariat was key punching new extensions and corrections or P-Notes on DURA Mach X for input and output as a routine operation.

In order to save time and cost, A.C. Foskett has suggested the idea of producing UDC in computer Output Microfilm (COM)² instead of a hard copy. Under this procedure, revision would be concerned with the feeding of new data in in the form of corrections and additions to the existing file.

As we know that revision of conventional schemes of classification is a slow process because consultation and finalization by traditional methods takes too much of time. Therefore, Computers can be of great assistance in speeding up the revision of conventional schemes.

In view of above, computers should be used in the administration of the schemes. This would require the feeding of the schedules into the computer memories. In any such application, various thesaurus should be coordinated with the schedules of the concerned scheme. At least in the case of UDC, such a project would require international collaboration because of the availability of editions in many languages and wider participation in the revision work.

¹A. Neelameghan and S. Venkataraman, "Formulation of kernal terms . . ." *Library Science with Slant to Documentation*, 6, 1969, paper D.

²A.C. Foskett, *Universal decimal classification: the history, present status and future prospects of a large general classification scheme*, London, Bingley, 1973, p. 38.

5 PREPARATION OF INDEXES

51 Indexes to Schemes of Classification

Studies have shown that useful but crude type of indexes or bases for an index can be prepared automatically to schedules of scheme of classification by using KWIC, KWOC or KWIC/KWOC program modified by tagging keywords to be listed in the index. This has been demonstrated successfully in case of UDC. It is suggested that the same approach could be adopted to prepare a comprehensive index to LC with the help of a computer.

Centre Mechanized Documentation at Frankfurt-am-Main compiled the forty thousand entry alphabetical subject-index to the 1967 Medium German edition of UDC, through mechanization application. This has proved to be quite effective.

52 Indexes to Abstracting or Indexing Periodicals or Book Catalogues

An index was successfully prepared to *Geo-Sciences abstracts*, classified by UDC. An introductory index, both alphabetical, with UDC numbers and systematic index arranged according to UDC was also provided.

6 COMPARISON OF INDEXING LANGUAGES

Now, classification is regarded as one of the indexing languages. A computer can be used to compare the various indexing languages, regarding matter of their detail, specificity and coverage.

7 USE OF LIBRARY CLASSIFICATION FOR STORING INFORMATION ABOUT DOCUMENTS

A number of mechanized UDC-based systems for storing information about documents have been evolved. These systems³ have been used for a variety of purposes such as:

(a) File maintenance, control and display of bibliographic citations with or without abstracts;

³Malcolm Rigby, "Advances since Elsinore in use of automated equipment for vocabulary, classification schedule and information or data control on a universal scale," Paper read at Third International Study Conference on Classification Research (Bombay) (1975), p. 11-20, mimeographed.

- (b) Selective dissemination of information;
- (c) On-line interactive retrieval;
- (d) Library work and services;
- (e) Data or inventory control;
- (f) Network switching at national or international level.

As early as 1961, Malcolm Rigby at the American Meteorological Society demonstrated the preparation of computer-printed systematic indexes based on UDC. The current-awareness service entitled *Meteorological and Geostrophysical titles* used this type of index on experimental basis. This technique was used for accessions of the US National Oceanographic Data Centre and annual indexes to *Geoscience abstracts*.

McCash and Carmichael¹ have described use of UDC for user profile matching in a computer-based SDI service.

8 LIBRARY CLASSIFICATION BASED SYSTEMS FOR INFORMATION RETRIEVAL

Classification and indexing techniques have an important role to play in the design, development and operation of mechanized information storage and retrieval systems. A variety of services can be generated from such systems. In view of above, an attempt is being made to use sophisticated classification and indexing techniques to add to the capabilities of a computer.

Much research has been done on UDC as a language for information retrieval. In the United States, research on UDC in computer-based retrieval systems has been carried out by RR Freeman and P. Atherton in late 1960's in the AUDACIOUS (Automatic Direct Access to Information with the On-line UDC System) project at the American Institute of Physics. Similar research has been done by M. Rigby and T.W. Caless and others, who have tried to evaluate UDC as a tool for computer retrieval and discussed means and ways for its manipulation. Similar efforts have also taken place in other countries. They have demonstrated the feasibility of UDC as an indexing language in a mechanized system. UDC can be used successfully in either a batch processing or interactive mode.

The findings of American Institute of Physics UDC project under

¹W.H. McCash and J.J. Carmichael, "UDC user profiles as developed for a computer based SDI service in the iron and steel industry," *J of Doc* 26(4), Dec 1970, 295-312.

Robert R. Freeman and Pauline Atherton formed the main theme of the *First Seminar on UDC in a Mechanized Retrieval System* and the same topic was the theme during the *Second Seminar on UDC and Mechanized Information Systems* held at Frankfurt in 1970. These seminars led to a definite and a far reaching conclusion that UDC can effectively serve as an indexing language in a mechanized retrieval system. It can be used in a batch processing or interactive mode.

UDC seems to be an out of date classification scheme. However, it has been found suitable for use in a large number of libraries. Its notation can be used for computer processing of information, profile matching in information dissemination and on line information retrieval. UDC notation is such that it is possible to search an identifiable part of the notation under a form division or country or any other element irrespective of the position of the element in the class number.

Due to certain limitations of UDC such as occasional violation of hierarchical pattern in the notation, defective auxiliary tables, use of the same indicator digit colon (:) for many purposes, filing problems etc., use of UDC for above purposes has led to certain difficulties. It must be added that in computer-based systems UDC must be used in association with other approaches. It is rather unfortunate that many of users of the scheme have not participated in the improvement of the scheme. Many of the powerful organizations, who matter have not given full support to it. For instance, the British Library has not given enough support to BSI to bring improvements.

Hindson⁵ has described application and development of UDC, principally by means of computer-based techniques available via large ICL 1900 series installations. Hindson during the decade 1968-78, developed a multipurpose data base and operated it using remote computer resources equipped with extensive telecommunication facilities.

Much research has been carried out on UDC as a language for information retrieval. In the United States, research on UDC as the indexing language for a computer-based system has been carried out by R.R. Freeman and Pauline Atherton in late 1960s in the AUDACIOUS (Automatic Direct Access to Information with an On-line UDC System) system at the American Institute of Physics.

⁵R. Hindson. "Development and utilization of an on-line information retrieval system in the steel industry using UDC as the indexing language." Paper presented at the Fifth Cranfield International Conference on Mechanized Information Storage and Retrieval Systems, 22/25th July 1975.

This led to the feasibility of use of UDC in an on-line, interactive retrieval system, using the nuclear science data base and the *Special Subject edition of UDC for Nuclear Science and Technology*. AUDACIOUS was probably the first on-line inter-active retrieval system, which used traditional classification and indexing tools such as UDC. The success of the experiment indicated the possible usefulness of other such schemes for the same purpose.

Similar research has been done by M. Rigby and T.W. Caless and others, who have tried to evaluate UDC as a tool for computer retrieval and discussed means and ways for its manipulation. Similar efforts have also taken place in other countries. They have demonstrated the feasibility of UDC as an indexing language in a mechanized system. UDC can be used successfully in either a batch processing or interactive mode.

The success of UDC in mechanized retrieval systems suggests that other schemes could also be used for the purpose. There may be some preference for UDC due to the following reasons:

(i) FID, which is responsible for the development of UDC has succeeded in building large files and prepared a large number of persons who are skilled in the use of UDC.

(ii) UDC is already being used on a large scale as indexing language in manually operated information systems. Here is a indexing language, which is already well developed for the purpose and the same can be used without spending too much of resources on developing another language.

(iii) UDC is already being used for exchange of documents and information at the international level. Therefore, it can be adopted for mechanized retrieval systems at international level.

(iv) For international networks, we can adopt UDC because it is not dependent on any natural language. It can overcome the weaknesses of natural languages to a large extent.

In case UDC is to be used in computer-based retrieval systems in future, then it is considered desirable that it should be developed keeping in view the requirements and capabilities of computer-based systems. It has been suggested that UDC should be revised taking into consideration principles and techniques of faceted classification. Sophisticated devices should be used for providing syntagmatic relationships. In addition a detailed thesaurus should be developed to be used in conjunction with UDC. UDC has been criticized for inadequate terminology (not up-to-date) in technical subjects. At present, FID and its Central Classification Committee is unable to maintain

the schedules in many languages up-to-date. This involves maintaining records in 20 languages. UDC file is expected to contain 500,000,000 characters (20 languages, 125,000 records in a full edition, 200 characters per record). This is due to lack of adequate permanent expert staff and inadequate communication between different committees.

In May 1968, DRTC initiated experiments to determine the feasibility of using a general purpose computer in a document-finding system based on a classified catalogue system using a freely faceted version of CC. The results have been encouraging. Experiments were also carried out to design a special purpose computerized document searching aid called 'Doc-finder'⁶. The objective was to establish one-one correspondence between the specific need of a specialist at the moment and the documents recorded in the memory of the 'Doc-finder.' The expectation being that depth classification would make the work of the 'Doc-finder' leakage-proof as well as noise-proof.

In an article B.S.S. Gupta has described an information retrieval system based on CC. He mentions a set of fifteen programmes, which can be used for storing and updating a catalogue, a classification schedule, an alphabetical index to the classification schedule as well as a catalogue of user profiles. The output options are interactive retrospective searching and selective dissemination.⁷

A set of experiments were carried out by Michael Shepherd⁸ to determine the suitability of CC as a basis for automated analysis, representation and retrieval of primary information from the full text of a document. He concluded that systems based on CC did not perform significantly better than other systems. In addition, these systems were more expensive to operate than simple word occurrence system. The conclusion to be drawn was that it would require more research before CC based systems could become cost-beneficial systems for the retrieval of primary information from full text of a document.

In mechanized indexing and searching operation, a classified arrangement offers a systematic, general to specific approach and enables the enquirer to readily broaden or narrow down his search

⁶A. Neelameghan, "Design of the document finding system," *Library Science*, 5, 1968, paper P.

⁷B.S.S. Gupta, "Program package for a system for document finding," *Library Science with a Slant to Documentation*, 7 (2), June 1970, pp. 179-191.

⁸Michael Shepherd, "Text passage retrieval based on Colon classification: Retrieval performance", *J. Doc.*, 37 (no. 1), March 1981, pp. 25-35.

when necessary. If a classification scheme with hierarchical notation is used in computerized information retrieval system, then computer would find it feasible to narrow down or broaden the search for information. Likewise data fed into a computer may well assume a classified form, if it can be argued that this is the form which will facilitate the retrieval of a large number of relevant references.

Some persons believe that faceted systems are superior for the work of information retrieval. There is much that remains to be done, before we can reach a definite conclusion.

The use of general classification in computer-based information retrieval systems has been increasing over the last few years mainly due to the impact of MARC distribution system of the Library of Congress and *British National Bibliography*. There are increasing number of examples, where MARC distributed files are being modified so as to include classification codes not covered in the original MARC files.

91 USE OF FACET ANALYSIS

In order to make the best use of computer, facet analysis of the needs of users is essential. Facet analysis has been found to be extremely useful in determining the requirements of a user. This requires co-operation between a reference librarian and program librarian. This will enable a program librarian to give a right program to the computer, taking into consideration the needs of the users.

92 KNOWLEDGE OF FACET ANALYSIS

A reference librarian working with an information retrieval system should possess knowledge of facet analysis, which will help in the facet analysis of the queries of the users. This will help in meaningful retrieval of information from an automated information retrieval system.

93 AID TO OTHER INDEXING VOCABULARIES

Some persons have suggested that UDC can be of help to other indexing vocabularies in a number of ways, such as, lending its own

terminology, displaying hierarchical structures, or acting as a thesaurifacet.

Classification lends itself to machine exploitation but in order to achieve the best results, it is therefore necessary to adhere rigidly to the schedules of faceted schemes.

94 AUTOMATIC CLASSIFICATION

The first phase (1958-64) was concerned with studies regarding feasibility of automatic classification. The second phase (1964-74) concentrated on experimental studies. In the third phase, the practical applications have been started.

Manmade classification systems are called *a priori* systems⁹ because these are based on a preconceived theory of breakdown of information. This may involve genus-species hierarchy. These systems use concepts as their basis. Here an attempt is made to put like entities together and unlike entities are separated.

An automatic classification is not based on any theory of information division by concept. Here words form the basis of classification. The basis of determining and grouping the classification categories depends upon their satisfactory use, resulting in an efficient and cost-effective retrieval system. Here, classification structures can be generated only after records have been assembled and examined. Therefore automatic systems are regarded as *a posteriori*¹⁰ in nature. Here we do not begin by analysing concepts but identify the vocabulary used in the records assembled. A document or record would contain controlled vocabulary. The author controls vocabulary and not the classification system. It may be remembered that an author of a record does not use words at random. He is expected to use those words, which best express his ideas. Thus rejecting those words not found suitable by him.

It is an accepted view that computer-generated classifications are not appropriate for most of the libraries. These are also not suitable for most of the semi-automated retrieval systems. However, their application to specialized data banks is considered to be feasible.

⁹Harold Borko, "Changing roles and developments in automated classification," paper read at Third International Study Conference on Classification Research (Bombay) (1975), p. 5, mimeographed.

¹⁰*Ibid.*, p. 5.

Besides, those libraries which have accepted established schemes of classification would also not be willing to apply computer-generated schemes for information retrieval with computer.

Looking back, we can say that a great deal of work on automatic classification has been achieved during the last twenty years. G. Salton, M.E. Lesk and K.S. Jones have done good work in this area. It has become possible to achieve classification on a large scale with the help of computers. "Automatic classification has not, however, been adopted in operational information systems. The choice and application of automatic methods for classification are still problems for research, and their value for different library purposes, and particularly document retrieval, is still unknown."¹

95 SUBJECT ANALYSIS OF DOCUMENTS

The job of subject analysis (that is, finding of a specific subject, of a document) requires judgement. A computer does not possess inbuilt judgement. It cannot think for itself, it can only carry out statistical analysis of words only. Therefore, it cannot perform subject analysis of documents. This has to be done by human beings.

Can computer replace classificationists and classifiers? At the present stage of technology, computers cannot replace human beings because certain steps in classification involve judgement. But a computer can only carry out statistical analysis of the words in a document. Therefore, it cannot do subject analysis but can do synthesis.

96 BROWSING

Faceted classification permits browsing. However, browsing is not possible in case of a computerized information retrieval system. Through mechanical means, a reader might be able to get the book and a copy of it but he cannot browse. In case of current books, it is essential that these be classified and arranged on the shelf so that users can get the best out of these by browsing these. The same is equally true about old books. As regards the use of a library catalogue, one is often required to go back and forth. Moving of entries to and fro is not possible in case of a computerized catalogue. In

¹ K.S. Jones, "Automatic classification" in Arthur Maltby, ed., *Classification in the 1970s: a second look*, London, Bingley, 1976, p. 209.

terms of one's requirements, one should be specific, only then a computer can be utilized effectively.

97 CONCLUSION

UDC and CC are best suited for computer manipulation. The same cannot be said about BC2 because of the retroactive notation. Large number of experiments have been carried out on UDC. In a report published in Dec. 1974 (FID, publication 523), 60 experimental or operational systems had been reported from 15 countries using UDC. In a survey published in July 1981 (FID, publication 565), the number of systems had increased to 72, from 30 countries. Many mechanized information retrieval systems are using it. It is being used as an indexing language. It is beginning to play an important role in large information systems. Some information systems have used DDC. However, in case of CC, very few experiments have been carried out.

Tremendous developments have taken place in computer technology. Introduction of third generation of digital computers have made it possible to process information much faster. It has tremendous storage capacity to handle large data rapidly. There is a need to formulate a general classification for use in computer systems to take full advantage of computers.

With increasing capability of a computer, there are great possibilities for classifying and indexing information in the years to come. It will become possible to make it appear to each user at the time of consultation that information file has been classified according to his interests. It is expected that with the availability of more powerful machines, their use in the field of classification will increase.

A computer should be treated as a servant but not a master. It should support the effort to achieve the objectives and not be used merely for its own sake.

At present a computer can carry out many of the jobs, but only those which do not require any judgement. Certain steps of classification (such as finding of a specific subject) will continue to be done by human beings till such time when faculty judgement is inbuilt in the computers.

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Chapter 32

ABSTRACT CLASSIFICATION

1 WHAT

According to Ranganathan (*Prolegomena*, p. 569), the relation between pure mathematics and applied mathematics corresponds to that between abstract classification and a classification scheme meant for actual application. In pure mathematics, a variety of models are prepared on the basis of abstract principles without bothering about actual phenomena. The models thus produced are applied in actual practice to solve the problems existing in the subject of study. As a result, applied mathematics makes progress. Knowledge of the external world at a given time can be correlated to or fitted into one or the other of the then existing models. Such a model, which suits the requirements completely, would lead to a successful application of the model. Later, when knowledge advances, the old model has to be replaced by a new one.

In abstract classification, a variety of models can be prepared according to abstract principles. These models have been described, exhaustively, by Ranganathan (*Prolegomena*, pp. 570-71). We can have the enumerative model (suitable for periods before the First World War), the faceted model (suitable between the First and Second World Wars), the depth model (suitable after the Second World War), and the freely faceted model (suitable for present times). Different models would be required in future.

During the Second World War, emphasis increased on the serving of articles appearing in periodicals, and scientific reports dealing with micro-subjects. This required intensive classification. The same situation continued after the Second World War. The faceted model was unable to provide for intensive classification. The number of facets provided in it was insufficient, and the number of indicator digits too limited. Thus, a more complex model was required. This model was called the depth model.

Later, work started on a new model. The new model (suitable for present requirements), has certain new features. Facets belong to various subjects, going with the basic subject. The basic subject is a basic facet itself. There is no rigid, predetermined facet formula for the compound subjects going with a basic subject. The new model is a freely faceted analytico-synthetic model. Here everything is free. Postulates and principles provide guidance. The seventh edition of CC is based on a freely faceted model.

In the future, new models will be put forward by abstract classification. These would be better suited for meeting the demands of the growing universe of subjects.

Before the First World War, the documents served by libraries consisted mainly of books dealing with macro-subjects. The subjects were formed largely through dissection and denudation. The number of subjects was limited, as well as the number of books on each subject. An enumerative model with a single schedule was helpful. Such a model led to the designing of enumerative schemes of classification (such as DDC and EC).

Between the First World War and Second World War, librarians were required to serve an increasing number of specialized books dealing with macro-subjects having an even larger number of proliferations. The number of books became large and began to increase at a high rate. It was found that the enumerative model was unable to cope with books on subjects with a large number of proliferations. Books also began to appear on subjects formed on the basis of lamination. Thus, it became necessary to have a scheme with several schedules. The model chosen for the purpose was a faceted one. This model led to the formulation of faceted schemes such as UDC and the first three editions of CC.

A classification scheme based on the subject contents of books may be termed natural classification. On the other hand, "abstract classification systems can be devised without reference to the contents of books or other library materials."¹ According to Daily, there are three basic classes of abstract classification, artificial classification, accidental classification and purely abstract classification. An artificial classification is often based on some characteristics of books, which do not provide reliable guidance regarding the subject matter. Often, it may use elements such as geographic location, form of material, author's name, name of publisher, name of printer, country

¹Jay E. Daily, "Abstract classification" *Encyclopedia of library and information science*, New York, Dekker, 1968, vol. I, pp. 12-13.

to which the author may belong, year of publication, place of publication, name of issuing body, as characteristic, or a combination of these. An accidental classification is based on those characteristics of the document which are not related to the subject content, such as colour of binding, size of the document and so on. These are the observed features of the book. Sometimes, an element used as a characteristic may be completely independent of the document concerned. These may be features which may be added (for example accession number). This would be the case if the scheme is based on the accession number. The accession number indicates the order in which documents are received by the library. An accidental scheme can also be prepared on the basis of a system of numbering indicating location on the shelf, by using symbols to represent stack number, tier number, bay number and shelf number. Purely abstract classification can be extremely useful because it can take the form of a mathematical-linguistic model, which can serve the purpose of evaluation of classification schemes. An abstract classification of the kind suggested by Daily,² uses mixed notation, consisting of letters and numbers. Such a scheme is a close one and it does not have a provision for expansions within, but gaps are made available in the form of whole blocks of numbers. It can be extremely useful for collections, arranged by form (for example slides, pictures, phonograph recordings and so on) in fixed location systems. Within a particular form, further arrangement may be made according to accession numbers. It can also be used for books, if the fixed location system is followed.

Ranganathan has explained the concept of abstract classification by giving an analogy from mathematics. On the other hand, Daily says that abstract classification can be formulated without taking into account the contents of documents. The author refers to artificial and accidental classifications, which seem to be used for limited purposes. His concept of purely abstract classification can help achieve improvements in future schemes, by providing a mathematical linguistic model.

2 WHY

There is an inherent tendency in the universe of subjects, to become not merely dynamic, but turbulently dynamic. This means that schemes of library classification need to be developed which can

²*Ibid.*, p. 13.

adequately meet the onslaught of the universe of subjects. Experience shows that development of abstract classification would go a long way in enabling schemes for library classification to meet the challenge. It is rightly believed that future benefits would be possible from the application of abstract classification. This is based on the analogy from pure mathematics.

3 How

Abstract classification should be developed so that the existing dynamic theory of library classification can be strengthened and placed on a firm footing. A dynamic theory provides methodology for the design of a scheme for library classification, which is capable of organizing new subjects as well as already known subjects in their proper places in the helpful sequence. It is essential that such a methodology should provide for a design based on a scientific method. Therefore, our approach in developing abstract classification should be an empirical one. The aim should be to bring out guiding principles for the formulation of a system of postulates for a dynamic theory of library classification; develop lemmas for abstract classification; form a variety of abstract models(the later model should be contained in the earlier models); prepare new methods, tools and techniques for the analysis; prepare a system of symbolization for the communication of classification ideas etc.

4 PROBLEMS

Ranganathan (*Prolegomena*, p. 593) has listed problems for pursuit in abstract classification. These are given below:

1. Guiding principles for the formulation of a consistent and necessary and sufficient system of postulates.
2. Lemmas for working on abstract classification.
3. Forging of new tools for analysis.
4. Establishment of a variety of models in abstract.
5. Establishment of a consistent system of symbolization for universal use, to secure brevity and precision in the communication of ideas on classification.
6. Establishment of a system of symbolic meta-language to facilitate the study of classificatory language of ordinal numbers as object

language.

7. The practicability of retaining the postulate that energy facet should have only one array.

5 CONCLUSION

Licklider has suggested "storage, organization and retrieval systems based on the following models: (1) sets and subsets, (2) space analogues, (3) functions and relations, (4) predicate calculus, and (5) other formal languages."³ In the light of this, in abstract classification a variety of models can be prepared to serve present-day needs and future requirements. Some investigation has been done to provide models for information storage and retrieval based on symbolic logic and linguistics. We shall require a variety of models so that a suitable model can be chosen from a wide range. Besides preparing models, there is a need to pursue other problems in abstract classification. No problem should be considered of less importance. Our approach in this field of study should be an empirical one, the ultimate aim being that with the help of abstract classification we should attempt to produce a "do-all classification" scheme. Hopefully, such a scheme should be able to provide simple class numbers for macro-subjects, as well as complex micro-subjects, with the same ease.

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—, *Prolegomena to library classification*, 3rd ed., Bombay, Asia Publishing House, 1967, Chap XG.

³J.C.R. Licklider, *Libraries of the future*, Cambridge, Mass., MIT Press, 1965, p. 71.

Chapter 33

DESIGN OF A SCHEME FOR LIBRARY CLASSIFICATION : A METHODOLOGY

0 INTRODUCTION

Here, we shall describe a methodology¹ for designing a freely faceted scheme for library classification for a given subject of study based on the general theory of classification largely formulated by the late S.R. Ranganathan.

Scientific method has been applied in the development of the design methodology by demarcating the work of design to three planes of work (namely, idea plane, verbal plane and notational plane), and laying down guiding principles in the form of postulates, canons and principles. Work at idea plane is paramount. The notational plane implements the findings of the idea plane. Provision of guiding principles for designing has made it possible to achieve objectivity in the approach. This has reduced the element of flair and made the work of designing depth classification systematic. These guiding principles are constantly being refined and extended as need arises. At this stage of development, we have been able to achieve a fairly successful methodology.

1 CHOICE OF A MODEL

A scheme for classification to be designed for classifying subjects must be based on a suitable model. Such a model must have a sound theory of classification behind it. It has been found that a scheme for classification based on such a model can prove to be better fitted to

¹The methodology described here is the one developed in India based largely on the work of the late S.R. Ranganathan.

meet the onslaught of dynamic developments in the universe of subjects.

A scheme to be formulated must be hospitable to the changes as well as the new developments taking place in the subject fields. A scheme should be able to provide co-extensive class numbers for the documents to be classified in the field concerned.

In choosing a model, our choice is confined to the enumerative model or the faceted model. Our choice goes in favour of a faceted model because it is able to withstand the onslaught of the universe of subjects far better than an enumerative model. A faceted model, provides facets explicitly even at the notational plane.

Here, we shall choose a faceted model based on the general theory of classification formulated largely by the late S.R. Ranganathan. Ranganathan's general theory of classification has proved to be a sound one. This theory has been described largely in Ranganathan's *Prolegomena to library classification* (3rd edition, 1967).

2 CHOICE OF A SUB-MODEL

Within the scope of a faceted model, we can choose a specific kind of faceted model called the sub-model. A large number of depth classification versions of CC have been produced. On the basis of experience, the Indian School of Thought has identified three sub-models. A person designing depth classification can take help from one of these, which may indicate certain similarities to the subject in hand.

The sub-models are: (i) medicine, (ii) production engineering, and (iii) Sociology.

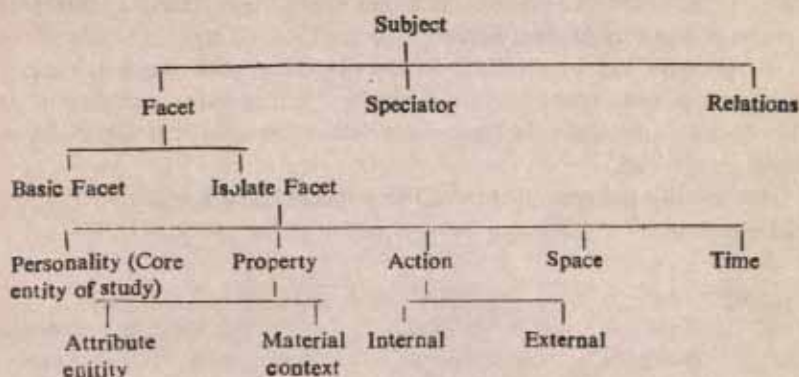
Once a sub-model has been chosen, it can be very helpful with regard to getting at a helpful sequence, providing for interpolation and extrapolation. In the designing of a depth schedule, one can use similar approaches and solutions, wherever found useful.

3 NATURE OF FACETED MODEL

A subject may have three components.² These are facet, speciator

²A. Neelameghan, *Absolute syntax and structure of an indexing and switching language*, In *Ordering systems for global information networks*, edited by A. Neelameghan, Bangalore, FID/CR, 1979, p. 173.

and relations. A simple subject may have a facet only but it may not have a speciator even.



31 Facet

Facets are of two types, such as the basic facet and the isolate facet.

311 Basic Facet

The basic facet is a first context-specifying element. A simple subject may have a basic facet only, and it may not have a speciator.

312 Isolate Facet

An isolate facet may be one of the following types:

Personality property, action, space and time.

Personality is a core entity of study. In the study of books, the core entity becomes a focus of attention. In botany, the plant is the core entity of study. In zoology, animal is the core entity of study. In sociology, social group is the core entity of study.

Any thing that happens within the system is property. Property is concerned with attributes. Some may be visible (such as black), but not others (for example, a table is heavy or light). A table possesses the property of height, and also the property of a soft or hard top.

Any thing that is imposed from outside is action.

An event that takes place has to happen at some place at a certain time. Therefore, time and place are intimately connected with an event. It is easy to identify time and place isolates.

32 Speciator

The speciator is an idea or idea-complex used or intended to be used as a qualifier, going with a host basic subject or a host isolate idea.

However, a speciator idea, when combined with a basic subject idea or isolate idea, produces a change in their respective connotations, then in that sense a speciator becomes a modifier. Thus, a speciator can be a modifier or qualifier.

A speciator can be attached to any one facet, such as personality, property, action, space and time. Matter is speciator to action. It can also be attached to a basic facet. Two kinds of speciators have been recognized.

A conventional speciator is called a speciator of Kind 1.

EXAMPLES :

Table

By size

Small

Medium

Large

Table

By purpose

Dining

Classroom

Reading

Speciators of Kind 2 for language isolates:

zd Dialect

Note—division by (GD)

zg Local jargon

Note—divisions by (GD)

Speciators of Kind 2 for space isolates:

EXAMPLES:

By population cluster

Village

Town

City

Supercity

By Orientation

East

South

West

North

Centre

Speciator Kind 1 (these are conventional speciators)

The hyphen (-) is used as an indicator digit for speciators of Kind 1.

EXAMPLES FROM CC 7:

Y, 86-2 Sociology of the African family

Speciator Kind 2 (previously called special component)

The equal-to sign (=) is used as an indicator digit for speciators of Kind 2.

EXAMPLES

V,6=A56 History of British territories in Africa

T,6=9N Education in North Africa

P,6S=zd Dialect of Swahili

T 6=(P, 111) Education in the English-speaking areas of Africa

33 Relationships

We may recognize the following relationships:

Hierarchical relation (relationship of genus to species as well as whole-part relationship)

EXAMPLES OF GENUS-SPECIES HIERARCHICAL RELATIONSHIP:

Relationship between radiation and wave radiation

Relationship between transmission and overhead transmission

EXAMPLES OF WHOLE-PART HIERARCHICAL RELATIONSHIP:

Relationship between Asia and India

Relationship between British Parliament and House of Lords

The relationships (other than hierarchical) between concepts are given below:

Coordinate relation (relation between two or more concepts belonging to one and the same array)

Facet relation (relation between two facets)

Phase relation (relationship between two subjects studied in mutual relation)

Speciator relation (relation between a speciator and the facet it modifies/qualifies)

As indicated earlier, we have chosen a freely faceted model based on the general theory of classification formulated largely by S.R. Ranganathan. We have also examined the nature of the faceted model. The steps in the design described here will be confined to a large extent to the schedules of isolates in [1P]. The methodology has been described keeping in view that the depth scheme to be prepared for classification would be an extension of a scheme such as CC7. As a result, a classificationist of a depth schedule can depend upon the notational system formulated for CC7, including devices, indicator digits, allocation of notation and so on. Similarly, he would also be able to use the common isolates and schedules for

other subjects given in CC7.

4 BACKGROUND KNOWLEDGE AND PREPARATION

It is necessary to obtain background knowledge and make preparations about the subject of study, the objective being to learn about the definition of terms, concepts, scope of the subject and its subdivisions, developmental history of the subject—including landmarks and trends in research.

In order to acquire the necessary knowledge and make preparation, one may consult the following categories of sources of information:

- (i) General/specialized encyclopaedias
- (ii) Standard technical dictionaries
- (iii) Glossaries on the subject
- (iv) Books on history or growth and development of the subject
- (v) Textbooks
- (vi) Monographs/treatises on the subject
- (vii) Articles on the subject
- (viii) Good review articles on the subject
- (xi) Trend reports on the subject

A proforma would be found useful in regarding information from the above-mentioned categories of sources of information. It may include scope of the subject, main divisions and subdivisions (along with their meanings), related subjects, developmental history of the subject, list of documents which were used for collecting information and so on.

5 CHOICE OF THE BASIC SUBJECT

After doing a preliminary scanning of literature in Stage 1, concerning a study of the subject, choose the first context specifying element(s) basic (subject) with which the subjects are deemed to go. Also, determine the related fields.

6 COLLECTION OF ELEMENTS

Next, get hold of abstracting periodicals for the field, falling within

the scope of the subject of concern.³ Try to locate the abstracts for documents of concern.

7 PREPARATION OF STANDARD ENTRIES

Prepare a main entry on a 75×125 mm slip for each micro-document dealing with the subject of study, abstracted in the abstracting periodical which may be relevant for designing the schedule. The main entry should be prepared according to a standard catalogue code. Suppose we use Ranganathan's *Classified catalogue code*;⁴ then, in addition, we may add an abstract.

8 PREPARATION OF TERM RECORD

From the entries prepared above, pick up the terms. For each term prepare a separate term record^{5,6} (or concept record) on 75×125 mm slips, as given below:

1 Term: READING

- 2 Context in which term occurs: Table used in a reading room
- 3 Definition, and source of definition: . . .
- 4 Indication, whether it is a facet or a speciator: Speciator to table
- 5 If a facet, then write category (PMEST): Nil
If speciator, then indicate the characteristic on the basis of which it is derived: By purpose

6 Kind of speciator: Speciator 1

1 Term: NATURAL

- 2 Context in which term occurs: Natural Water
- 3 Definition and source of definition:
- 4 Indication, whether it is a facet or a speciator:
Speciator to water
- 5 If a facet, then write category (PMEST): Nil

³Series of articles (number P, Q, R, ZF, ZG) on "Design of scheme for classification" by A. Neelameghan appended in *Herald of Library Science*, v, 8, 1969. These will be found useful on sections, 6, 7 and 8.

⁴S.R. Ranganathan, *Classified catalogue code* . . . 5th ed., Bombay, Asia Publishing House, 1961.

⁵A. Neelameghan, "Preparation of list of isolates and qualifier, *Herald of Library Science* , 8, 1969, article ZF.

⁶A. Neelameghan etc., "Motor vehicle production," *Library Science*, 4, 1967, pp. 107-08.

If speciator, then indicate the characteristic on the basis of which it is derived; By source or by type

6 Kind of speciator: Speciator 1

1 Term: TISSUE

2 Context in which term occurs: tissue-human body

3 Definition and source of definition:

4 Indication, whether it is a facet or speciator: facet

5 If a facet, then write category (PMEST): P

If speciator, then indicate the characteristic on the basis of which it is derived: Nil

6 Kind of speciator: Nil

In choosing the characteristics, the canons of characteristics must be satisfied. The canon of relevance is very important here. Overall economy and impartiality are important considerations.

91 DETERMINE THE CORE ENTITY

In education, the core entity of study is educand. In sociology, the core entity of study is social group. Educand is a part of social group. Experience shows that if core entities are similar, then subjects are related. Therefore, we can say that education and sociology are related. In food technology, food is the core entity of study. In water pollution, the core entity is water.

92 SORTING INTO FACETS AND SPECIATORS

Sort out the term records into facets and speciators.

Facets should be sorted into personality, property, action, space and time.

93 HELPFUL SEQUENCE AMONG FACETS

Facets are arranged in a dependency sequence. The dependency sequence is obtained by the application of the wall-picture principle, and its corollaries such as act and-action-actor-tool principle, whole-organ principle and cow-calf principle. It may be noted that the facet formula gives a decreasing concreteness sequence, but shelving is based on increasing concreteness.

94 ARRANGEMENT OF SPECIATORS

The speciators can be grouped on the basis of characteristics used for deriving them. Arrange these groups by means of group strategy in a helpful sequence. Within each group, apply the principles for a helpful sequence.

In the example illustrated below, the speciators have first been grouped on the basis of characteristics. Then, methodology of correlation (that is, correlated to fundamental categories) has been applied to arrange the groups among themselves. Within each group of speciators, principles of helpful sequence can be applied. Dependency sequence (well-picture principle and its corollaries belong to the principle of dependency sequence, which is a basic principle) can be helpful in arranging speciators involved in specials compound basic subjects.

The speciators can be grouped on the basis of common characteristics used for deriving them. If the characteristic used is "by source," then we can form a group, as given below:

(a) Water

Speciators to (1p1) isolate "water"

By source

Municipal/public

Tap

Sea

Surface

Coal-mines

River

Lake

Note: In the above group, the host subject is water pollution. Water is the core entity.

Similarly, the characteristic "by chemical nature" would give a group of speciators as given below:

(b) Water

Speciators to (1p1) isolate "water"

By chemical nature

Ionic

Brackish

Hard

Soft

Similarly, the characteristic "by treatment" will give another group of speciators, as follows:

(c) Water

*Speciators to (Ip1) isolate "water"**By treatment*

Untreated

Drinking

Chlorinated

Pure/unpolluted

Fresh

(d) Water

*Speciators temperature**By temperature*

Hot

Cold

By applying principle of increasing concreteness, we get decreasing abstractness. Concreteness means that the idea can be correlated to something concret. Hungry cannot be correlated. But we know that space is more concrete than time. The definition of space subsumes time. We cannot find a property without action. We have to perform action to determine property. The property may be hard or soft. Thus, on the basis of the principle of decreasing concreteness, we get the order P M E S T.

In order to decide the sequence among groups (a), (b) and (c), the methodology of correlation can be used. That is correlated to fundamental categories.

From the above, we find that "by source" can be correlated to P, "by chemical nature" can be correlated to matter property (MP) and "by treatment" goes with energy (E). "By temperature" can be correlated to (MP). Therefore, their order will be (P), (MP), (E). The speciators corresponding to these would be arranged in this order.

Suppose we are expected to decide the sequence between (d) speciators to (Ip1) isolate water "by temperature," (b) speciators to (Ip1) isolate water "by chemical nature." Temperature goes to physics, and chemical nature goes to chemistry. We know that physics is less concrete than chemistry. Physics comes earlier than chemistry in the schedule of basic classes in CC. But here the sequence has to be reversed. Therefore temperature will come later than chemical nature. This is based on principle of correlation.

Thus the arrangement of different groups of speciators is as follows:

‡ By source

By chemical nature

By temperature

By treatment

Let us suppose the number of characteristics is large, then, group strategy can be applied. The totality of characteristics are divided into a few groups on the basis of a certain amount of affinity sensed in each group. At this stage, the methodology of correlation can be applied, or the wall-picture principle can be applied to a pair of characteristics within a group at a time, to determine the helpful arrangement among them.

Within each group of speciators (a)/(b)/(c)/(d), the principle for a helpful sequence can be applied. The principle of dependency sequence (one of the principles of helpful sequence) is a basic principle for the purpose. The wall-picture principle and its corollaries, such as act and-action-actor-tool principle, whole-organ principle and cow-calf principle belong to the principle of dependency sequence.

95 ARRANGEMENT OF ISOLATE TERMS

In order to arrange isolate terms in a helpful sequence, first examine the attributes of terms. Choose a given attribute, as a basis for arrangement, which provides an arrangement giving maximum satisfaction to the majority of the users. Next choose a suitable principle out of the "principles for the helpful sequence" (see Chapter Seven) to get a consistent sequence. The general normative principles can provide help in the choice of a right principle, keeping in view the relevant attributes. Wall-picture (dependency principle) is applicable for the arrangement of isolate ideas (coordinate), but sometimes it is easier to apply other principles for the helpful sequence.

EXAMPLES:

By Climate Control

Thermostatic control

Air conditioning

Pressurization

Note : The above isolates have been arranged according to the principle of later-in-time.

96 ALLOCATION OF NOTATION

Choose a notational system having a mixed base, consisting of Roman smalls, Roman capitals and Indo-Arabic numerals. Use the same set of indicator digits as used in the general scheme of library classification.

The notational system of *Colon classification* used for assigning numbers to isolate ideas and speciators consists of:

- (a) 23 Roman small letters (From a to z excluding i, l and o)
- (b) 10 Indo-Arabic numerals (0 1 2 3 4 5 6 7 8 9)
- (c) 26 Roman capital letters
- (d) Bracketed numbers
- (e) Indicator digits * " ' < > & ' . : ; , - = + -> (

Note: (a) z o 9 Z are used as empty digits (b) * " ' < > are allocated anteriorizing value.

The following sectors are available for allocation:

(S-a)	(S-za)	(S-zl)	(S-zA)
(S-0a)	(S-01)	(S-0A)	(S-1)
(S-9a)	(S-91)	(S-9A)	(S-A)
(S-Za)	(S-Z1)	(S-ZA)	

Above are listed 15 sectors with two digits.

The following sectors are avoided:

(S-a)	(S-za)	(S-zl)	(S-zA)	(S-0a)
(S-9a)	(S-Za)			

(S-a) is reserved for common isolates. Avoid the use of sectors of lower-case letters, unless it becomes absolutely necessary.

In the allotment of sectors,⁷ keep the following points in view:

- (i) Each of the first characteristic should be allocated a sector
- (ii) Law of parsimony
- (iii) Frequently occurring characteristics should be allocated shorter notation than those likely to occur less frequently (term records will indicate as to which characteristics and isolates occur more often; those must get a short number)
- (iv) Allow for future interpolation and extrapolation of isolates derived on the basis of any characteristic.
- (v) Facilitation of the use of mnemonics

⁷*Ibid.*, pp. 118-22, 125-32.

- (vi) Telescoping of an array
- (vii) Spare certain digits for the use of devices
- (viii) Allot sectors in the beginning, and also the last isolate numbers so that all best sectors do not get exhausted
- (ix) Choice of sectors should be based on kind and number of isolates to be allotted

As decided earlier, the arrangement of different groups of speciators will be:

- By source
- By chemical nature
- By temperature
- By treatment

In the allocation of sectors, we will start with "by treatment" which will be given the least ordinal value. "By source" will receive the maximum ordinal value.

Thus, on the basis of conventions adopted by the Indian School of Thought, the sectors will be allocated as given below:

Sectors	Group of speciators going with
(S-ZA)	By source
(S-ZI) or (S-A)	By chemical nature
(Second is preferred because of short numbers)	
(S-9A)	By temperature
(S-9I)	By treatment

Note: (a) According to A. Neelamegham, for extrapolation, we can use the following three-digit sectors:

- (S-))
- (S-ZZA)
- (S-ZZI)

These will appear after (S-ZA)

(b) For the purpose of allocation we have started with the sector having highest ordinal value. This has been allotted to "by source." If required the allocation can be made on the basis of minemonics.

(c) Sectors to be avoided have been left out. Other sectors are available for allocation.

(d) Compound isolates can be formed by means of enumerated ones, wherever needed, with the aid of indicator digit hyphen (-)

97 PREPARATION OF AN INDEX

The index is essential. It can serve three purposes. It can indicate the location in the schedules, of the terms to be located, and also bring together scattered relatives. It can also be used for checking mnemonics. It may be added that the order of the schedules should not be repeated in it.

98 PILOT PROJECT

Use the above schedule as a pilot project. Preparing a schedule is a difficult job, and no depth schedule can be perfect. The pilot project is prepared to serve the requirements of the users. Its practical use would help in making it effective.

991 FINALIZATION OF SCHEDULE

In the light of the experience of a pilot project, the schedule should be finalized. A finalized schedule should have the following parts:

- A (i) List of abbreviations used
- (ii) List of definitions
- (iii) Scope of the scheme for classification
- (iv) Description about schedule of different categories of isolates, indicating the arrangement used so on
- (v) Description about notational system, including devices
- B Index
- C Schedule proper arranged in columns
- D Worked out examples
- E Bibliographical references

992 CONCLUSION

The description given in this chapter has shown that the methodology for designing a depth schedule, developed by Indian School of Thought, is quite sophisticated. It is being constantly improved upon on the basis of scientific approach. The achievement of a design of such a high order does credit to the Indian School of Thought.

In the successful designing of depth schedule, it is essential that

a classificationist should either possess specialized knowledge of the subject or try to gain enough background knowledge. He should consult specialists at each stage, so that knowledge of specialists can be utilized to the maximum. Any scheme to be formulated is purpose oriented meant to be used for documentation/information service. Therefore, it should be able to adequately meet the requirements of users.

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Chapter 34

USES OF CLASSIFICATION

0 INTRODUCTION

In common use, classification means division into groups and arranging groups into a preferred sequence. Human beings use classification in an involuntary and deliberate manner. They possess an inherent habit to arrange things in a more or less helpful sequence. Even in communicating ideas, we try to communicate these in a more or less helpful sequence. In everyday life, we use classification. In case a shopkeeper deals with a number of things which he is required to arrange, his efficiency, to some extent, would depend upon his arrangement of things. We cannot live at all without the power of being able to classify things around us. Classification of abstract ideas provides intellectual training. This has led to a great deal of progress in our society. Classification is an education in itself, because it makes the mind more alert and analytical, thereby making one a better thinker. Men are born with a flair for classification and efficiency in classification can be improved by training. Also one is taught classification in courses on logic. This enables one to achieve a systematic way of thinking, and the right approach to communicate ideas.

We may now recognize the following for main uses of library classification:

- (i) shelf arrangement of documents,
- (ii) subject analysis of documents,
- (iii) aid to automated and semi-automated information retrieval systems, and
- (vi) aid to fact or data retrieval.

Other uses may be considered secondary.

1 SHELF ARRANGEMENT OF DOCUMENTS

The primary use of library classification is for the shelf arrangement of documents. Library classification aims to arrange documents in a helpful sequence which is most convenient for users and for the library staff. The documents are arranged in classes, based on the mutual relations between them. Thus, related documents are grouped in closed proximity. The helpful sequence is determined, once and for all, by allocating notation, which expresses order. Thus, it becomes possible to easily insert or reinsert the various documents in their correct places, as well as interpolate new ones. This leads to mechanization of the arrangement.

2 SUBJECT ANALYSIS OF DOCUMENTS

In case a cataloguer is using a list of subject headings to derive subject headings, a scheme of classification can assist him to analyse the thought content of document for the purpose of deriving subject headings.

3 INFORMATION RETRIEVAL

A library classification possesses the potentiality for enabling an information officer/documentalist/librarian to arrange entries and prepare feature headings in a bibliography, documentation list or an abstracting service. In case the same scheme is used for all these three categories of tools as well as arrangement of books on the shelf, then this can be very helpful to the users and the library staff of a particular library/information centre/documentation centre.

Some people are of the view that we require two kinds of schemes for classification, one for library use, and other for detailed information retrieval. The author is of the view that the same scheme can be used for both purposes, provided it is well developed and based on a sound methodology for designing schedules, keeping in view the general theory of library classification. CC is being developed along these lines.

At one time, the use of classification was rejected in mechanized information retrieval. However, it has been realized that many of the problems in library classification and mechanized information

retrieval are common. Therefore, the theory worked out for library classification can be of some use in mechanized information retrieval. It has been found that in mechanized systems, documents themselves are not required to be classified, but some sort of classification is necessary for the sake of achieving consistency in indexing, and for the purpose of forcing in retrieval. Findings of the American Institute of Physics on the UDC project—under R.R. Freeman and Pauline Atherton—formed the main theme of the *First Seminar on UDC in a Mechanized Retrieval System*, and the same subject was continued during the second Seminar held at Frankfurt in 1970. These seminars led to the conclusion that UDC can be used as an indexing language, in a mechanized system using either batch processing or the interactive mode.

An outstanding example of mechanized information retrieval is that of *thesaurofacet*, compiled by Jean Aitchison and her colleagues. It makes use of both the scheme for classification as well as a thesaurus. Here, features of a faceted classification have been built into the thesaurus.

Experience shows that the use of well-constructed thesauri, along with hierarchical schedules of a scheme like UDC, could lead to better search as well as retrieval control than the use of either one of these alone.

The use of general classification for computer-based information systems has continued to increase rather rapidly, due to the direct impact of the MARC system of the Library of Congress, as well as the *British National Bibliography*. This is especially true of UDC. Its use in computer-based information retrieval systems has increased during the recent years. One information retrieval system, based on the use of CC, has been reported by B.S.S. Gupta. He has described a set of fifteen programmes which can be used for storing and updating a reference catalogue, a classification schedule, an alphabetical index to the schedule, and a catalogue of user profiles. Interactive retrospective searching and selective dissemination are the output options.

4 FACT OR DATA RETRIEVAL

Schemes for library classification have been employed successfully for fact or data retrieval. It may be economic data, population data, library data or any other kind of data.

In many computer-processable bibliographic data bases, a pro-

vision is made for including a data element which shows the broad class(es) to which each record is supposed to belong. Very often, a special classification scheme is developed for the purpose.

5 DESIGN OF THE DOCUMENT FINDING SYSTEM

In May 1969, the Documentation Research and Training Centre (DRTC) initiated experiments to determine the feasibility of using a general-purpose computer in a document-finding system, based on a classified catalogue system using a freely faceted version of *Colon classification*. The results have been quite encouraging. Experiments were also carried out at DRTC to design a special-purpose, computerized, document-searching aid named "Doc finder". The objective being to establish a one to one correspondence between the specific requirements of a specialist user at a given time and the documents already recorded in the memory of the Doc-finder being used for the purpose. The depth classification schedule developed at DRTC was used with the expectation that it would make the work of the Doc-finder leakproof as well as noise-proof.

6 BOOK DISPLAY

In a restricted sense, the word "display" is adopted for a special exhibition of books and other materials on a given topic. In the widest sense, the term is used to indicate that the collection in an open access library, is well presented and guided. Library classification should be helpful in book displays.

7 HELP IN REFERENCE SERVICE

The technique of facet analysis enables a reference librarian to get exact enunciation of the requirements of a user interested in getting information on a specific subject. For the analysis of the query or question, one can use facet analysis. This can also be helpful in determining the search strategy.

The suggestions received from the users by the reference section (or any other section) of a library can be classified with the help of a scheme. This will help in the analysis and implementation of the

suggestions.

8 ARRANGEMENT OF ENTRIES

Classified arrangement of entries describing the documents can be achieved with the help of a scheme of library classification. A classified arrangement provides an orderly display of documents on a specific subject and its related areas. Library classification mechanizes such an arrangement, so that new entries can be interpolated at proper places. These entries may form part of a library catalogue, a national bibliography, a union catalogue, an indexing service, an abstracting service and so on. It may take any physical form.

91 PREPARATION OF AN INDEX

POPSI (Postulate-based Permuted Subject Indexing) is a technique for subject indexing. But it has a classificatory base. It has been used to compile different kinds of indexes. The postulates, canons and principles of classification have been found to be useful for preparing such indexes.

92 PROGRAM FOR COMPUTER

Facet analysis is a powerful technique, evolved for classification by S.R. Ranganathan. It can be used for a variety of purposes. The facet analysis technique can be helpful for preparing a suitable program for the computer.

93 BOOK SELECTION

Class number can be useful in doing selection of books. In the process of selection, a librarian may mark an item in the book selection tool which may be considered useful for his library. A book selection slip may be prepared for the same, and a provisional class number written on it. A group of such slips can be arranged subject wise and sent to respective subjects for final selection.

94 DOCUMENT OTHER THAN BOOKS

A scheme of library classification is normally used for the arrangement of books and periodical publications. Similarly, a scheme for library classification can be helpful in arranging files of correspondence, photographs, standards, specifications, patents, negatives and so on. The same scheme may be used for books and other kinds of documents listed above. However, in practice documents such as standards, patents and specifications are arranged according to the schemes of issuing agencies.

95 COMMUNICATION

Library classification overcomes the language barrier. Lists (such as documentation lists, abstracting services and bibliographies) following the classified arrangement can be searched for foreign-language documents with ease. This is possible if an international scheme of classification like the *Universal decimal classification* is used with its multilingual indexes to achieve a classified arrangement. Then, literature searches for foreign-language literature become easy. Thus, international cooperation is possible. This is difficult to achieve in a dictionary arrangement. Therefore, the classified arrangement provides a means of communication, especially international communication.

96 CLASSIFICATION AS A META-LANGUAGE

Classification language may be used as a bridge between natural language and machine language. That is, coding can be done with the help of classificatory language.

Natural language is the one current among a group of people forming a community. A machine language is different from any natural language, because it consists of mechanical bits. Any natural language is confusing and inefficient at higher levels of study, research and communication. It is because of this that artificial languages such as chemical formulae, graphs, diagrams, classification, mathematics and so on are used in many of the disciplines. As we know, classification is an artificial language, which is supposed to be unambiguous in the use of terminology. Therefore, it may be used as

a bridge between natural language and machine language.

97 CONCLUSION

We have already seen that library classification schemes, the techniques evolved for library classification, as well as the theory of library classification can be put to a variety of uses. The list of uses is increasing with the passage of time. However, the main uses consist of shelf arrangement of documents, subject analysis of documents, information retrieval systems and, fact or data retrieval. Other uses are secondary. There is a need to discover new uses of classification. It is desirable that these uses should be publicized for the greater good of society.

FURTHER READINGS

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Chapter 35

CLASSIFICATION RESEARCH GROUPS, SOCIETY AND ORGANIZATIONS

0 INTRODUCTION

During the last twenty-five years or so, many research groups, research societies and organizations have been formed to carry on activities in the field of classification. These activities are regularly reported in *International Classification*.

The Library Research Circle (Delhi) was formed at the suggestion of S.R. Ranganathan on 2 September 1951, but discontinued in 1954. The discussion centred around classification and other areas of library science. However, Classification Research Group (London) is considered the first group founded in 1952 at the national level, to provide opportunities to members to discuss the problems of classification. The FID Bureau, in June 1964, suggested that national groups for the study of classification be formed. As a consequence, classification research groups were formed in Australia, Austria, Brazil, Canada, Chile, Czechoslovakia, Denmark, France, Germany (Federal Republic of Germany), India, the Netherlands, Norway, Poland, Sweden, United Kingdom and United States.¹ FID/CR serves as a link between these groups.

Amongst organizations FID/CR and Documentation Research and Training Centre (DRTC) have been very active. Due to the initiative of S.R. Ranganathan, the FID/CA Committee on Classification Theory was founded in 1950. Latter, in 1961, it was renamed FID/CR (Committee on Classification Research of the International Federation for Documentation). This committee has played a leadin role in matters relating to classification. DRTC was established in Bangalore (India) in 1962. S.R. Ranganathan organized and developed it into a

1. Ingetraut Dahlberg, "Major developments in classification," in *Advances in Librarianship*, vol. 7, 1977, p. 86.

centre, which has earned international fame in the field of library classification.

Mention may be made about societies whose work is of interest to those engaged in the field of library classification. The Classification Society was started in England in 1964. Its branch was formed in the United States in 1968. *The Classification Society Bulletin* (issued annually) as well as the bibliography called *CLASS* are brought out by the society. The bibliography lists citations of 20 pertinent articles in numerical taxonomy, produced from the ASCA tapes of the Institute for Scientific Information. Another society in England is the Society of Indexers. This is more interested in indexes given at the back of a book. It has a branch in the United States. It brings out *The indexer*. The Coordinate Indexing Group of Aslib is an active one and holds conferences on "informatics."

In the next few pages, description has been given in a chronological order about the work being carried out by different classification research groups, societies and organizations. The work of CRG (London), DRTC and FID/CR has been described in detail because they are considered very active.

1 LIBRARY RESEARCH CIRCLE (DELHI)

The Library Research Circle was formed by Ranganathan in Delhi in 1951. This circle used to meet on Sundays. An active group, its discussion centred around classification and other areas of library science. The meetings of the circle were discontinued in 1954. Its members concentrated on a discussion of fundamental categories, indicator digits, rounds and levels, zone analysis, and so on, with special reference to the requirements of depth classification. The work entitled *Depth classification*² indicates the contributions made by the members of this group.

2 FID/CR

In 1946, Eric de Grolier, then Chairman of the Classification Committee of the UFOD (Union Française des Organismes de

²S.R. Ranganathan, ed., *Depth classification and reference service and reference material*, Delhi, Indian Library Association, 1953.

Documentation) proposed that a Committee should be established within FID. Shortly after this FID/CA (General Theory of Classification) came into being. Later, in 1961, FID/CA was renamed FID/CR, its full name being Committee on Classification Research of the International Federation for Documentation (FID/CR). FID/CR has stimulated as well as directed the development of research in classification. It is the most influential group at the international level because sixty-two countries are members of FID. The members take an active interest in the work of FID/CR.

S.R. Ranganathan was the Rapporteur-General and also the moving spirit behind FID/CA during its early period.

The Chairmen were Henri Clavier (1947-1950),

S.R. Ranganathan (1951-1960),

R. Molgaard—Hansen (1961-72),

A. Neclameghan (1973-1980).

Dr. Ingetraut Dahlberg is the Chairman at present.

A register of those interested in classification is maintained at the secretariat for the purpose of international exchange of research personnel. Some exchange of personnel, mostly in the area of teaching, has taken place.

Beginning from 1981, *International Classification* has a new section called 'FID/CR News.'

FID/CR publishes the FID/CR report series. During recent years, "country reports" describing progress in classification research made in different countries such as India, Australia, Argentina and so on, have been published.

Other areas of interest for FID/CR are the terminology of classification and the education of personnel.

FID/CR organized four international conferences—at Dorking, Elsinore, Bombay and Augsburg—which gave a great impetus to the development of the theory of classification. These should be considered important landmarks.

3 CLASSIFICATION RESEARCH GROUP (LONDON)

The Royal Society Scientific Information Conference was held in 1948. Arising out of discussion at the Conference, a committee was formed under the chairmanship of Professor J.D. Bernal to study classification. This committee made little progress; therefore, it

suggested to A.J. Wells (then editor of BNB) and B.C. Vickery (then Librarian, Akers Laboratories, I.C.I. Ltd), that the subject be studied in detail by professional persons interested in the subject of classification. This is how the Classification Research Group (CRG) was formed in 1952.

The Classification Research Group (CRG) is an unaffiliated discussion group, which meets regularly in London. Its first meeting was held in February 1952. The original members were A.J. Wells, B.C. Vickery, E.J. Coates, J. Farradane, D.J. Foskett, J. Mills and B.I. Palmer. Subsequent members have included names like D.J. Campbell, R.A. Fairthorne, Barbara Kyle, D.W. Langridge, and so on. CRG has published very little as a group, but its members have been extremely active and influential. The group has certainly succeeded in establishing an international reputation.

At the beginning, the group came to the conclusion that the then existing schemes of classification were unsatisfactory. Thus, "discussion began from first principles and reconsideration of the nature of concepts or terms, their unique and homogeneous grouping, and the expression of relations and interrelations."³ They also realized that the ideas and theories put forward by Ranganathan seemed to be more acceptable than those of many others. Therefore, it was decided to adopt some of his terminology and techniques.

The early work of CRG is reflected in the *Sayers memorial volume*.⁴ Foskett⁵ has also described in brief the contributions made by the members during the first ten years of the existence of CRG. However, occasional summaries of the discussion are published as "CRG Bulletin" in the *Journal of Documentation*. CRG Bulletin no. 4 was the first one to be published in the journal.

CRG, as a whole, published a brief outline of its views on faceted classification⁶ in 1953, and later issued a memorandum entitled "The need for a faceted classification as the basis of all methods of information retrieval"⁷ in 1955. The memorandum emphasized three basic

³Thomas Landau, ed., *Encyclopaedia of librarianship*, 3rd edn., London, Bowes and Bowes, 1961, p. 107.

⁴D.J. Foskett and B.I. Palmer, ed., *Sayers memorial volume*, London, Library Association, 1961.

⁵D.J. Foskett, "The Classification Research Group 1952-1962," *Libri*, 12 (no. 2), 1962, pp. 127-38.

⁶B.C. Vickery, "Classification Research Group," *Library Association Record*, vol. 55, 1953, pp. 187-88.

⁷International Study Conference on Classification for Information Retrieval, Dorking, 1957, *Proceedings*, London, Aslib, 1957, appendix 2.

ideas, namely, facet analysis as the basis of library classification. Farradane's theory of relationship, and the use of simple notation. Acceptance of facet analysis constituted a bold statement, controversial in nature. There is no doubt today that the idea of facet analysis is a valuable one for the organization of documents. This is useful for the organization of subject vocabularies in indexing as well as search for information.

From 1952 to 1960, CRG members concentrated on the construction and use of special schemes of classification. The members formulated many schemes. Each was prepared to serve the requirements of a particular group of users. These were faceted ones, based mainly on the principles propounded by S.R. Ranganathan. In these special schemes, members of CRG did not restrict themselves to Ranganathan's five fundamental categories; instead, they used a varying number of categories, depending upon the subject. These included categories like thing, kind, part, material, property, process, operation, agent, space and time. However, these are reducible to Ranganathan's five fundamental categories. In a way the CRG approach may be regarded as a pragmatic approach. The earliest of these schemes was the SfB system, internationally authorized by the Conseil International du Batiment (CIB). This scheme is now used in a large number of countries. Other schemes of note are on soil science, by B.C. Vickery, and on music, by E.J. Coates.⁸

Much work has been done on notation for classification schemes. It was concluded that notation need not necessarily express the hierarchical structure of a scheme of classification. This leads to brevity in the length of a class number. The above idea was put to use in some special schemes. This further led to the invention of "retroactive ordinal notation" by Coates, which is a very useful use of pure ordinal notation. His ideas on non-structural notation⁹ are extremely helpful.

Another important area which drew the attention of the members, was the analysis of relationships between different concepts. In this area, the work of J.E.L. Farradane¹⁰ on "relational operators" is extremely important. These relators are based on a theory in the psychology of thinking.

⁸E.J. Coates, *The British catalogue of music classification*, London, Library Association, 1960.

⁹International Study Conference on Classification for Information Retrieval, *op. cit.*, pp. 51-64.

¹⁰Foskell and Palmer, *ed.*, *op. cit.*, pp. 120-35.

By examining the work of the members of CRG, one might get a notion that they were mainly interested in designing special schemes of classification in highly specialized fields. However, it may be pointed out that these schemes were formulated to discover general principles and notational techniques and new lines of research.

In the 1960s the CRG turned its attention towards a study of the relation between special and general classifications, and the problems relating to the construction of a new general classification. The contribution made by the members is reflected in the work entitled *Classification and information control*.¹¹

In 1962, the NATO Science Foundation awarded the Library Association a grant of 14,000 dollars to study the feasibility of a new general classification scheme, and the Library Association appointed the CRG as its agent for this research. Helen Tomlinson worked on the project from 1964 to 1968, and Darek Austin from 1968 to 1969. Thus work of CRG on a general classification scheme was begun by Helen Tomlinson and Darek Austin. Austin later shifted to developing an alphabetical indexing system of PRECIS.

CRG concentrated on: (i) determining principles of the categorization of concepts; (ii) ordering concepts within categories; and (iii) relationships between concepts.

Under (i) a set of categories was produced by Helen Tomlinson, which was developed further by Darek Austin. A use of the theory of integrative levels was involved in (ii) and (iii) led to a set of relational operators by J.E.L. Farrandane. Austin produced a set of role indicators.

CRG came to the conclusion that certain principles had been discovered which could provide a solution to the problems faced in the formulation of a general scheme and would be necessary to construct two classified thesauri, one of the entities and the other of attributes organized according to the above mentioned principles. Classifying would consist of selecting terms from the thesauri and linking their notational elements using the set of roles developed by Austin.¹²

A project¹³ financed by the Office of Scientific and Technical Information (Great Britain) to test the feasibility of an intermediate lexi-

¹¹Classification Research Group, *Classification and information control*, London, Library Association, 1970.

¹²H. Wellisch and T.D. Wilson, ed., *Subject retrieval in the seventies*, Greenwood, Westport, Connecticut, p. 69.

¹³"Classification Research Group, Bulletin no. 9," *Journal of Documentation*, 24, 1968, pp. 292-95.

lexicone was under way, where the indexing terms or notation applied to a given document entry under one indexing system may be converted to their conceptional equivalents in any other indexing system by clerical means. The results of such a project have immense possibilities for future development.

Vickery's *Faceted classification*¹¹ has proved to be a valuable guide. Many of those who have compiled special schemes, in England and elsewhere, have made use of this guide. These schemes have proved to be quite satisfactory.

*Thesaurofacet*¹² is a significant contribution. It is a classification scheme for engineering and allied topics, combined with a thesaurus for post-coordinate indexing, which serves as an alphabetical index to the classification scheme. Experience shows that for classification and documentation a combination of two is ideal.

In the initial stage, CRG aimed to produce a general compatible scheme to serve different purposes, like shelving, classified catalogues and information retrieval. However, this was not found feasible because different purposes are not compatible.

CRG believes that no general scheme existed which was suitable for computer retrieval. Therefore, it was decided to develop a general classification scheme, in association with the UK MARC project for an automated retrieval system. The theory of integrative levels is being developed, and it would possibly be used to serve as a basis for the arrangement of concepts in the a general classification. The idea of integrative levels was introduced to the members of CRG by means of a paper circulated in the form of a draft in 1959. A revised version was given in 1962 in *Savers Memorial volume*.

Members of CRG in early fifties compiled a number of special schemes. They had to face the problem of providing for marginal subjects. Take the example of a subject like 'Education.' A provision has to be made for the teaching of different subjects requiring enumeration of the universe of subjects. For this purpose, one has to depend on a general classification scheme. However, members of CRG came to the conclusion that no good general scheme existed to serve the purpose. They also concluded that a combination of special schemes cannot meet the above requirement. Therefore, it was decided to formulate a general scheme. The first problem that came up in

¹¹B.C. Vickery, *Faceted classification*, London, Aslib, 1960 (Reprinted, with corrections and additions in 1968 and 1970).

¹²J. Aitchison, etc., *compiler, Thesaurofacet*, Whestone, English Electric Company, 1969.

this regard was from where to start. Should one start from the enumeration of main classes. But these do not have a scientific basis. At this point the members of CRG decided that theory of integrative levels may be used to achieve objective or systematic basis for main classes.

The theory of integrative levels was first discussed by members of CRG in late 1950s mainly on the basis of "Joseph Needham's Herbert Spencer lecture at Oxford University, 1937." Joseph Needham referred to "successive forms of order in a scale of complexity and organisation"¹⁶ in the universe of knowledge. In this context, according to Foskett, the theory of integrative levels is that "the world of things evolves from the simple towards the complex by an accumulation of properties, and that, at a succession of levels, these aggregations reach new degrees of complexity and become new wholes, with individual and unique identities."¹⁷ This theory can be used to divide a list of things into a succession of groups, each containing members of the same level of organisation. To each group, we can add properties and processes. This results in a pattern similar to those of personality and property facets of CC.

The description given below is based on the ideas of Foskett:

The basis of the theory is that the world of things evolves from simple to complex by means of accumulation of properties. Thus from simple things evolve complex things. From complex things evolve more complex things.

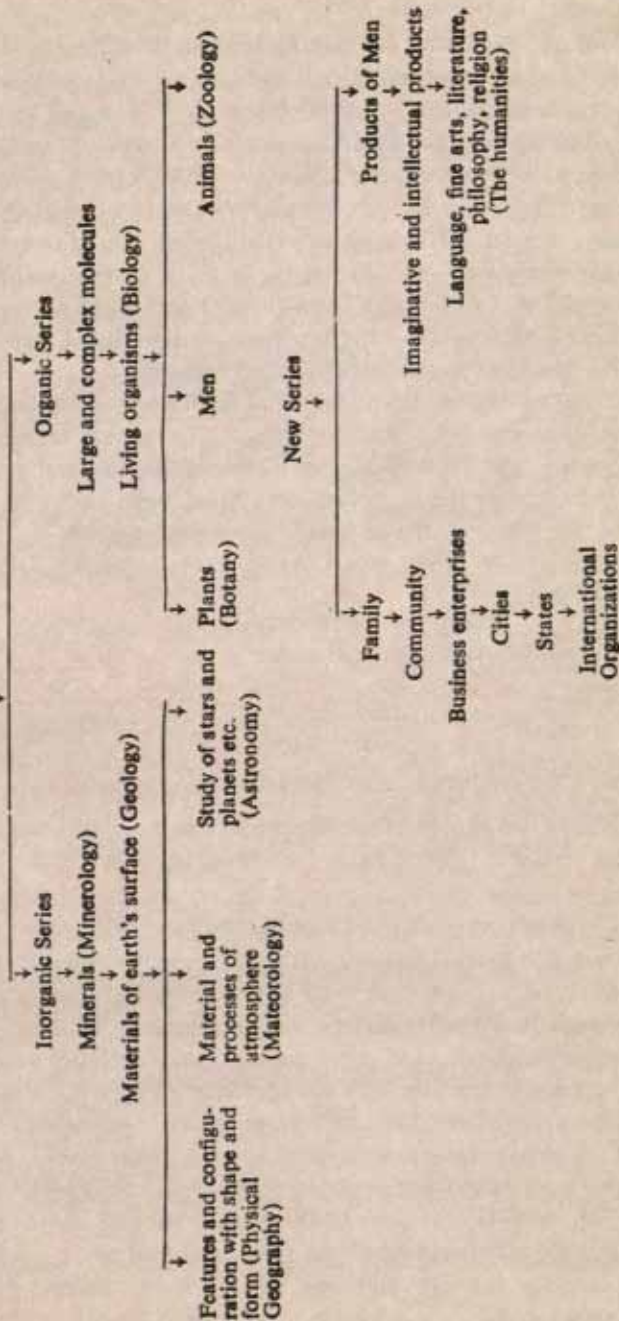
Fundamental particles *combine to form* atoms. Atoms *combine to form* molecules. Molecules, *combine to form* masses. (Fundamental particles, atoms and molecules, masses lead to fields such as physics, chemistry, etc.) Masses can be either organic series or inorganic series. Inorganic series *gives rise to* minerals (minerology). Minerals *combine to form* materials of the earth's surface (geology). Materials *give rise to* features and configurations with shape and form (physical geography); materials and processes of atmosphere (Meteorology); the stars, planets and other galactic phenomenon (Astronomy). The organic series *gives rise to* large and complex molecules. Large and complex molecules *combine to form* para-crystalline forms and cells, and soon. This *leads to* living organism (Biology). Living organisms are refined at higher and higher levels into plants (Botany), animals

¹⁶Joseph Needham, *Time, the refreshing river*, Allen and Unwin, 1943, p. 234.

¹⁷D.J. Foskett, "Classification and integrative levels" in *Sayers Memorial volume*, London, the Library Association, 1961, p. 139.

DIAGRAMME Fundamental Particles

↓
Atoms
↓
Molecules
↓
Masses
↓



(Zoology) and men (human biology and medicine). Man, when considered at a higher level, leads to human biology and medicine. Man can also be the subject of the lowest level of a new series. It leads to psychology. In case we add to it distinct new element of influence from outside to change, then this would lead us to education. New series has another branch. New series leads to higher forms of organisation of men. *Man combines into families. Families combine to form community. Communities form business enterprises. From business enterprises, it combine to form cities. From cities we combine to form states. States taken together form international organizations. All these combines to achieve the social sciences.*

New series on the other hand *leads to products of men, their imaginative and intellectual products. These are language, fine arts, literature, philosophy, religion. These all belong to the humanities.*

Let us apply the theory of integrative levels to the field of linguistics. We get elements of language as given below:

Phoneme
Syllable
Word
Phrase
Clause
Sentence
Paragraph
Composition

Above, we proceed from simple to complex. *Phonemes combine to form syllable and syllables combine to form words. It goes on like this.*

There are certain limitations in the theory of integrative levels. It is not adequate by itself. General systems theory developed by philosophers of science such as L. von Bertalanffy, Ervin Laszlo, Kenneth Boulding et al, has similar features to that of theory of integrative levels and also provides more elaborate rules and laws governing interaction between various elements.

The application of theory of integrative levels leads to schedule of basic classes in natural sciences and other areas. It also provides us with list of entities in different basic classes. There would be need to add activities to each of the entity obtained above. One approach in this regard would be to use relational analysis of J.E. Farradane. By adding the operators to each unit in turn and the study of the literature to find out what contexts exist to complete the analets, we can prepare a series of process terms specific to the level of the unit

preceding the operator—the first isolate in the analet. The 'isolate taken with an operator,' represents a unit and it forms a complex subject which represents a particular level of integration.

Take the following subject: Cleaning of milking machines. In the above title, there are three elements, 'cleaning', 'milking' and 'machine'. According to Farradane's theory, these isolates are related to each other. He further adds that there are only nine relations. Each relation has been allocated a code mark, which serves the purpose of a connective symbol meant to join the isolates. He calls the relationships by the name operator. A group of isolates connected by means of operators are considered to form an analet of a specific subject.

Farradane is the author of relational indexing. The following description is based on his article:¹⁸

Relational indexing expresses detailed information by means of interposition between the words of a given subject in terms of relational operators derived from psychology of thinking. The standard operators replace prepositions and even verbs.

The 9 categories of relations along with symbols are give below:

	Awareness	Temporary	Fixed
		Association	Association
Concurrent	/θ	/*	/;
	Concurrent	Self-activity	Association
Not-distinct	/=	/+	/ (
	Equivalence	Dimensional	Appurtenance
Distinct	/)	/-	/: Functional
	Distinctness	Action	Dependence

All the descriptors (nouns and verbs) representing a given subject are determined in the first place, usually in the form of an English sentence. These descriptors are next interconnected by means of suitable operator between pairs of words.

The concurrent relation /θ expresses the recognition of mere co-existence of the two forms, without any other definite inter-relation, e.g., chemistry /θ dictionary.

The self activity expresses intransitive action, e.g., bird/* migration. It also expresses dative case, e.g., rabbit /* food (/feeding). The association expresses a fixed mental association, e.g., cathedral/; beauty.

The equivalence relation expresses some degree of identity, e.g.,

¹⁸Jason Farradane and Peter Gulutzan, "A test of relational indexing integrity

leaves /= manure

The dimensional relation expresses position, time of state, *e.g.*, building/+ London, sleeping/+ night

The appurtenance relation expresses generic relation, *e.g.*, wood /(density

The distinctive relation/) expresses difference alone, as for imitations or substitutes, *e.g.* pearl /) synthetic pearl

The action relation expresses any action of the second term upon the first, *e.g.* anvil /- hammer.

The functional dependence relation, also possibly to be considered as cause and effect, expresses the first word causing the second, or the second arising out of the first, *e.g.*, author/: book.

According to the authors the above nine relations are capable of expressing any desired meaning between two terms and are sufficient for all kinds of situations.

EXAMPLES:

Fruit-trees/- grafting/; infection/(bacteria/- prevention

Symbols represent: /- acted on by /; associated with /(which appertains to

Thus, we may conclude that theory of integrative levels can be used to determine entities and also to arrange concepts within categories. The theory appears to be attractive but its practical value has yet to be proved. But it cannot be used to determine properties and activities or processes. For the latter, Farradane's relational analysis is considered helpful. However, the theory of integrative levels and the idea of relational analysis need to be tested extensively to reach definite conclusions.

It has been found that theory of integrative levels has certain defects and is not adequate by itself. However, general systems theory developed by philosophers of science is better fitted to provide help in solving problems. This theory was developed by L. von Bertalanffy, Ervin Laszlo, Kenneth Boulding and others. This theory can be applied in library classification and classification for information retrieval. It has been employed for analysis of the structure of the universe of subjects. It has the same features as those of the theory of integrative levels but is more elaborate with regard to rules and laws governing the interaction between various elements of a given entity. The theory stresses that a subject like 'classification for

in formation retrieval' should not be looked at in isolation but in relationship with other aspects of library work.

PRECIS (PREserved Context-Indexing System) is by-product of the continuing research for a general classification scheme. PRECIS is a direct descendant of the faceted classification. However, the credit for developing it should go to Darek Austin. From 1971, *British national bibliography* has been following it. It is also being used by British MARC and many other bibliographies. The ideas of Faradane have influenced the work of Austin.

Members of CRG have continued to produce special schemes in a wide variety of areas of specialization. However, much remains to be done.

During recent years, CRG has been actively engaged in the following areas of study:

- (i) revision of BC,
- (ii) broad system of ordering (BSO)
- (iii) classification scheme on library and information science, and
- (iv) PRECIS.

CRG has continued to concentrate on systematic arrangement of concepts rather than alphabetical indexing. It has also not given up the idea of integrative levels.

31 CRG and Ranganathan

There are some basic differences between the approach of members of CRG and Ranganathan, which are given below:

(i) Members of CRG believe that the number of categories depends upon the subject, while Ranganathan believed that there are five and only five fundamental categories and all facets can be derived from the specific application of one of the five fundamental categories.

(ii) Members of CRG are preparing special schemes, independent of the general schemes. On the other hand, Ranganathan was of the view that a general classification should be an all-purpose one, and depth schedules or special classifications should be an extension of the general scheme.

(iii) The CRG people have come to the conclusion that there is a need for two schemes, one for shelf arrangement and another one for computerized information retrieval. Western literature also shows that it is being increasingly realized that it is not possible to have a multipurpose universal scheme to serve the purposes of arranging documents on shelves, subject analysis of documents and as an aid to information retrieval. Ranganathan did suggest that a scheme like

CC can possibly be used as a multi-purpose classification scheme.

(iv) Ranganathan considered that the citation order of facets should be PMEST, and CRG people find that this order is not always helpful. They have formulated their own citation order.

(v) CRG members have used the non-hierarchical and retroactive notation successfully.

A study of the literature shows that members of CRG have moved too far away from the ideas of Ranganathan. But the basis of their work has been influenced considerably by the work of Ranganathan and they have retained some of these influences. CRG must be given credit for presenting the ideas of Ranganathan to the international community.

When CRG came into being, John Metcalf considered it a conspiracy by Ranganathan to run down librarianship. But the examination of contributions made by CRG shows that the apprehension of Metcalf has proved to be false. There is no doubt that CRG has made significant contribution to library classification, and related areas of study. The work of CRG has been widely noticed. It had a tremendous impact on the research, teaching and practice of classification and information retrieval, in Great Britain and elsewhere.

4 CLASSIFICATION RESEARCH STUDY GROUP

The Classification Research Study Group was founded in USA and Canada in 1959, and ended in 1965, due to reasons of geographical distance. The group also had a great difficulty in communicating ideas, due to the lack of standardized terminology.

5. DOCUMENTATION RESEARCH AND TRAINING CENTRE (DRTC)

DRTC was established in Bangalore in 1962. S.R. Ranganathan organized and developed this centre. The staff of DRTC has been actively engaged in research on classification and related areas. S.R. Ranganathan, A. Neelameghan, M.A. Gopinath and S. Seetharama have contributed a great deal to library classification. DRTC has been mainly engaged in areas, namely, the study of structure and development in the universe of subjects the development of a theory of library classification and design, as well as revision and continuous updating of schemes for library classification. Another area has been

the application of the computer. DRTC (Now Endowment is responsible for it) has also been looking after the revision of *Colon classification*, and bringing out depth schedules. It is assisted by other Indian researchers, many of whom happen to be alumni of DRTC.

DRTC, along with the Sarda Ranganathan Endowment for Library Science, started a quarterly Journal, called *Library Science with a Slant to Documentation* in 1964. This is a prestigious journal, which concentrates on classification at one time. Now Endowment is bringing it out. The *Annual Seminar of DRTC* is being published since 1963. A number of its issues have been devoted to classification and allied areas. Research work carried out at DRTC is covered in the above journals.

The following reports indicate the research in classification, mainly done at DRTC.

S.R. Ranganathan, *Classification research, 1957—1963: Trend report (India)* (FID/CR report no. 1)

M.A. Gopinath, *Classification research, (1963—1967: Trend report (India)* (FID/CR report no. 6).

M.A. Gopinath, *Classification research, 1968—1973* (FID/CR report no. 14).

A brief description of the major contributions is given below: *Colon classification edition 7 (1971): A preview* was published in *Library Science* in 1969. Till now, a few schedules for the seventh edition, covering library science, mathematics, chemistry, history, economics and so on have been published in different issues of *Library Science*. The delay in the seventh edition has caused disappointment to its users, as well as its well-wishers.

A large number of depth versions of *Colon classification* schedules, and on a variety of subjects, have been produced so far. Most of these belong to science and technology. Many areas still remain uncovered.

Experiments were carried out to design a special-purpose computerized document searching aid called "Doc-finder." Use of the computer for the synthesis of class number with a freely faceted version of *Colon classification* has also been done. One information retrieval system, based on CC, has also been reported, and work is in progress.

Areas regarding the study of structure and development of subjects remains one of special interest. In 1973, A. Neelamegham rationalized the basis of modes of formation of subjects. This has important implications for the developmet of the theory of library classification.

It is due to the efforts of the late S.R. Ranganathan and his associates at DRTC, that it has become possible to achieve an advanced version of the dynamic theory of library classification. Thus it has become possible to prepare a freely-faceted analytico-synthetic scheme for library classification. This should be considered an important achievement. CC7 is being developed along these lines.

The methodology for the design of classification schemes is still being developed at DRTC. The basic methodology worked out in the 1960s remains the same, but minor improvements based on experience, have been incorporated from time to time. In this respect, truly remarkable work has been done to develop notational techniques, to implement the findings of the idea plane at the notational plane. Now it should be possible to develop the theory for the notational system based on normative principles. It is essential that this takes into consideration the principle of the unity of notation.

Ranganathan's death in 1972 has been a big loss to classification. He organized and developed DRTC to become a major centre on classification research. Till his last days, he was closely associated with DRTC. The FID/CR Secretariat was located at DRTC, at one time which shows that the work being done there has been recognized at the international level. There is every hope that work done by Ranganathan would be carried forward by research workers at the institute.

6 CANADIAN CLASSIFICATION RESEARCH GROUP

The Canadian Classification Research Group seems to be active, and it held a conference during 6-7 May, 1978.

7 GERMAN CLASSIFICATION SOCIETY

The German Classification Society was founded in 1977. Ingetraut Dahlberg is founder-president of this society. First conference of the German Classification Society was held on 4 June 1977, the topic being 'Principles of Classification.'

8 FRENCH CLASSIFICATION SOCIETY

French Classification Society was formed in May 1978.

91 CONCLUSION

There are a large number of classification research groups in many countries such as Australia, Austria, Brazil, Canada, Chile, Czechoslovakia, Denmark, France, Germany (FRG), India, the Netherlands, Norway, Poland, Sweden, UK and USA. But few of them are really active. Dahlberg has rightly suggested that "the time has come to set up a national classification society in each and every country. Such a society should not, however, concentrate on one single application area of classification, such as library classification, classification for information retrieval, commodity or materials classification, patent classification, numerical classification, etc. Rather, it should comprise all these application areas while also inviting the interest of philosophers and terminologists in order to avert the danger of acquiring a one-track mind before long. There is one common ground for all fields concerned with the application of classification: the determination of the concepts to be used for knowledge ordering, the analysis of these concepts, and the determination of their characteristics—whether necessary or facultative—and of their differing roles in information representation."¹⁹ The different methods of subject indexing such as library classification, classification for information retrieval, thesaurus, POPSI, PRECIS etc. face similar problems. Therefore, findings in one field could be useful in another one. In fact, similar solutions are being tried out.

FURTHER READINGS

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- , "Bulletin no. 11", *Journal of Documentation*, 34, 1978, 21-50.
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- D.J. FOSKET, "The Theory of integrative levels and its relevance to the design of information systems" *Aslib Proc.*, 30 (6), 1978, 202-8.

¹⁹Ingetraut Dahlberg, "Editorial", *International Classification*, 5, 1978, p. 63.

Chapter 36

DEVELOPMENTS AND TRENDS

0 INTRODUCTION

Library classification has become increasingly important. Its importance will increase further, due to greater emphasis being laid on the provision of information service in libraries/information centres/documentation centres. For the retrieval and organization of subject information, we require powerful techniques and tools. The role of classification has been realized in computerized retrieval information systems, which has added to the importance of classification.

1 GOLDEN PERIOD

The period from 1950 (FID/CA was founded in 1950) onwards can be called a golden period for library classification. This has been a period during which the dynamic theory of library classification has been placed on sound footing. A dynamic theory provides a sound methodology for the design of a scheme for library classification. This methodology can enable one to organize new subjects and already known subjects in their proper places. As a result, it has also become possible to achieve a freely-faceted analytico-synthetic scheme for library classification, which is certainly better equipped to face the onslaught of the universe of subjects. This period is dominated by S.R. Ranganathan, who may be considered a genius of the twentieth century.

2 FIFTIES

21 FID/CR

In 1946, FID/CA (General Theory of classification) was formed. In

1962 FID/CA was renamed FID/CR classification Research. Ranganathan was the rapporteur-general as well as the moving spirit behind FID/CA during its early period. He submitted annual reports from 1951 to 1956, which are remarkable documents. The FID/CR report series is an important contribution. These report research activities on a given aspect of classification in a country.

22 CRG

Classification Research Group or CRG (London) is an unaffiliated discussion group, which meets regularly in London. Its first meeting was held in February 1952. The members have been extremely active and influential. Occasional summaries of their discussions are published as "CRG Bulletins" in the *Journal of Documentation*. CRG issued a memorandum entitled "The need for a faceted classification as the basis of all methods of information retrieval" in 1955. The memorandum emphasized three basic ideas, namely, facet analysis as the basis of library classification, Farradane's theory of relationship and the use of simple notation. The members concentrated on the construction and use of special schemes of classification. They formulated many schemes. These were faceted ones, based mainly on the principles propounded by S.R. Ranganathan.

Much work was carried out on notation for classification schemes. It was concluded that notation need not necessarily express the hierarchical structure of the scheme of classification. This leads to brevity in the length of a class number, which led to the concept of "retroactive ordinal notation" by Coates. Another important area which drew the attention of the members was the analysis of relationships between different concepts. In this context, the work of J.E.L. Farradane on "relational operators" is extremely important.

23 S.R. Ranganathan

S.R. Ranganathan¹ was able to achieve the following from 1950 to 1956:

(i) He concluded that each isolate facet of a subject can be considered as the manifestation of one and only one of the five fundamental categories called PMEST.

(ii) He prescribed different connecting symbols (later called indicator digits) for the different fundamental categories. However, connecting symbols for time and space were the same.

¹International Study Conference (Elsinore) (1964). *Proceedings: classification research*, Copenhagen, Munksgaard, 1955, p. 22-23.

- (iii) He formulated a generalized facet formula.
- (iv) He put forward the concepts of rounds and levels.
- (v) He realized the need for a long base of a notational system by the use of mixed notation.
- (vi) He succeeded in the development and application of the concept of zone analysis along proper lines.

The second edition of *Prolegomena to library classification* came out in 1957. This edition was a great advance over the previous one. Some persons consider it as the first book on the dynamic theory of library classification. The number of canons had increased from twenty-eight to thirty-five. The postulational approach to classification, along with the 21 postulates and 11 principles, made its appearance in this edition. His thinking became clearer in this edition because the work of classification was attempted at three levels, and the concept of zone analysis was put into practice. It was also in 1957 that the 5th edition of *Colon classification* came out. It incorporated many of the ideas discussed earlier. By this time, the ideas of Ranganathan had already spread beyond the confines of his own country.

24 Dorking Conference

The first International Study Conference on Classification for Information Retrieval was held at Dorking in 1957. The conference suggested the need for a faceted classification as the basis of all methods of information retrieval. Indexing or classification or automated selector were all considered systems of information retrieval. This set a trend towards faceted classification.

25 General Classifications

Bibliographic classification appeared in its complete form between 1940 and 1953. Bliss based the scheme on principles of classification. This is considered an important scheme of classification. The Standard (fifteenth) edition of DDC appeared in 1952, but was found to be inadequate by its users. Therefore, a revised standard (fifteenth) edition (1953) came out. This also did not get favourable response due to the reduction of tables as well as the inadequacy of its index. The revised edition had a completely restructured relative index. The sixteenth edition came out in 1958. It was the first edition to be brought out with the cooperation of the Decimal Classification Editorial Policy Committee and the Library of Congress. It was received

well by it users.

Library of Congress classification is an enumerative scheme of classification. It lacks the theoretical basis. The scheme consists of a set of schedules, developed independently to some extent. The schedule of law had not been printed. The individual schedules are kept current within the limitations of the scheme.

UDC is an almost faceted scheme. It is guided by implicit principles leading to subjective decisions. Its revision policy in the fifties was extremely slow, and major changes were avoided due to pressures from its users. The complete edition did not exist, which was a handicap for English-knowing users of the scheme.

3 SIXTIES

During the 1960s, much progress took place in different areas of library classification. The design of classification schemes and the application of machines to information retrieval were the two major areas in which tremendous advances took place. In the 1950s, doubts had been raised by some about the feasibility of machine retrieval systems. However, during the 1960s, many of these doubts had been overcome to a large extent. An increasing application of the computer began to take place. This led to a new role for classification.

31 CRG

In the 1960s, the CRG turned its attention towards a study of the relation between special and general classifications, and the problems relating to the construction of a new general classification. The contribution made by the members is reflected in the work entitled *Classification and information control*.²

In 1962, the NATO Science Foundation awarded the Library Association a grant of 14,000 dollars to study the feasibility of a new general classification scheme and the Library Association appointed the CRG as its agent for this research project. Helen Tomlinson worked during 1964-68 and Derek Austin from 1968 to 1969 on this project.

CRG concentrated : on (i) Determining of principles for the cate-

²Classification Research Group, *Classification and information control*, London, the Library Association, 1970.

gorization of concepts; (ii) ordering of concepts within categories and (ii) relationships between concepts.

Under (i) a set of categories was produced by Helen Tomlinson, which was developed further by Darek Austin; (ii) involved use of the theory of integrative levels, and (iii) led to a set of relational operators by J.E.L. Farradane. Austin produced a set of role indicators.

CRG came to the conclusion that certain principles had been discovered which could provide a solution to the problems faced in the formulation of general schemes, and it would be necessary to construct two classified thesauri—one of entities and the other of attributes organized according to the above-mentioned principles. Classifying would consist of selecting terms from thesauri and linking their notational elements, using the set of roles developed by Darek Austin.

A project³ financed by the Office For Scientific and Technical Information (Great Britain) to test the feasibility of an intermediate lexicon is under way, where the indexing terms or notation applied to a given document entry under one indexing system may be converted to their conceptional equivalents in any other indexing system by clerical means. The results of such a project have immense possibilities for further development.

Vickery's *Faceted classification*⁴ has proved to be a valuable guide. Many of those who have compiled special schemes in England and elsewhere have made use of this guide. These schemes have proved to be quite satisfactory.

Thesaurofacet⁵ is a significant contribution. It is a classification scheme for engineering and allied topics, combined with a thesaurus for post-coordinate indexing, which serves as an alphabetical index to the classification scheme.

32 DRTC

The Documentation Research and Training Centre (DRTC) was established in Bangalore in 1962. S.R. Rananathan organized and developed this Centre. The staff of DRTC has been actively engaged in research on classification and related areas. S.R. Ranganathan,

³Classification Research Group, "Bulletin no. 9", *J. Doc.*, 24, 1968, pp. 292-95.

⁴B.C. Vickery, *Faceted classification*, London, Aslib, 1950 (Reprinted with corrections and additions in 1968 and 1970).

⁵J. Hitchison, etc., compiler, *Thesaurofacet*, Whetstone, English Electric Company, 1969.

S. Seetharama, A. Neelameghan, and M.A. Gopinath have contributed extensively to library classification. DRTC has been engaged mainly in areas, namely, the study of structure and development in the universe of subjects, development of a theory of library classification and design, revision and continuous updating of schemes for library classification. Another area has been the application of the computer. DRTC has also been looking after the revision of *Colon classification*, and bringing out depth schedules. DRTC is assisted by other Indian researchers, many of whom happen to be alumni of DRTC.

Along with the Sarada Ranganathan Endowment for Library Science, it started a quarterly journal, called *Library Science with a Slant to Documentation*, in 1964. This journal mainly concentrates on classification. *Annual Seminar of DRTC* was started in 1963, and is being published since. A number of its issues have been devoted to classification and allied areas. Research done at DRTC is covered in the above journals.

The following reports indicate the research in classification mainly done at DRTC:

FID/CR report no. 6: "*Classification research 1963-1967, Trend report (India)*" by M.A. Gopinath.

FID/CR report no. 14: "*Classification research 1968-1973*" by M.A. Gopinath.

Some of the major developments in different areas of research are given below:

321 Modes of Formation of subjects

Typological studies regarding modes of formation of subjects, were made by Ranganathan in 1950. He isolated four modes. In the 1960s he added two modes. This further led to a systematic study of modes of formation of subjects.

322 Theory of Library Classification

In 1962, Ranganathan formulated a principle called the "wall-picture principle" for a determination of the sequence between isolates ideas deemed to be a manifestation of the same fundamental category. In 1963, work on a theory in the notational plane led Ranganathan to the idea of an emptying digit. It is a remarkable idea to provide infinite hospitality in an array. In 1966, he came to the conclusion that the property of an entity is the manifestation of the fundamental category matter. This has important implications for the designing

of schedules. In the same year, he propounded the concept of a subject bundle.

The need was realized to formulate a dynamic theory to guide the work of classification. In this context, Ranganathan came to an important conclusion, that the work of classification be separated into three planes (namely, the idea, verbal and notational planes). However, this finding was put into operation, in a conscious manner, only in 1967. This led Ranganathan and his band of researchers to make much progress in the field of library classification. It also shows the importance of separating the work of classification according to the levels of work.

Ranganathan's third edition of *Prolegomena to library classification* was published in 1967. However, this was actually released in October 1968. This edition had been recast, completely revised and rewritten. It contains 11 normative principles, 43 canons (15 canons for the idea plane, four canons for the verbal plane, and 21 canons for notational plane and 3 canons for book classification), 13 postulates, four principles for facet sequence, and 18 principles for a helpful sequence. According to Ranganathan: "A scheme for classification designed on the basis of postulates and guided by the principles for facet sequence, in addition to usual canons and the principles for sequence in array, is likely to be more enduring and long-lived than a scheme using the canons alone" (*Prolegomena*, p. 114). This is true because the use of normative principles amounts to the application of scientific method to the design of a scheme.

The third edition is an invaluable contribution to the subject of library classification. There is no doubt that it is an outstanding work of the decade. It has helped in establishing the classification theory as a fundamental subject of study on a firm basis.

323 *Methodology for Designing*

Ranganathan published an article entitled *Design of depth classification* in 1964, (*Library Science*, 1, 1964, pp. 1-42). This is a classic article, which describes the methodology for design in a scientific way. The depth schedules prepared in India are mostly based on the above article. The methodology of design has been developed to a high level at DRTC, and work is still going on.

324 *Colon Classification*

The sixth edition of Ranganathan's *Colon Classification* appeared in 1960. In it, he avoided the use of Greek letters. Many of the

schedules were revised.

In 1961, it was suggested that the single inverted comma (as an indicator digit for the time isolate instead of a dot) be used to overcome rigidity in *Colon classification*. This was an important idea.

The sixth revised edition of *Colon Classification* was published in 1963. An annexure was added in the revised edition, where the inverted comma was prescribed as an indicator digit for the time facet. A few corrections and minor changes were also included.

Ranganathan's *Colon classification edition 7 (1971): A preview*⁶ appeared in 1969. This described the changes which are likely to take place in the seventh edition. It indicated how the libraries could change over to the new edition. The changes suggested are the major ones, which would take CC towards a freely faceted scheme. The schedules are going to be overhauled, keeping in view the latest ideas in notational techniques, greater use of emptying digits, zone analysis, use of new indicator digits and so on.

Ranganathan examined the concept of a basic subject and, as a result, prepared an extensive schedule of basic subjects.⁷ The concept of a basic subject can make a scheme better equipped to face advances in knowledge. It enables a classificationist to overcome the limitations involved in the application of the concept of main classes. Later, he recognized the varieties of a basic subject with the help of modes of formation, and published his results in a preview of the seventh edition.

Starting from 1963, 63 depth versions of CC schedules were produced, covering various areas. Most of these schedules belonged to science and technology. These have been applied on a limited scale, and more areas need to be covered.

325 Application of Computer

In May 1968, DRTC initiated experiments to determine the feasibility of using a general-purpose computer in a document-finding system, based on a classified catalogue system using a freely-faceted version of CC. The results have been encouraging.

Experiments were also carried out to design a special-purpose, computerized document-searching aid called "Doc-finder." The objective was to establish a one-one correspondence between the specific need

⁶S.R. Ranganathan, "Colon classification edition 7 (1971): a preview," *Library Science*, 6, 1969, paper M.

⁷S.R. Ranganathan, "Basic subjects and their kinds," *Library Science*, 5, 1968, paper C.

of a specialist at the moment and the documents recorded in the memory of the Doc-finder—the expectation being that depth classification would make the work of the Doc-finder leakproof as well as noise-proof.

The use of a computer for a synthesis of the class number with a freely faceted version of *Colon classification* has been described by A. Neelamegham and S. Venkataraman.⁸

33 General Schemes of Classification

J. Mills was given the responsibility of revising *Bibliographic classification*. An attempt was made to include the best features of the original as well as the latest developments in the revised edition. A general classification scheme called Library-Bibliographical classification (its Russian abbreviated name is BBK), based on "Principles of Marxism-Leninism" was compiled at the Lenin Library (Moscow). The full edition is in 30 volumes (1960-68). It is used in 100 libraries in USSR, and is also being used in Vietnam, Czechoslovakia and Bulgaria.

The seventeenth edition of DDC appeared in 1965, in two volumes. It has a reasonable amount of relocation. A whole new schedule for 150 (psychology) was assigned. Form divisions were redesigned into standard subdivisions. The area tables was separated as an auxiliary. "Add to" replaced "Divide like." The index was so poor that a revised index had to be brought out in 1967. *Dewey decimal classification: Additions, notes and decisions* is a useful publication, which keeps the users of the scheme informed about changes taking place.

Rider's international classification appeared in 1961. This scheme is for the arrangement of books on shelves of general libraries. It is an enumerative scheme of classification, providing readymade class numbers. However, no number is more than three digits. It uses pure notation, consisting of Roman caps. Gaps have been left for future expansion. It follows the non-structural notation. It is surprising that an enumerative scheme should have come out at a time when the superiority of a faceted scheme had been more or less well established.

Much research has been done on the use of UDC as a language for information retrieval. In the United States, research on UDC in computer-based retrieval systems had been carried out by R.R. Free-

⁸A. Neelamegham and S. Venkataraman, "Formulation of general terms..." *Library Science*, 6, 1969, paper D.

man and P. Atherton in late 1960s, in the AUDACIOUS (Automatic Direct Access to Information with an On-line UDC System) project at the American Institute of Physics. Similar research has been done by M. Rigby and T.W. Caless and others, who have tried to evaluate UDC as a tool for computer retrieval, and discussed means and ways for its manipulation. Similar research has also been done in other countries. They have demonstrated the feasibility of UDC as a machine-indexing language.

Due to certain limitations of UDC, like occasional violation of the hierarchical pattern in the notation, defective auxiliary tables, filing problems and so on, its use for the above purpose has led to certain difficulties.

The full English edition had not been completed by the end of the 1960s. At the same time, it may also be pointed out that many of the schedules of full edition were out of date.

Soviet librarians have been especially interested in UDC. In future, they are likely to have a greater influence on its revision.

34 Elsinore Conference

The Second International Study Conference on Classification Research, held at Elsinore in 1964, had 60 participants and six observers. Sixteen nations were represented.

The topic of the conference was a broad one, covering the general theory of classification, research in mechanized classification, selected specialized schemes and evaluation techniques. The topics ranged from conventional classification schemes to computer-generated ones. This set a trend towards the application of the computer during the 1960. This conference should be regarded as an important landmark.

35 J.C. Gardin

The work of J.C. Gardin on relational indexing needs to be noticed widely. He is the author of SYNTOL ((SYNTagmatic Organizing Language). In this, isolates are related to each other paradigmatically and syntagmatically. A limited number of relationships are used and isolates are linked by these in pairs. The input can be accepted from a scheme of classification, a list of subject headings, or a post-coordinate index. The system is designed for retrieval by computer, but indexing is done by human beings.

36 *Eric de Grolier*

De Grolier's work on general categories⁹ is a useful one, which brings together the ideas of various authors on general categories. He came to the conclusion that the number of categories, prescribed by different authorities, vary. He suggested that specialists should collaborate to study problems relating to symbolization of general categories and relationships.

4 SEVENTIES

41 *CRG*

In the initial stage, CRG aimed to produce a general compatible scheme to serve different purposes like shelving, arrangement of classified catalogues and information retrieval. However, this was not found feasible because different purposes are not compatible.

CRG believes that no general scheme suitable for computer retrieval existed. Therefore, it was decided to develop a general classification in association with the UK MARC project for an automated retrieval system. The theory of integrative levels is being developed, and it would possibly be used to serve as a basis for the arrangement of concepts in the new general classification scheme.

CRG believes that enough knowledge is available regarding theory of Document information retrieval systems to enable designing of a new general scheme, which would be satisfactory for libraries and information centres in all subjects, general as well as special. This would also be useful to some extent for machine-based retrieval systems. One would fully agree with CRG that none of the existing schemes of classification are good enough to meet the challenge of the growing universe of subjects.

PRECIS (PREserved Context-Indexing System) is a by-product of the continuing research for a general classification scheme. PRECIS is a direct descendant of faceted classification. However, the credit for developing it should go to Darek Austin. From 1971, *British national bibliography* has been following it. It is also being used by UK MARC as well as many other bibliographies. The ideas of Farradane have influenced the work of Austin.

Members of CRG have continued to produce special schemes in a wide variety of areas of specialization, especially in science and

⁹Eric de Grolier, *Study of general categories applicable to classification and coding in documentation*, Paris, Unesco, 1962.

technology. Much remains to be done.

The work of CRG has been widely noticed. It had a tremendous impact on the research, teaching and practice of classification and information retrieval in Great Britain and elsewhere.

42 DRTC

FID/CR Secretariat had shifted to DRTC at Bangalore for a few years. There is every possibility that the work being done at DRTC and elsewhere in India would get greater attention at the international level.

Fifty-five depth versions of *Colon classification* schedules were produced, covering various areas, during the 1970s, till April 1974. However, much still remains to be done.

The methodology for the design of classification schemes is still being improved. The basic methodology worked out in the 1960s remains the same, but minor improvements, based on experience, have been incorporated from time to time.

The area regarding the study of structure and the development of subjects remains an area of special interest. In 1973, Neelameghan¹⁰ rationalized the basis of modes of formation of subjects. This has important implications for the development of the theory of library classification.

The developments at the notational plane were reviewed by Bhattacharyya. He suggested that the theory for notational system should be based on normative principles. It should take into consideration the principle of the unity of notation. For instance, this has important implications for the application of the concept of indicator digits.

In order to meet the explosion of knowledge, many new indicator digits have been accepted and incorporated into the new edition of CC.

Now we have an advanced version of the dynamic theory of library classification. The problem with existing general schemes of classification is that these are not freely facted in the sense in which we understand it today.

The seventh edition of *Colon classification* was expected to be published in late sixties, but it has eluded its users so far. "Colon classification edition 7 (1971): a preview" was published in *Library*

¹⁰A. Neelameghan, "Primary basic subject by fission," *Library Science*, 10, 1973, paper G. (Similarly, papers H, J-N also appeared in volume 10. These were all by Neelameghan).

Science. We are still awaiting the completion of the revised edition. A few schedules for the seventh edition covering library science, mathematics, chemistry, history, economics and so on have been published in different issues of *Library Science*. The delay in the seventh edition has caused disappointment to its users, as well as to its well-wishers.

One information retrieval system, based on the use of CC, has been reported by B.S.S. Gupta. He has described a set of fifteen programs which provide for the storing and updating of a reference catalogue, a classification schedule, an alphabetical index to the schedule, and a catalogue of user profiles. Interactive, retrospective searching and selective dissemination are the output options. The work is in progress.

POPSI (Postulate-based Permuted Subject Indexing) is being developed at DRTC. It is a procedure for implementing the policy of "grouping by juxtaposition". It has a strong classificatory base. The results have been encouraging.

Ranganathan aimed at providing an excellent representation of the semantics of a given document. This required the use of a large variety of indicator digits. As a result of a large variety of indicator digits, arranging and retrieval of documents or information based on CC7 became rather complex. Such an approach may be useful for certain purposes e.g. trade catalogue, documentation list, etc. Theoretically speaking the approach adopted by Ranganathan was excellent. However, practicing libraries found the schedules of CC7 too complicated for arrangement and retrieval of documents or information. CC7 was felt to be uneconomical to use. In libraries shelving is done by attendants, who find the job rather complicated. Users also find it difficult to locate documents. Therefore, during recent years, rethinking is being done at DRTC on these problems.

In order to make CC economical to use, the following ideas are under consideration:

(i) To go back to the structure of CC6 (it is based on knowledge as it existed around 1950) and expand it to a minimum level, taking into consideration the state of the universe of subjects as at present. The methodology is available for expansion of schedules, which would allow a classifier to expand a schedule at a given point to meet the requirements of his users.

(ii) To reduce the number of indicator digits being employed in the schedules of CC7 and thus go back to CC6.

(iii) To give more importance to subject headings. The idea being

that subject headings should be improved to increase the probability of retrieval of documents or information required by a user. If required, depth subject headings should be given.

43 General Schemes

BC2 is planned in 20 volumes, and a few volumes have already appeared. The new edition is a totally revised one, incorporating the latest ideas. The volumes which have come out show great promise.

The 18th edition of *Dewey decimal classification* appeared in 1971, in three volumes. The revision from the seventeenth to the eighteenth edition has been substantial. It incorporated new materials, especially in the scientific fields. It has tried to provide more adequately for the requirements of foreign users. The tables forming introductory matter have been revised. Western emphasis has been reduced to some extent, and there is a trend towards making it an international scheme in the true sense. It introduces, for the first time, a flexibility of notation beyond the use of artificial digits, to the use of established numbers with unofficial meanings. In the recent edition of DDC, the influence of British National bibliography is evident. Some of the ideas of Ranganathan also seem to have influenced the revision.

DDC19 appeared in 1979 in 3 volumes. The past four editions, 16 to 19, have been edited under the direction of Benjamin A. Custer. This edition has been produced by computerized photocomposition. The characteristics of DDC 19 have been described in the next few pages.

Expansion: In DDC 18, the number of entries was 26,141. In DDC 19, the number has increased to 29,523. DDC 18 had 3,565 entries which were permitted to be expanded by means of instructions in the schedules and tables, if required. The number of such entries has increased to 4,892. In addition, every number can also be expanded by the application of Tables 1, 2, 5 and 7. Thus in the present edition, there are more entries to take care of more topics and more opportunities for building class numbers.

Faceting: In DDC 19, "there is more recognition of the possibilities of subdividing various subjects according to more than one characteristic, and there are more notes establishing the order in which the classifier is to consider or combine those characteristic" (DDC 19, vol 1, pxxi). This is a move along right directions.

Notes: DDC 19, has greater provision for notes of explanation and instruction. For instance, very detailed instructions for building numbers have been given in 800s at two places, namely the schedule

and table 3. Table 3 is followed and supplemented by table 3-A. Table 3A aims to provide additional elements for building numbers within table 3.

There are many new provisions in Table 1 (standard subdivisions). There are also more directives taking one from unused standard subdivisions to proper places in the schedule.

International Usage: DDC 19 shows greater commitment to international use and value. This is evident from the new policy laid down by the Decimal Classification Editorial Policy Committee and the Forest Press. According to this, "in preparing an edition, it is desirable to allow positively for the needs, both in detail and in order, of countries outside the US. Where there is a conflict between these needs and those of the US, the Editor should give his preference to the needs of the US, but must make provision for an alternative use by libraries outside the US in a manner appropriate to the particular problem" (DDC 19, vol 1, p xxiii).

In order to take care of international usage, expansions, at certain places have been permitted to meet the needs of countries lying outside the United States. The examples are given below:

(a) Area notations 41-42 (Local subdivisions of England, Northern Ireland, Scotland and Wales) and 8 (South America).

(b) More options to emphasize favoured languages, religions etc.

(c) Adoption of conventional American spellings rather than residual simpler spellings of editions 16-18.

Options: Some of the options which had been authorised in the past to meet the needs of particular libraries have been withdrawn because these did not promote correct classification.

Completely revised schedules and tables: Completely remodeled provisions have been provided in the following cases:

(a) 301-307 Sociology has been recast from former 301. 302-307 numbers had been lying unused since DDC 16. These have now been employed.

(b) The political process has been recast from the numbers 324 and 329, which were used previously. This has helped in avoiding previous notational bias in favour of United States political parties.

(c) Area notations 41-42 have been revised keeping in view recognized local administrative pattern of the United Kingdom.

List of printed significant topics whose numbers have been changed have been listed under 'lists of changed numbers' near the close of volume 1. It shows the number changes from DDC 18 to DDC 19 for a substantial list of topics.

Relocations: In addition to relocations in completely revised schedules and tables, there are 340 relocations.

Reuse of numbers: According to earlier rule the old numbers could be reused with new meaning (except in phoenix schedules). This rule has been relaxed to some extent. The new rule permits "a number previously used to be freely reused if it has been vacated for at least two consecutive editions (instead of for 25 years)" (DDC 19, vol 1, p xxlv). This edition has reused eleven numbers under this rule.

Other significant expansions and explanations. Table 1 (standard subdivisions) provides a table of precedence. In class works to which two or more standard subdivisions are applicable, the table of precedence will help in deciding the order of precedence of standard subdivisions unless, there are other instructions.

Standard subdivisions 088-089 provide a device for arranging any subject by ethnic groups or classes of persons.

Standard subdivision 068 replaces 658.9 as preferred treatment for management of enterprises engaged in specific fields of activity, of specific kinds of enterprises.

Standard subdivision 08 for collection has been discontinued except for belles-letters.

Expansion of table 2 entries for Great Britain, Latin America, Australia and Southern Africa has been done. The entries for Great Britain have been reorganized.

In addition to new schedules for sociology and political process, the following subjects have been expanded:

Information Science

Social Welfare

Law (under 340, an optional provision has been provided to arrange law by jurisdiction)

Zoology

Engineering

Home Economics

Management

History (under 900, history periods have been expanded substantially).

Index. Index in DDC 19 follows the same pattern as that of DDC 18. Many cross-references have been dropped and replaced by numbers. Thus there are more direct entries. More synonyms have been included. Some of the aspects of various subjects, which are less used have been deleted. As a whole, index shows an improvement.

Conclusion. The latest edition has been updated to keep pace with the growing universe of subjects.

It represents a consolidation of the efforts towards revisions and additions carried out in 17th and 18th editions. DDC 19 contains more entries and provides more scope for building class numbers. New schedules have been provided for sociology and political process. There is greater recognition of the possibility of subdividing various subjects according to more than one characteristic. There are more notes and instructions.

More notes have also been provided to establish the order in which characteristics should be combined. The revision has been done keeping in view the international use and value of the scheme. For this purpose options and other aids have been further developed. The editor's introduction has been revised, giving many new examples. Melvil Dewey's introduction has been omitted but still useful parts have been incorporated in the preliminary sections. The index has been further improved by adding more synonyms and giving more direct entries.

At the International Conference on Scientific Information (Washington, DC, 1958), Ranganathan suggested that a team of persons consisting of epistemologists, psychologists, linguists, reference librarians, statisticians and classificationists investigate "the way in which the human mind thinks—that is, the syntax of facets that will give the greatest satisfaction to the greatest number of readers."¹¹ In 1966, Ranganathan put forward the concept of absolute syntax. According to Neelameghan, "Absolute syntax is the sequence in which the component ideas of subjects falling in a subject-field arrange themselves in the minds of majority of normal intellectuals, for instance, when they think and communicate about the subject."¹²

In library classification, we deal with subjects. A subject represents an organized or systematized body of ideas. Ideas are the product of human thinking. Human thinking is controlled by the brain. It has been found that there is a considerable similarity in the structure of the brain in a large majority of normal human beings. Thus, we can say that there is a considerable similarity in the functioning of the brain in the majority of normal human beings. This leads us to the

¹¹S.R. Ranganathan, "Hidden roots of classification," *Information Storage and Retrieval*, 3, 1967, section 7.2.

¹²A. Neelameghan, "Absolute syntax and structure . . ." in International Study Conference on Classification Research (Bombay) (1975), *Ordering systems for global information net work: Proceedings*, Bangalore, FID/CR, 1979, p. 170.

conclusion that the mode of thinking and learning is more or less similar in a majority of normal human beings. The same can be said about the forming and combining of ideas to build knowledge. Human beings have undergone changes culturally, but biologically, man has not changed to any appreciable extent. Therefore, the possibility of sudden change in the mode of thinking and learning in a majority of normal people is very little in the near future.

From the above, it follows that "if the syntax of the representation of the component ideas of subjects is made to conform to, or parallel to, the absolute syntax, then the pattern of linking of the component ideas—that is, the resulting knowledge-structure—is likely to be"¹² helpful to a majority of normal human beings, will also be consistent in pattern in subjects belonging to different basic subjects. It would also be free from problems created due to the variations in linguistic syntax for naming the subjects. Studies in psychology, linguistics, cybernetics and so on have supported the postulate of absolute syntax.

Even today, *Universal decimal classification* does not have a general theory behind it, because it lacks a sufficient and consistent body of principles. Such a theory is needed urgently.

Till recently, UDC was revised keeping in view maximum stability. But now, it is undergoing an overhauling process, so that it can serve the purpose of international cooperation and standardization of documentation practices; this will make it more amenable to information retrieval.

UDC has an important organization looking after it, which is financially sound. Its revision policy is affected by the viewpoint of well-established users, who seem to be against any drastic change. Despite this, attempt is being made to give it a scientific base to meet the wishes of its new users.

The publication of full editions of UDC has been slow. Therefore, it has been suggested that the computer be used to update its schedules.

In order to save time and costs, A.C. Foskett has suggested the idea of producing Computer Output on Microfilm (COM), instead of a hard copy. Under this procedure, revision would be concerned with the feeding of new data, which would be in the form of corrections and additions to the existing file.

Computers have been used for the maintenance and display of UDC schedules, in the preparation of its index, and for the UDC

¹²Ibid.

control of vocabulary language in a thesaurus.

The findings of the American Institute of Physics on the UDC project under R.R. Freeman and P. Atherton formed the main theme of the *First Seminar on UDC in a Mechanized Retrieval System*, and the same subject continued during the second seminar held at Frankfurt in 1970. These seminars led to the conclusion that UDC can be used as an indexing language in a mechanized system, using either a batch processing or interactive mode.

Experience shows that the use of well constructed thesauri, along with hierarchical schedules of a scheme like UDC, could lead to better search as well as retrieval control than the use of either one of these. The combined use of UDC and a thesaurus was one of the main themes of an international symposium held at Herceg Novi, Yugoslavia.

There have been many attempts to use mechanized UDC-based systems for storing information about documents. Such systems have been used for various purposes, like the control and display of bibliographic citations, SDI, file maintenance, on-line interactive retrieval, library routines and services, and so on.

Some persons have suggested that UDC can assist other indexing vocabularies in a number of ways. For instance, it can lend its terminology, serve as a thesaurus facet, or display its hierarchical structure.

44 Special Schemes

A Number of special schemes are available. Many of those created during the last 25 years are based on the faceted approach. Still, there are many areas in which satisfactory special schemes are not available.

45 Bombay Conference

Today, an information revolution is taking place. This has social consequences, which has resulted in the concept of information network. This has brought forth the need to formulate a programme for setting up "ordering systems for global information network," to be carried out by authorities and agencies. This was the theme of the Third International Study Conference on Classification Research, held in Bombay in 1975. At this conference, there were 55 contributors (43 from abroad and 12 from India) and 66 observers (eight from abroad and 58 from India). In the context of the theme, classification, thesauri building, and indexing techniques were

considered as information-ordering methods. In view of the above classification will have to play a new role.

This conference may be considered an important landmark. This has given fillip to the application of computers, with cooperation at the global level. This has also led to in-depth examination of indexing methods and switching languages.

46 INSPEC

A thesaurus-based indexing and classification system has been developed for INSPEC. It is a vocabulary system consisting of a unified indexing and classification scheme. It uses a hierarchical classification and a vocabulary-development file with thesaurus structure.

47 Broad System of Ordering (BSO)

At the FID conference held in Budapest in 1972, it was resolved to increase the size of the FID/CCC panel formed in 1971, to serve as a Working group called FID/SRC for the purpose of preparing a Subject-field Reference Code, which could serve as the Broad System of Ordering (BSO) needed for UNISIST. The basic idea was to prepare an independent "roof classification" to control the transfer of large amounts of information between constituent centres, systems and services using different indexing languages, special classifications, thesauri and so on. In other words, it was intended to prepare a broad classification to serve as a switching language between different information systems. Thus a broad classification was aimed to serve as a switching mechanism to link different classifications, indexing languages and thesauri in the process of information transfer between information centres in a network. This could also be used for referring to the contents of the existing information systems. Later, a small, panel FID/BSO, consisting of three persons, namely, Eric Coates, Geoffrey Lloyd Dusan Simandl, was appointed from among the FID/SRC members, to prepare and complete a single (merged) BSO for UNISIST.

BSO is basically discipline-oriented, but the class for human needs has also been provided; this is in addition to usual subjects like arts, crafts and technology. The BSO code is meant for organized information sources, but not for the classification of documents.

The following criteria have been used for the inclusion of a subject in BSO:

The existence of periodicals, university departments, data collections, and abstracting services and organizations in the subject of

concern.

However, human needs is considered as an exception to the criteria listed above.

FID published the *BSO-Broad System of Ordering: Schedule and Index* in 1978. It is a classification of the whole field of knowledge, covering about 4000 terms in English. BSO has been tested before being produced as a final version. It has provided a great scope for classificationists to try new ideas. It has a faceted structure, which allows syntactic combinations for dealing with prescribed inter-term relationships. Basically, it is discipline-oriented, but also provides comprehensively for mission-oriented or multi-disciplinary subjects, of concern to organized information sources. BSO has been allocated notation consisting of numerals in millesimal and centesimal integer arrays. It also uses two punctuation symbols, (comma) and - (hyphen). It avoids hierarchical expressiveness, but provides first priority to system predictability. Notation is meant for human users rather than primarily to serve machine handling.

The BSO manual: The development, rationale and use of the Broad system of ordering, the Hague, Netherlands, FID, 1979.

The Broad System of Ordering, a general classification scheme for information transfer and switching appeared in 1978. This scheme appeared under the title *the BSO—broad system of ordering*, which described the application of the scheme. The manual discusses the theory behind the scheme and the issues which arise in the practical application of BSO, giving a specimen file of 50 directory entries to illustrate the issues and ordering patterns, etc.

The Broad System of Ordering described a general classification scheme for information exchange and switching. *The BSO manual*¹⁴ gives an extended treatment of the scheme. It describes the stages through which the original concept went through, along with the theoretical basis of the scheme. It discusses in depth the issues/problems concerning the practical application of BSO, giving a specimen file of 750 directory entries of specialized organizations and secondary information services.

48 Optical Structures and Universal Classification

During recent years, outstanding contributions to the study of classification have been made by the British Classification Research Group

¹⁴*The BSO manual, the development, rationale and use of the Broad system of ordering*, prepared by the FID/BSO Panel, Eric Coates, Geoffrey Loyd and Dusan Simandl, The Hague, FID, 1979.

and DRTC (Bangalore). In addition, work done by Dr Ingetraut Dahlberg¹⁵ in Germany deserves attention. According to her, we may regard concepts as knowledge units referring to any selected reality of our world and assume these to consist of the characteristics of a referent, the necessary prediction(s) and an expression. In that case, we may recognize that construction of a concept system (i.e., classification system) means the organization of such knowledge units on the basis to their inherent relationships. She has proposed a universal classification.

49 Other Uses of Classification

491 Switching Languages

In order to get over the problem in information explosion, we require one, standard switching language or linking device between the indexing thesauri of different languages and countries. UDC has been proposed due to its large usership, usability in modern mechanized retrieval and dissemination systems, and organizational set-up. In order to promote UDC as a switching language, FID has started the preparation of concordances between the UDC and various descriptor lists and thesauri. Perhaps *Colon classification* is better fitted for such a task, but the organization behind it is too small and has little influence at the international level.

492 Construction of Thesauri

It has been found that formal classifications can assist in the selection and building of terms for a thesaurus. The hierarchies of a classification scheme can be helpful in the preparation of references also.

The compilation of concordances between the UDC and thesauri or other special schemes would throw more light on their combined use. It would also lead to optimal methods of subject organization and control. A number of such projects have been undertaken.

493 Aids to Classification

Library classification schemes and thesauri are considered aids to classification. A combination of a library classification scheme such as UDC or CC (in those areas where depth schedules are available) along with a well developed thesaurus can prove to be excellent for

¹⁵Ingetraut Dahlberg, *Ontical structures and universal classification*, Bangalore, Sarada Ranganathan Endowment for Library Science, 1978.

classification and documentation purpose. Library classification and thesauri have their own advantages.

A general library classification covers the whole field of knowledge. A scheme like UDC can be considered universal to a certain extent because it aims to cover all human knowledge. However, a thesaurus usually covers one subject field and aims to cover the field to the minute details, a scheme like DDC and UDC can be understood internationally. On the other hand, a thesaurus is meant to serve the requirements of subject specialists, who are supposed to understand the specialized terminology. As far as new subjects are concerned, a library classification takes a great deal of time before it is able to incorporate these. However, a thesaurus has no such problem. It can include new subjects without much of a difficulty.

5 Eighties

The Fourth International Study Conference on Classification Research was held in Augsburg (W.Germany) from 28th June to 2nd July 1982. The conference was organized by FID/CR in collaboration with IFLA section on Classification & Subject Cataloguing and Gesellschaft für Klassifikation. The theme was 'Universal classification; Subject Analysis and ordering systems'. The aspects covered included (e) General principles and policies, (b) Structure and logics of indexing languages; (c) Empirical investigation and practical use.

Due to empirical research which is coming up, it was considered desirable to regard the discipline of classification science as a science in its own right. Stress was laid on evaluation of existing classification systems and user needs before developing new information systems. Application of procedures of data and cluster analysis in knowledge organization and information retrieval was emphasized. The emphasis was laid on universality of approach applying principles of complementarity and transdisciplinarity approach. Need was felt for greater empirical research in classification and formulation of a unified theory of classification.

The important recommendations were "(i) To study the extent to which general principles of classification can play a part in improving the effectiveness of IR systems; (ii) To develop classificatory aids for on-line searching situation."

UDC (International medium edition, English text) appeared in 1985. This edition is a great improvement over UDC abridged edition.

Use of classification in computerized information retrieval systems

has continued in 1980s. Facet analysis has been used in a number of data bases. Indexing and classification have come closer. Some of the experts have advocated a combination of depth indexing and classification for the purpose of information retrieval. It is being realized that classification has a greater role in the communication of information. Classification is now moving towards becoming a discipline of classification as a science in its own right.

6 TRENDS

The use of *Dewey decimal classification* is increasing. However, in the United states, there is a trend in academic libraries to switch over from DDC to LC. In any case, DDC is being used by the largest number of libraries.

A study was conducted by Mowery, in the United States, to find out the extent to which libraries of four-year colleges and universities have adopted the *Library of Congress classification* schemes. It was found that between 1967 and 1971, the percentage of institutions which were using LC increased in every category. In 1967, DDC users outnumbered LC users in three categories, but in 1971, they outnumbered LC users in one category only. 1968, 1969, 1970 and 1971, there were 70, 40, 29 and 20 libraries respectively,¹⁶ which adopted LC. It shows that the trend to adopt LC has lost momentum.

In Great Britain, certain public libraries have changed from the scheme of *Subject classification* to DDC in recent years, and some academic libraries have abandoned obsolete schemes for flexible ones devised by them.

UDC is being accepted by more and more countries. It is finding greater acceptance among documentation centres and for documentation work.

Three planes of work isolated by Ranganathan are beginning to be recognized. Experience shows that separation of the work of classification according to three planes gives better results. There is certainly a trend towards centralized classification services. In this context, MARC projects of the Library of Congress and BNB have an important implication for classification. This is one step towards the

¹⁶R. L. Mowery, "Trend to LC in college and university libraries," *Lib Reso and Tech Ser*, XIX, 1975, pp. 393, 395.

standardization of classification and indexing practices. It would be a great idea if MARC tapes could include class numbers prepared according to major schemes of classification, and any other scheme for machine retrieval system.

Industrial houses and other bodies have started providing financial support to the work of ASLIB and FID. Similar aid has also been given to other bodies for research in classification and allied subjects. Such financial support has shown good results.

Classified arrangement is considered superior for bibliographies supposed to serve the requirements of specialists. For this purpose, a large number of specialized schemes of classification have been worked out. This is a good development.

According to Dahlberg, the new trends in classification are:

"1. The realization that the present situation calls for a re-surveying of the totality of knowledge and for measures to bring about compatibility between existing classification systems and thesauri; 2. The realization that the elements of classification systems are concepts which may be understood as units of knowledge and that it is only through their analysis that, first, conceptual relationships can be determined and, on that basis, reproduceable thesauri and classification system can be built up; and 3. The realization that classification and indexing are of necessity complementary activities, with classification establishing the relationship to existing knowledge and indexing complementarily serving for indicating partly with the aid of new terms and names—the new knowledge."¹⁷

For a long time, techniques like classification, alphabetical indexing and mechanical selection were regarded as different ones. Each had a different terminology, to the extent that a specialist in one field could not follow completely the terms used by others. However, it is becoming clear today that all methods of subject indexing face similar problems. Thus, similar solutions are being tried out.

The trend is towards information networks. This is due to economic pressure and explosion of knowledge. Information networks lead to large-scale information systems. These require greater cooperation, as well as the standardization of practices. In this scheme of things, classification is being regarded as a vital tool of information retrieval. As such, the schemes of classification and the theory of library classification are being developed in this light.

¹⁷I. Dahlberg, "Reports and Communications", *International Classification*, 6, 1979, p. 36.

C.D. Batty has succeeded in popularizing the use of programmed learning. More and more school libraries are teaching CC, though at a superficial level. The theory developed by Renganathan is also being introduced in library schools at an elementary level, in western countries.

Besides, trends set up in the 1950s and 1960s have also continued. The trend towards the use of faceted classification for special classification, set up in the 1950s, continues. The trend of the 1960s towards the application of computers has become stronger.

7 AUTOMATICALLY CONSTRUCTED CLASSIFICATION

Gerard Salton, M.E. Lesk and K.S. Jones have done good work in this area. The first phase (1958-64) was concerned with the studies relating to the feasibility of automatic classifications. The second phase (1964-74) was concerned with experimental studies. In the third phase (1975-), practical applications have started. Some are of the view that these computer-generated classifications are rarely relevant for libraries because of the costs involved. Besides, libraries having accepted established systems of classification would be hardly willing to accept computer-generated schemes for information-retrieval with computers. However, it may be pointed out that such schemes are not appropriate for most libraries, or even for most semi-automated retrieval systems. But their application to specialized data banks is feasible. The application of computer-generated schemes to computerized information-retrieval systems had not proved to be as successful as was thought, at one stage around 1975.

8 IMPACT OF DEVELOPMENTS IN OTHER AREAS

Tremendous developments in information technology, computer technology and communication facilities have taken place in the recent years. For instance, the introduction of third-generation digital computers has made it possible to process information much faster. It has also tremendous storage capacity to rapidly handle large data. There is now an urgent need to formulate a general classification for use in computer systems, to take full advantage of computers. LC and DDC, which are being used for MARC projects, are no good for machine systems. UDC, CC and BC2 have good

potential for mechanization, but these have not been used by these projects. In any case, the need for mechanization has posed a challenge to classification experts.

UNISIST aims to achieve a global information network. This would require a programme for setting up ordering systems. Classification is an information-ordering method. Therefore, it can play a very important role in contributing towards the aims of UNISIST. This would require a new role for classification.

This influence of studies in the fields of behavioural sciences, epistemology, general systems theory, linguistics, logic, mathematics, psychology and so on is beginning to be felt.

The studies in mechanical translation have also affected information systems and classification work.

91 MODES OF FORMATION OF SUBJECTS

There has been growing interest on the study of modes of information and development of new inter- and intradisciplinary subject fields. Work of this nature is going on in many countries, such as India, Great Britain, West Germany, France, Russia and so on, and has been of immense benefit to classificationists and classifiers.

92 FUTURE

According to Schabas, "We are not about to see the skills of indexes, abstractors and classifiers made obsolete because of computers. On the contrary, there is a crying need for more of these skills in computer-based information retrieval. Too many information retrieval systems (IRSs) today are flawed, some seriously, because of the absence of such information experts during the design phase. . . . So the problem is getting worse and the need for the involvement of information experts at the *outset* of IRS design is becoming more urgent."¹⁸ In the future scheme of things classifiers can play an important role.

There is a great scope for innovation in classification. The trends indicate that there is every possibility that the future of classification will be more interesting and exciting than it is today.

Much work has already been done in the theory and practice of classification. As a result, the next few years are going to be a period

of consolidation of technical advances achieved so far.

On the basis of present-day trends, we can possibly speculate on the future of general schemes of classification. There are some chances for the survival of *Bibliographic classification*. The future of *Colon classification* is uncertain because of the passing away of Ranganathan in 1972, and the slow speed of revision taking place in it. LC and DDC will maintain their hold. UDC is also likely to be adopted by an increasing number of libraries.

It had been found that none of the existing schemes of library classification are fully suitable for the arrangement of a mechanized information store. Thus, a new general scheme is needed to serve this purpose.

With the increasing capability of computers, it will also have greater efficiency for the classifying and indexing of information in the years to come. It will become possible to give a feeling to a user, at the time of consultation, that the information file is classified according to his interests. It is expected that with the availability of more powerful machines, their usefulness in the area of classification will also increase.

Basically speaking, there are two lines of development. One is that of Ranganathan and his disciples in India. The other one is that of CRG. The future line of development is more likely to take place along the lines being set up by CRG, because of its influence at the international level.

In the years to come, we are likely to have large-scale, multi-organizational, multi-national information systems. There are many such programmes at the international, global and regional levels, which are being worked out. UNISIST is one such programme. The MARC project is another one, which deserves our attention here. Their aim is to facilitate the sharing of information and knowledge and the establishment of a world-wide information network. The future of classification would depend upon the kind of role it is able to play in the above context.

92 AREAS FOR RESEARCH

Unified terminology does not exist even today. Different authorities are using different terminology. At all four international conferences

¹⁹Ann H. Schabas, "The real information experts," *Indexer*, 15 (no 1), Ap 1986, p. 1.

on classification research, the question of standardization of terminology was raised. Standardization needs to be achieved to facilitate research and communication among specialists. The lack of such terminology has resulted in a delay in advancing from the descriptive theory to the dynamic theory. The establishment of INFOTERM in Vienna, and the work of ISO/TC 37 should facilitate efforts in this direction.

There is a need to develop abstract models of classification, guided by different sets of normative principles. These could serve as models for the development of schemes to be applied in practice.

There is also the need for a good typology of classification (the study of types and their succession). People like M. Coyaude, J.C. Gardin, J. Toman, S.R. Ranganathan, A. Gilchrist and so on have already worked in this area.

Even today, we do not have a satisfactory general scheme of classification. However, there is no agreement as to what kind of general scheme we need. There is a necessity for experimental work to develop a new system which should be universally accepted. It is doubtful if we can achieve such a system. The aim should be to prepare a meta-language, which could express any subject as a string of notated elements. It should be natural with regard to, "(a) the placing of the subject in various standard shelf order classification, (b) the categorical frameworks of the user of the system, (c) the words and syntax of any one natural language."¹⁹ It should be independent of any one language, and also be capable of being used for mechanized information retrieval.

There is a need to develop scientific tests with regard to the usefulness of classification schemes in general libraries. This will enable us to pursue an objective study of the performance of the existing schemes of classification.

The question arises as to how far an established scheme should be revised. Should we give greater emphasis to innovation even at the cost of stability, or *vice versa*?

Furthermore, we do not have an objective criterion to decide as to when reclassification should be done. Such criteria should be developed, which will certainly be found extremely useful.

A classification is an important tool for information retrieval; therefore, it must be developed to take care of the requirements of

¹⁹A. Maltby, ed., *Classification in the 1970s*, London, Bingley, 1972, pp. 246-47.

information retrieval.

There is a need to continue Ranganathans' work regarding the facet formulas. Therefore, it has been suggested that "one should systematically analyse all the verbs in one language according to their valencies in given subject fields and construct algorithms accordingly for the positioning of the necessary complements to go with such a verb structure. The basic formula (absolute syntax ?) for any classificatory statement would then be:

S	P	C
(Subject),	(Predicate),	(Complement),

where there may be almost no end to the possible complements that can be added optionally to such a structure as additional information, should a given document warrant it."²⁰

There is a need for basic research, using quantitative data, and linguistic, semantic, logical and mathematical models for designing ordering systems and switching methods for the global information network. Similarly, more research on testing and evaluation of on-line information-retrieval system should be conducted which are likely to be used extensively in the future. This would make it possible to develop schemes of classification so that these have inter-connections and it would be possible to transfer block of information between any two of them.

Arthur Maltby has raised the question: "Can a computer measure statistically the frequency of word-use and word-associations and thus promote mathematically-generated classifications based on impartially selected keywords and clusterings?" Some studies have been carried out in this direction, but more in-depth research should be carried out to reach definite conclusions.

In library classification, one is expected to represent the entire range of relationships involved with almost any subject. The schemes of library classification try to use various techniques to achieve this purpose. These techniques include the indentation of terms, the use of bold typefaces or special type fonts, positional and notational devices and so on, on the printed page. But these have their limitations, due to representation being restricted to a linear outline. In flow charts, off-page connectors are used. However, in library classification schemes these have been avoided except as cross-references of one or another type.

²⁰ Ingetrout Dahlberg, *Ontical structures and univesal classification*, Bangalore, Sarada Ranganathan Endowment for Library Science, 1978, p. 52-3.

Some people have suggested three-dimensional physical models to demonstrate structure and relationships. There is a need to perform experiments to produce such types of suitable models. These can be useful in teaching, as well as helpful in translating classification ideas from one language to another. In case there is no equivalent term in another language, then a diagram or a physical model could help in providing a clarification. Even otherwise, a visual pattern can help a viewer understand an idea, so that he can then describe the same in his own terms, overcoming language and cultural barriers. Thus, a thought on the idea plane can be conveyed without misunderstanding or confusion, where its expression at the verbal plane might have led to misunderstanding.

The problems of library classification regarding linguistic, philosophical and psychological basis have not been given enough attention. Besides, we have yet to find out the best approach towards the ordering of concepts representing reality. In fact, this should be regarded as the basic problem, which remains unsolved. Library classificationists have neglected the naming and ordering of classes but devoted their attention to the ordering of terms within classes themselves.

94 CONCLUSION

There was a time, around the early 1960s, when it was felt that interest in library classification would decrease; but instead of that it has been on the increase. This is apparent from the increasing amount of literature indexed in *Library literature*, as well as increasing participation in international conferences on classification. The number of papers contributed in this field has also increased substantially. More and more library classification research study circles are being formed. It may be pointed out that during recent years, a variety of persons belonging to different disciplines have shown interest in classification, such as psychologists, philosophers, logicians, scientists-taxonomists, semioticians, historians of science, and so on. This has given impetus to the growth and development of library classification.

Again, the computer is an extremely powerful tool and its potentialities are also being exploited. All this has brought about new recognition of the subject of library classification during the last 25 years or so.

A journal entitled *International Classification* dealing with the theory and application of classification schemes and related areas, began appearing in 1973. Another journal entitled *Cataloging and Classification Quarterly* started in 1979 from New York. This shows that classification has come of age.

For a long time, classification was meant for shelf arrangement and the arrangement of entries in a classified catalogue. However, due to the needs of standardisation and cooperation required in large information systems, classification has to face a new role. Besides, the availability of computer technology has added a new dimension to its role. This has posed a challenge to those concerned with classification research.

Since 1950, a vigorous attempt has been made in UK, India and elsewhere to discover new principles and to examine critically the principles which underlie the existing schemes of classification. This has resulted in a dynamic theory of library classification. However, the theory of library classification has been developed mainly by the late Ranganathan, whose *Prolegomena to library classification* (third edition published in 1967) may be considered as a classic. He provided us with a new approach to the theory of classification. The application of a dynamic theory in a scheme can make it better equipped to face the onslaught of knowledge. Ranganathan's death in 1972 has been a big loss to classification.

It is being increasingly accepted that only a freely-faceted analytical-synthetic scheme of classification can face the explosion of knowledge in a satisfactory way. The concept of facet analysis is getting greater acceptance, not only for classification for shelf arrangement but also for indexing and so on. This concept helps in dealing with the complex problems of subject analysis. A number of systems of indexing have successfully used some of the ideas of classificatory nature.

It has been realized that the work of classification should be separated at three planes. At the idea plane, much work has been done regarding the organization of knowledge. Knowledge being dynamic, earlier schemes of classification have, as a result, been found to be rather inadequate. The work done by Robert K. Merton, de Solla Price, T.S. Kuhn, H.E. Bliss, Eric de Grolier and S.R. Ranganathan deserves mention. At the verbal plane, work has been done by a number of documentalists, anthropologists and others. A. Borillo, J.W. Perry, A. Kent and S.R. Ranganathan have done good work. The semantic field is important, and much remains to be done. At present, work is going on in syntactic structures. At the notational

plane, the work of D.J. Foskett, E.J. Coates, G. Cordonnier, J.E.L. Farradane, J.M. Perreault, S.R. Ranganathan and B.C. Vickery is notable.

We find that the established general schemes are breaking down under the onslaught of knowledge. These schemes are not going to be given up, because attempts are being made to revise them to meet challenges arising every day.

Much work has been done on UDC. It is being promoted as an aid for information retrieval. More and more documentation centres, information centres and special libraries are adopting it, especially in Europe. This is also due to a large and influential international organization being at its back. The DDC and LC classifications are two other schemes having large and influential bodies behind them. These will sustain themselves. There is a permanent staff at the Library of Congress, who takes care of DDC with regard to short, medium and long term requirements of DDC. Efforts are made to follow policy of continuous revision and the aim is to develop different disciplines equally. The organizations behind DDC are influential and are maintaining excellent cooperation. These are American Library Association, the (British) Library Association, the publishers and permanent staff at Library of Congress. As a result, there has been increasing interest as well as greater confidence in DDC during the past several years. However, the future of BC and CC is not very bright.

UDC and CC have a largely hierarchical notation, and compared with other schemes, are best suited for computer manipulation. A large number of experiments have been done on UDC, and many mechanized information-retrieval systems are using it. It is beginning to play an important role in large information systems. The same cannot be said about CC. If FID could take the responsibility for developing CC, then it might prove superior to UDC in many ways—but this is not going to happen because FID is deeply committed to UDC.

Classification has certain limitations of its own. Of course, the calibre and training of a classifier matter a great deal. Through research and development, classification schemes have improved, but much still remains to be done. Classification needs to be complemented by the use of other tools like catalogues, documentation lists, and so on.

Indians and Europeans have been deeply involved with research in classification. In USA, classification has a low reputation, due to the

rigid structure of DDC and LC. Even today, classification is still regarded as a method for shelf arrangement, that is as a method for linear ordering of books on shelves and nothing more. The order is also followed as directed by LC cards or services. As a result, not much attention has been given to research on classification in USA. The same can be said about North America.

In Britain, the ideas of Ranganathan have greatly influenced the thinking of persons engaged in classification research. The ideas of Ranganathan formed a starting point for many of them. Those engaged in research have further developed these ideas, in their own way.

Members of CRG have made a remarkable contribution. They have done little as a group; however, as individuals, they have been extremely active. The group has included, at one time or the other, persons like Derek Austin, E.J. Coates, J.E.L. Farradane, D.J. Foskett, B. Kyle, J. Mills, B.C. Vickery, and so on.

CRG (London) and DRTC (Bangalore) are two important centres which are engaged in fundamental research in classification. However, in the case of DRTC, great emphasis has been laid, all along, on developing CC, with the result that fundamental research has received less attention.

A study of the literature shows that the members of CRG have moved too far away from the ideas of Ranganathan and his disciples, to the extent that one does not seem to be much influenced by the other.

Now, it is believed that "the techniques of classificatory analysis can be used to construct fully developed and coded classification schemes. . . . They can also be used to structure an alphabetical word list or thesaurus or some combination of this with classed schedules. Any of these tools may be used in either visual or machine information retrieval at either the indexing stage or the search stage, or both."²¹ This shows that there are a variety of uses of classification other than the traditional ones—like shelf arrangement or the arrangement of classified catalogue.

We can recognize four main uses of classification:

- (i) shelf arrangement of documents,
- (ii) subject analysis of documents,
- (iii) aid to information retrieval systems, and
- (iv) aid to fact or data retrieval.

²¹B.C. Vickery, *Classification and Indexing in science*, 3rd ed., London, Butterworths, 1975, pp. 14-15

The above shows that there is scope for various kinds of research into classification. The different research groups in various countries or regions need to conduct research to fulfil complementary tasks. There is also plenty of challenge.

Research in classification has become diversified in nature, and new areas have opened up. Impressive progress has been made in classification. And there is every hope that the research being carried on will also continue to be exciting and fruitful. In fact, trends show that more and more people are getting involved in classification research.

In recent years, it has been noticed that large commercial organizations bringing out computerized data bases for information retrieval have tried to discourage or suppress all other endeavours to organize information in other ways. They have also discouraged users from making improvements in their own systems. The computerized information retrieval systems are spreading widely their network in USA, Canada, Europe and elsewhere, leading to discouragement of any initiative and thus leading to stifling of advances in theoretical research. This is equally applicable to research in classification. This is giving a setback to research in this field. Classification is concerned with theory of formation, structure and development of subjects. Classification forms the basis of all kinds of organisation of information including computerized information retrieval systems. Therefore, it should also be given due attention in the context of computerized information retrieval systems.

From all these trends it appears that the libraries of tomorrow will become more like information service centres. As such, they would require more powerful tools for the storage and retrieval of information. In that case, outdated schemes of library classification would have to be modified drastically, or replaced completely.

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