NOTATION IN CC, DC AND UDC SCHEMES OF CLASSIFICATION
(A COMPARATIVE STUDY)

SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF
Master of Library Science,

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1973-74
This Project "Notation in CC, BC and UDC: a comparative study" has been submitted in partial fulfilment for the award of M.Lib.Sc. degree. The main objective of this dissertation is to survey the use of Notation in CC, BC and UDC schemes of Library Classification.

The whole work is divided into four chapters. First three chapters consist of discussion on the types, problems of hospitality and mnemonic quality of notation of these schemes. In the fourth chapters these schemes are studied in the light of canons of notational plane as enunciated by Dr. S.R. Ranganathan and W.C. Berwick Sayers. The last chapters deals with the scope and applicability of these notations on machines. In this chapter the advantages and disadvantages of notation in context to their application to machines has been discussed.

The last section consists of "Bibliographic References" which are cited at various places in the script. List of abbreviations used in the bibliographic citations is also provided.

In the typing stage of this manuscript the various Greek symbols were not available in the type-writer. At such places these symbols are hand-written.

I wish to express my deep sense of gratitude to Mr. A.H. Kidwai, Reader, Department of Library Science, for his valuable suggestions all through the course of this work.
I am also thankful to Mr. M.H. Razvi, Head, Department of Library Science for his constant inspiration and encouragement in the completion of this project.

I also express my gratitude to Prof. P.B. Mangla, Head, Department of Library Science, University of Delhi, for providing the seminar facilities to me in his department.

I am heartily grateful to Mr. Z.H. Zuberi, my friend, who helped me a lot at every stage in the completion of this project.

Aligarh (Mushahid Ali Khan)
July, 8, 1974.
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Bibliographic references
CHAPTER 1

Type of Notation used in CC, DC and UDC.
**What is notation?**

The main purpose of library classification is to decide the sequence or order of subjects in such a manner which should be most helpful for the users of the library. This sequence of subjects may be alphanumerical but Dr. S.K. Ranganathan rules it out due to its unhelpfulness. Hence there should be some code of symbols which should stand for the natural language. This code is called notation.

So "notation is a system of short symbols standing in the place of natural language".

According to W.C. Berwick Sayers "A book notation, then is a series of signs or symbols standing for the name of terms and forming a convenient means of reference to the arrangement of our classification."

Father of librarianship Dr. S.K. Ranganathan defines it as "Notational system is a system of ordinal numbers used to represent the classes in a scheme for classification. A notation is a number forming a member of a notational system."

According to Richardson "a notation is a short hand sign.

**Purpose:**

Notation serves mainly two purposes. Firstly, it gives the concept represented by it. Secondly, it gives its place in the scheme of classification.

For example, "B" in colon classification represents "Mathematics". Here "B" serves the two purposes. Firstly, it indicates that 'B' stands for "Mathematics". Secondly, the place value of 'B' which is between "A" and "C", which are respectively "Natural Sciences" and "Physics".

**Types of notation:**
of letters; of various arbitrary signs; or of mixture of several
or all of these. Broadly it may be divided into two classes.

1. **Pure notation** :-

   A notation which consists of only one type of symbols
   is called pure notation. Such as a1, 2, ..., 9 or A, B, ..., Z.

2. **Mixed notation** :-

   A notation which consists of two or more type of
   symbols is called a mixed notation. Such as 1, 2, ..., 9, A, ..., Z.

   In this context E.C. Richardson had stated that "an
   ideal notation is one using mixed symbols but with a predominan-
   tly decimal base". He further comments "every practical system
   sooner or later does make use of both letters and figures".

   Most of the schemes of classification uses the mixed
   notation. Even though pure notation later on tend to a mixed one.
   For example Dewey Decimal scheme of classification used the pure
   base Indo-Arabic numerals upto edition 12 but from edition 13
   (1933) the use of Roman Capitalis was also recommended to indi-
   vidualise the dramas of Shakespeare.

   But some of the recent schemes advocates the use of
   pure as it is simple, for example Rider's International classi-
   fication (1901). Rider has used a pure base of letters offering
   twenty-six places at each step of division.

**FEATURES OF A GOOD NOTATION** :-

W.C. Berwick Sayers gives a brief and adequate account
of a good notational system. It may be summarized as follows:

1. It must convey clearly, the order of classes in the scheme.

2. It should, if possible, reveal the structure of the system,
   indicating which classes are of equal rank, and which are
   subordinate to others.
3) It should be brief and simple.
4) Notation ought to be easy to say, read, and to write or type.
5) Flexibility, or the power to accommodate new topics in the most suitable place, is a very necessary quality.
6) It may have special mnemonic aids to promote and assist the librarians ability to recollect class-marks or to construct a probable class-mark for a particular topic.
7) Notation should, if feasible, fully reveal the subject content of each book.
8) A completely synthetic scheme should have a notation which reveals each changes of facet and phase.

Dr. S.R. Renganathan in 'Prolegomena' gives the qualities of a notational system in the following order.
1. Brevity of class Number: Brevity is a desirable quality in the class number.
2. Speed of writing: For speed as well as the brevity, the basic characters of a classificatory language and the method of combining them into class numbers should be simple.
3. Pronoun cibility: Pronouncibility is not a necessary quality.
Colon classification uses a mixed notation. The digits used in notation are drawn from different conventional species of digits as shown below.

1. Indo-Arabic Numerals;
2. Roman small excluding 1 and 0 as they cannot be distinguished quite often in print and in typing from the Indo-Arabic numerals 1 and 0.
3. Roman Capital :- Here colon classification uses all the digits from A, B, ..., X, Y, Z in the array of Main classes. But the digits I and 0 are not used in other places because their similarity to the Indo-Arabic numerals.

The other type of digits used in the colon are the "Indicator digit".

Indicator Digit :- A digit prefixed to an isolate number to indicate the fundamental category of which the isolate is a manifestation. The indicator digits are recently called the "Connecting symbols".

These connecting symbols used in the colon classification are:

1. Punctuation marks such as single inverted comma (') Dot (.) colon (: Semi colon (;) comma (,).
2. The two circular brackets;
3. The forward and backward arrows.
4. Vin inverted form (just being considered for use but yet not established for use).
TRENDS in the use of digits in CCJ-

In edition 1 of colon classification of 1933 the numerals and Roman Capitals were used as the base of the notational system.

Roman smalls were used to denote the "approach documents. The approach documents are those documents which should be kept before the documents on the subject itself.

For example

- Bibliography
- Atlas
- Periodical
- Serial
- Encyclopedia
- History
- Biography
- Collected Works
- Syllabus

When any one of the above is connected to a host class number, without any indicator digit the, they anteriorise its position. For example "C is Physics". When attached with one of the above mentioned "roman smalls" they fall in the following sequence.

- Ca Bibliography on Physics
- Cw Periodical on Physics
- Cy Syllabus on Physics
- C Books on Physics
- C3y Syllabus on Sound
- C3m Periodical on Sound
- C3 Books on Sound
Use of new specie of digit "Δ" (Delta) was used in the edition 2 (1939). "Δ" denoted the main class "Spiritual experiences and Mysticism". The ordinal value of "Δ" was fixed between M and N. The main subjects represented by digits A to M make a progress from the abstract to the concrete, and "Δ" is the most concrete. Again in the main subject represented by the digit "N" and "Δ" regress from the natural to the artificial.

Use of Oscillating digit:-

In 1937 the digit "ο" was deprived of any semantic value but allow to retain only its ordinal value. In other words digit "ο" was made empty syntactically.

For example in an array 1,2,3,4,5,6,7,8,9 the digit "ο" was made empty.

1,2,3,4,5,6,7,8,9

The formation of blocks of eight numbers and making the numbers in all blocks was then called "Octave Device". Now a days it is called "Sector Device".

Digits used for the partial comprehension:-

In the earlier editions the digit "Α" was used to represent the partial comprehension of "Natural Science". The digit "Ο" was used to represent the concept "Biological Science". But when it was realised to kept "Biology" alone. Thus the letter "ο" represented the main subject "Biology" and not a partial comprehension of the succeeding main subjects collectively known as "Biological Science".

Similarly the term "Mathematical Sciences" denotes the partial comprehension of the range "B Mathematics" to "D Engineering". But the helpful place for this was taken between 'Α' and 'Β'. But no roman capital exists between A and B. Therefore the Greek letter "Β" (Beta) was used to represent the partial
The ordinal value of "B" was fixed between those of A and B.

A Natural Science
B Mathematical Science
C Mathematics

Physical Science was also taken as the partial comprehension of the range "C Physics" to "F Technology". The most helpful place for this subject between "C Physics" and "F Technology". So the Greek letter "Γ" was used to represent the partial comprehension "Physical Sciences". Its ordinal value was fixed between B and C.

B Mathematics
Γ Physical Science
C Physics

A new digit (Nue) was chosen to show the partial comprehension "Humanities". It denotes the range between "N Fine Arts to "S Psychology".

Social Science: The term social science denotes partial comprehension of the range "T Education and Z law. The helpful place for this was between "S Psychology" and "T Education". So its ordinal value was fixed between "S" and "T".

S Psychology
Σ Social Sciences
T Education

"Humanities and Social Sciences" deemed to be the partial comprehension of the range "Δ" spiritual experience and Mysticism" and "M usefull arts". So another greek letter "κ" used to denote this partial comprehension. Its ordinal value was fixed between "M useful Arts and "Δ" spiritual experience and Mysticism".

...7...
experiences and mysticism”.

**Indicator Digits or Connecting symbols used in **
in various editions :-

Colon classification uses the connecting digits for
different purposes. They are given below in the sequence of their
increasing ordinal value.

- Backward Arrow
- Forward Arrow
- Inverted comma
- Dot
- Colon
- Semi-Colon
- Comma
- Hyphen
= Equality sign

Use of colon (:) :-

In 1934 the punctuation mark ";" colon alone was added
to serve as the connecting symbol for attaching the different
facets. This was the only connecting symbol used in edition 1st.

For example

\text{X:3M24:73:N3} \quad \text{American Socialism its aim, practical }
\text{programme etc.}

\text{V44:1} \quad \text{President of India}

16-17

Use of Hyphen as connecting digit :-

In edition 2, 1939 the connecting digit (-) was introduced
for the denoting the "Auto-Bias Device". (Now a days known as
super Imposition Device.) Regarding this S.R. Rangnathan said
"In the forth-coming edition of colon classification, yet another
ordinal number lying between 0 (zero) and 1 (one) - greater than zero
but less than colon- will be found introduced to serve yet as
another device known as auto-bias device by which the hospitality in chain will be possible. Following are examples:

- L13 - 74 Nerves of Extremit
- Y15 - 53 Middle class woman
- Y15 - 31 Sociology of rural woman
- V44 - 56 British India (History)

Use of Zero (0) as a connecting Digit:

From the first edition of colon classification the digit zero (0) was used as the symbol to show the "Phase Relation". Following are examples:

- B 0a C Relation between Mathematics and Physics
- L 0b Z Medical Jurisprudence
- C 0c E Physics compared to Chemistry

Punctuation Marks as connecting digits:

In 1950, the author introduced distinctive connecting digit to represent the facets which are deemed to be manifestation of different fundamental categories. The fundamental categories "Personality", "Matter", "Energy", "Space" and "Time" represented by the following punctuation marks.

<table>
<thead>
<tr>
<th>Fundamental category</th>
<th>Digits used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personality</td>
<td>, (Comma)</td>
</tr>
<tr>
<td>Matter</td>
<td>; (Semi-Colon)</td>
</tr>
<tr>
<td>Energy</td>
<td>: (Colon)</td>
</tr>
<tr>
<td>Space</td>
<td>. (Dot)</td>
</tr>
<tr>
<td>Time</td>
<td>. (Dot)</td>
</tr>
</tbody>
</table>
Use of Circular Brackets:

The use of subject device led to homonyms. For example T:3, U.44 will mean both
1. Teaching of Geography in India
2. Teaching of Geography of India.

Thus the class number became a homonym.

In C3 there was no provision to indicate whether the last facet, space facet—belonged to the entire number preceding it or its later part got by subject device.

In 1954 an idea of enclosing the subject device part within circular brackets. This type of notation called the "packeted Notation".

As a basic ordinal digit, the ordinal value of "(" (Starter Bracket) should be greater than that of ")" and less than the ordinal value of ")" (Arrester Bracket) should be smaller than the ordinal value of "0" (zero). There amendments were incorporated in edition 5 (1957).

Use of Single Inverted Comma:

From 1952 onwards the rigidity caused by the use of the same connecting digit for space facet as well as Time Facet came to be experienced. In (1960) it was realised that the rigidity could be removed only by improvising the digit "'" (Single inverted Comma) as a connecting digit for Time facet. This connecting digit is being used from edition 6 (reprint 1962).

For example

23.44'N64 Academic library system for India in 1964

So the homonym by using dot (.) for both space and time was now removed by having the separate connecting symbol time.
Normally a book traces the history of any event down to the epoch of time. The epoch of time in which the event begins is often vogue. So Colon classification represent both beginning and epoch.

Reign of Elizabeth in 1563-1603

Indian history during 1376-1914

In the above cases the Time Isolate are represented as follows.

<table>
<thead>
<tr>
<th>Time Isolate</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>V36'K03a</td>
<td>J38</td>
</tr>
<tr>
<td>V44'N14</td>
<td>M70</td>
</tr>
</tbody>
</table>

Reason for using: ← -

The majority of readers is most interested in the happening of event at the end epoch then in the beginning stages of events in the end of epoch. The ← (backward arrow) will include the specific sketch of time.

**Ordinal Value of** ← -

The digit ← - (backward arrow) has been given the anterivising value. Its ordinal value should be least. To illustrate the helpfulness of the decision we can consider the result of making the ordinal value ← - greater than that of ← by taking the set example. For example

<table>
<thead>
<tr>
<th>Time Isolate</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>V36'K03a</td>
<td>-</td>
</tr>
<tr>
<td>V36'K03J</td>
<td>53a</td>
</tr>
<tr>
<td>V36'K03J</td>
<td>58</td>
</tr>
<tr>
<td>V36'K03a</td>
<td>-</td>
</tr>
</tbody>
</table>

...
Obviously it is not helpful sequence. The bibliography on the subject "British History 1603 is separated from the book on the host subject by a number of other subjects which is violation on canon of helpful sequence. Hence we fix the value of ¬ to be less than that of any of the Roman Smallis. So the above may be arranged as

\[ V_{50}'K_{03} \rightarrow J_{53}a \]
\[ V_{55}'K_{03} \rightarrow J_{53} \]
\[ V_{55}'K_{03a} \]
\[ V_{50}'K_{03} \]

Use of ¬ to indicate the future: 

"Future of Education in India" will have the number

\[ T_{44}'N_{73} \]

Here ¬ is meaningful and indicator of "future". The canon of helpful sequence indicates the book should come after all the books in which the history upto 1973. So its ordinal value should be greatest among the ordinal value of connecting digits used in SC.

Some Provisions suggested for edition 7 of colon classification:

Use of = sign: 

The works of an author were given the Isolate numbers by enumeration. For this purpose works were arranged chronologically, and then numbered either 1, 2, 3 or with the used of group notation of two or three digits, depending upon the total number of works to accommodated in the Array. But involved lot of time. Firstly "Hyphen" (¬) was used to connect the two Donomial alphabetical numbers which are got by Alphabetical device. This means of adding one more connecting symbol. This provision will be found in edition (7) of colon classification.
Use of Inverted V or " ^ " :-

The use of inverted V is also suggested for the edition 7 of colon classification. It will be used as an empty-empty digit in the schedule of isolates.

Use of "&" (Ampersand)

In edition (7) "&" will be used as an indicator digit for the phase-relation.

Use of Zero (0) in edition 7.

Zero is suggested as the "semantically empty" for use as sectorising digit.

Use of "^" in edition (7)

It will be used to denote the "Sectorising common Isolate".

Ordinal Values:-

1. The ordinal values of the Indo-Arabic numerals, Roman lower case letters and Roman capital letters among each of the species or as they are in ordinary usage;

2. The digit z is taken to be earlier than in the ordinal value (This means that the species Roman lower case letters precede the species Indo-arabic numerals);

3. Nine is taken to be earlier than A. (This means that the Roman Capitals succeed the Indo-Arabic Numerals);

4. As arranged in the ascending sequence of the ordinal values, the punctuation mark, are taken to fall in the same sequence as follows:-
and zero is smaller than that of single inverted comma.

5. The hyphen is taken to be earlier than zero and a in the ordinal scale.

6. The ordinal value of first of the circular brackets is taken to be greater of 2.

7. The ordinal value of the closing bracket is taken to be smaller than that of zero.

3. The ordinal value of the backward arrow precedes the forward arrow which itself precedes zero.
Type of Notation In Universal Decimal classification:

This scheme of classification is almost faceted scheme of classification.

Basically the notation consists of Arabic numerals used decimally, but without three-figure minimum in used decimal classification.

Indo-Arabic numerals—from the first order array of main classes.

0 Generalities
1 Philosophy
2 Religion
3 Social Science, Law Education, etc.
5. Mathematics and natural sciences.
6. Applied sciences and Technology
7. Arts
8. Literature
9. Geography

On this foundation the notation is build up by continuous extension in the decimal fractions, on of the principle of "general to specific".

Thus every concept within the domain of pure sciences is represented by a decimal fraction greater than .5 and less than .6, the sub-division being carried to a required degree as shown in the following example.

.5 Pure Sciences
.51 Mathematics
.52 Astronomy
.53 Physics
.531 Mechanics
.531 7 Measurement in Mechanics
.531 71 " of length, dimension
.532 Fluid Mechanics.

So as purely "visual aid" the points are inserted after three digits. So that they fall as 53, 531, 531 7, 531 71 etc.

U.D.C. uses the following type of connecting digits.

(1) Addition and Extension sign (+) and /

The plus sign may be used to connect two or more separated U.D.C. numbers especially when these denote common concepts. For example:

629*669 Mining and Metallurgy
53*(540) Zoology and Animal husbandry
(72)*(540) America and India

The / (stroke) sign is used to combine or connect the first and last of a series of consecutive U.D.C. numbers. Here/ denote the sense of "from------to------". For example:

597/599 Systematic Zoology
624/623 Civil Engineering

Relation Sign-Colon and square brackets

It is the most important auxiliary in U.D.C. It is used to link two or more concepts which are in a relation of approximate "equality" or coordination- as distinct from a relation of subordination of one concept to another.

For example:

622.33*622.232 Coal-Mines-Mechanical cutters.
622.33*622.41 Coal-Mines-Ventilation
When a colon is used as a facet indicator it has two effects.

1. The number is lengthened too much.
2. The filing order produced is unhelpful.

Square bracket [ ]

It is used as a relation sign for the subordinate class numbers or topics. Generally in those cases when no separate entry is required by reversing it.

For example:

33 622.33 Economics- Coal mining Industry
33 622.33 Economics- Coal Mining Industry labour
33 622.33 1.2 " Coal Mining -labour-wages
33 622.33 1.331 Economics Coal Mining-labour trade unions.

Use of (....) Bracket zero.

It is used in common Auxiliaries of Form. These used to serve to distinguish the form in which the subject is denoted by the preceding main number is presented.

For example:

(0) Systematically arranged works. Books generally. Manuals etc.
(0) Alphabetically arranged reference works.
(0) Reports
(0) Periodicals.

Use of ( ) Bracket one

It is used to indicate the geographical range of the subject to which it is attached.

For example:

(1) World
(2) Orientation
(3) Source and destination
Use of ( = )-

This sign is used to show the racial aspect of the subject denoted by the host class number.
For example:

(=31) Primitives
(=3) Slavs
(=95) Mongolian
(=50) Africans

Use of " - "

It is used to specify the date, period or other time aspect of the subject denoted by the host member.

"03" 4th Century
"19" 20th Century
"193" The Thirties (1930-39)
"-0064" (In the year 64 B.C.)

Use of Alphabetical and Numerals:

Alphabetical device is used to specify the individual names. Numerals are also used for the same purpose but are prefixed with a "No."

32 (Shak.)
It means "Biography of Shakspere"

634.4.02 (492.89) No.12-Amsterdam, Services, 1ime No.12.

It is generally used in the case of "literature" and "Biography" to individualise the name of author etc.

Use of .00 -.00-

The .00 (point zero zero) can be added to any main I.D.C. number, indicate the broader aspect of subject, each of the subdivisions (.001/.009) provides the distinct but
comprehensive approach to the whole field.

For example:

- 1. Theoretical point of view. Aim, research.
- 1.1 Theory. Definition
- 2. Detailed investigation
- 3. Scope
- 4. Appraisal

**Use of = sign:**

It serves to specify the language suspect of any document.

For example:

- 61 (03) = 30 Medical Encyclopaedia in English language
- = 30 = 05 English Periodicals
- = 30 = 03 Collected works in German

**Use of (-) hyphen:**

These symbols are used to denote the special auxiliary within a special class. For example the special auxiliaries of 621 should be applicable only to 641. We may also call it special analytical subdivision.

For example

1. Literary Form Divisions in 8 literature are applicable throughout the class 8. Drama 3-2; English Drama 330-2.

2. Problem facet in 616 Pathology is applicable only within 616. For example

- 001 Injuries
- 02 Aetiology
- 034 Prevention
Use of 0

The provision of point zero (0) as the facet indicator means that these can be compounded themselves.

For example:

7.034 Renaissance
7.074 Art patrons.

Use of Inverted Comma :-

It is used to make the compound number for a substance by integrating the relevant component division.

It is generally used in Chemistry.

For example.

547.29'86 Carboxy–acid esters.

Suggestions for the use of new indicator digit :-

The U.D.C. there is no symbol to indicate the various type of relations, but some new symbols are suggested to differentiate among various type of relations. These are as follows.

<table>
<thead>
<tr>
<th>Name of relation</th>
<th>Sign suggested</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Multi-Active Relation</td>
<td>..</td>
</tr>
<tr>
<td>2. Multi-Passive Relation</td>
<td>...</td>
</tr>
<tr>
<td>3. Active-Passive Relation</td>
<td>.</td>
</tr>
</tbody>
</table>

The last mentioned two cases are based on Act and Action-Actor-Tool principle.
**Arrangement of U.D.C. notation:**

J.D.C. notation is essentially mechanical in that its primary function is to convey position and can be posted without any knowledge by the sorter of the concepts it represents.

U.D.C. class numbers are overwhelmingly numerical and this element in them is filed decimally. The non-numerical devices are given an ordinal value for filing purposes and this is shown in the following example.

**Filing order:** The recommended order is as follows:

<table>
<thead>
<tr>
<th>Plus</th>
<th>e.g., 651-657</th>
<th>Office management and accountancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke /</td>
<td>651/653</td>
<td>Office management copying, shorthand and typing</td>
</tr>
<tr>
<td>Simple number</td>
<td>651</td>
<td>Office management, office work</td>
</tr>
<tr>
<td>Colon :</td>
<td>651:333.962</td>
<td>Office in large scale enterprises.</td>
</tr>
<tr>
<td>Square brackets</td>
<td>651 332.1 .5</td>
<td>Office in banks-record filing</td>
</tr>
<tr>
<td>Equals =</td>
<td>651=32</td>
<td>Office management (documents in Russian)</td>
</tr>
<tr>
<td>Brackets zero (0)</td>
<td>651(0)</td>
<td>Encyclopedia of office management</td>
</tr>
<tr>
<td>Brackets 1 to 9(1/9)</td>
<td>651(73)</td>
<td>Office management in U.S.</td>
</tr>
<tr>
<td>Brackets equals=</td>
<td></td>
<td>(Race-not relevant here)</td>
</tr>
<tr>
<td>Inverted Commas &quot; &quot;</td>
<td>651&quot;196&quot;</td>
<td>Office management in 1980's</td>
</tr>
<tr>
<td>Alphabetic device N/Z</td>
<td>651</td>
<td>ICI Office management in ICI Ltd.</td>
</tr>
<tr>
<td>Point Zero Zero .00</td>
<td>651.005</td>
<td>Office management - Accommodation, point of view</td>
</tr>
</tbody>
</table>
Hyphen -
Point Zero .0 651.011.56
One to nine .1/.9 651.2
651.5

Not used in 501 so far

Offices-Automation in
Office-Equipment
Offices-records filing
Type of notation used in Dewey Decimal classification:

Dewey Decimal classification is an enumerative scheme of classification. It uses only one species of digit. Such that it uses the pure base of Indo-arabic Numerals.

Its notation is linear, right handed and decimal fractional.

Due to using the only Indo-arabic numerals it uses

\(0,1,2,3,4,5,6,7,8,9\).

Editions of DC earlier to edition 13:

Dewey Decimal classification has been using a pure base of Indo-arabic numerals in its earlier editions up to edition 13.

Edition 13 of DC:

In edition 13 of DC (1933) the use of Roman capitals was recommended to individualise the Dramas of Shakespeare.

Edition 14 of DC:

But in edition 14 (1942), it introduced a touch of mixed notation by allowing the use of a dash of Roman capitals in a few places such as the following.

1. We get the following under 375 which is class number "curriculum". "Methods" of teaching individual subjects, also text books, may be kept with the educational literature by adding letters 375 as follows:

A general
B educational values of specific subjects
C Place in curriculum
Methods of teaching specific subjects.

Text book.

Example.

375.32 B  Education value of Political science
375.32 C  Place of political science in the curriculum.

Edition 16 of DC :-

In edition (16) of DC (1958) Roman capitals were used for Alphabetical Device in several places.

For example.

333.63 A4  Agricultural producer's cooperatives
593.3  Passeri farmers belonging to Turid Family.
629.287 L7  General servicing of Lincoln cars.

Edition 17 of DC (1965) :-

In edition 17 of Dewey Decimal classification a base of pure Indo-arabic numerals is used, but alphabetical device is also used on several places.

In the first order arrays of main classes the indo-arabic numerals are used.

000  Jenritia
100  Philosophy
200  Religion
300  Social Science
400  Linguistics
500  Pure Sciences
600  Applied Sciences
700  Fine Arts
800  Literature
900  History
We may observe that in all the above classes the two zeros are added without any significant meaning. For example in case of "BOC Literature". The main class is 3 plus two zeros. These two zeros are used to fill the three digit number. Similarly a space in left between the three digit pair in a class number. For example.

370.193 B Urban education.

Use of Roman Cags in edition 17 of DC.

In some places for example at 593.8 and at area table 74-79, where a subject has many coordinate subdivisions with the accepted names, the option of using the alphabetical device is provided.

Similarly in "Political Science" the provision is provided for arranging the political parties of the country alphabetically.

For example.

399.342 L2 Labour Party of Great Britain.

In the case of literature "Works of Shakespeare" are arranged. The various works on "Shakespeare" also arranged alphabetically.

For example.

A Authorship Controversies
B Biography
D Critical Appraisal
E Textual Criticism.

Similarly, the works are arranged as

0) Individual works
O - R Comedies
S - V Tragedies
Use of (. ) dot as connecting digit :-

DC was the first scheme to introduce within its class number a digit looking like a connecting digit. It was a dot after the first three digits in its class number. It was used only for the relief of eye. It was having no synthetic function. It has neither a semantic or ordinal value. In his introduction edition 13 of DC (1920) Dewey uses the word pair "decimal point" for this connecting digit. But it does not carry its usual meaning.

Idea of using colon as connecting digit :-

It seems to be that the idea of using the connecting digit colon and other such digit also, came to Dewey. Since he says "A colon between two numbers to mean in relation to; and other combining symbols for time etc. made of the system a compact short-hand for each facet.

Use of zero (0) as connecting digit :-

DC uses zero as a connecting digit common isolates or standard subdivisions in edition 17.

603 Encyclopaedia of Applied Science

Here

6 is Applied Science
0 is connecting digit for common isolate
3 is Encyclopaedia.

One or more zeros as connecting digit :-

In some subjects one or more consecutive zeros are used to indicate different kinds of facets.
For example under

351  Administration of central government.

Three zeros are used as the connecting digit for a common isolate facet.

For example.

351.0003  Dictionary of central government administration.

Two zeros are used as connecting digit for a facet representing an organ of a government for example.

351.001  Bureaucracy
351.003  Chief Executive

One zero is used as connecting digit for a facet representing problem.

351.01  Foreign policy.

The digit zero is also used to indicate a different basis for division of the discipline or subject represented by the digits preceding 0 for example

500  Pure Sciences
550  Earth Sciences
551  Physical and dynamic geology
551.4  Geomorphology
551.46  Oceans and sea waters
551.460  Indicates special basis for division
551.4601  Composition and properties of sea water
551.4609  Special Oceanographic forms
551.461  North American Atlantic Ocean
551.462  Mediterranean & Black sea.
Here we observe that 351.4601-.4609 are used for topical subdivisions of the subject oceans and sea waters in general and 351.461-.469 are used for specific oceans and seas. 0 is never used as the terminating digit following the decimal point; 351.460 is itself has no meaning.

Use of zero nine (09) as connecting digit :-

The digit pair (09) is used as a connecting digit for space facet in some subjects as

32.954 History of Agriculture in India

Time Facet :-

In the main class history DC uses zero as connecting symbol to indicate the Time Facet.

949 History of Great Britain
940.62 Norman Period (1066-1154).

Use of hyphen (-) as connecting digit :-

Hyphen is used as chronological device to indicate a subject spread over different consecutive class number without an individualising class number of its own.

220-230 Christian religion
636-633 Animal husbandry

These are also called "centered headings".
CHAPTER 2

Hospitality of CC, BC and UBC
Universe of Knowledge :-

Universe of knowledge is made up of infinite number of entities. The purpose of notation is to provide the symbols to stand in the place of the various terms used for various entities. These entities belong to the universe of knowledge which have three properties.

1. Infinite Universe :- "This is due to the first place to the universe of knowledge being infinite. By this is meant that the number of classes of knowledge is very large and indeed tends to infinity. Further, all future classes are not knowable at any time. At any moment, we do not know what class of knowledge is coming round the corner, as it is claiming its helpful place among the already existing classes.

2. Multi Dimensional :- Secondly the universe of knowledge is multi dimensional. By a dimension is meant a characteristic distinguishing the different classes of knowledge according to measure, intensity, extent, or any other attribute in which the characteristic is incident as a class. It is a matter of experience that the number of characteristics available for distinguishing different classes of knowledge are many. Indeed it tends to infinity. Therefore we say that the universe of knowledge is multi-dimensional and that the number of its dimensions tends to infinity.

3. Continuum :- A universe is said to be a continuum if an entity of the universe exists between any two given entities, however close they may be. This is true of the universe of knowledge. If we distinguish two classes on the basis of one characteristic, however close these classes may be, another class exists between them. Thus the universe of knowledge is a
continuum along each of its many dimensions. If we take into consideration the infinite nature of the universe of knowledge and the fact of its being continuum, it follows whatever class of knowledge we think of it on the basis of any one characteristic, there will be a class whose class number is later in ordinal value than that of one we originally thought off.

These properties of the universe of knowledge were thought before but they were not recognised and studied separately in the various places.

In 1952 S.R. Ranganathan first divide the whole work of classification into three planes.

Idea plane: It is the product of thinking, reflecting, imagining, etc. got by intellect by integrating with the aid of logic, a selection from the apprehension mass, and/or what is directly apprehended by intuition and deposited in the memory.

Verbal plane: Along with the capacity to create ideas, came also the capacity to develop an articulate language as medium for communication.

Notational plane: It is concerned with providing the short symbols with having the ordinal value to denote the various terms got by verbal plane.

All these planes are accepted in every scheme of classification but they are consciously recognised by colon classification.
Problem of "Hospitality"

Knowledge is add infinitum. This means that the knowledge is ever growing. All the developments in the knowledge should also be incorporated in the notation. This means that the notation should provide the place to the newly developed ideas in the sequence of existing subjects without disturbing the existing sequence.

In the words of Dr. S.R. Ranganathan, "viewed from the angled of classification" the essence of a growing universe—such as the universe of subjects or a subuniverse of it—is the unknowability of the new subjects likely to emerge in the future. In addition to the new comers being unknowable it is unpredictable as to what would be its helpful or the filiatory position among the already existing classes. It may claim any position in any array and also any position in the chain.

To overcome this difficulty mentioned above Dr. Ranganathan suggests that "the uncertainty mentioned above produces a greater pressure on the notional system of a scheme of classification. To stand this pressure each array and each and each chain of numbers should have the great hospitality tending to infinity. This property of providing the accommodation to the new comer subject at the appropriate place without disturbing the position of other existing subjects.

W.C. Berwick Sayers says "The hospitality of notation is an essential feature for without it a scheme is soon exhausted."

In the words of J. Mills "A notation should be hospitable— the new topics. That is to be able to
E.J. Cortes also feels the necessity of hospitality in the notation. He describes his views in "International study conference on classification for information retrieval" said "all notations are able to accommodate the new concepts by adding to the length of existing symbols after all conveniently placed digits have already been assigned. Relating to the growth of knowledge to the basic elements of the classification structure mentioned, it is to be noted that the new subjects occur as fresh coordinates with established ones; that is as new members of an existing array; as new hierarchical intermediates arising between a subject and its hitherto closest containing the generic subject; and finally there may become visible a hitherto unsuspected facet within any subject. In all such contingencies the new subject must be inserted at the point most appropriate to its relationship with the subjects already scheduled and the notation should offer no obstacle to this".

Hence we see from all the above statements that the universe of knowledge is multi-dimensional and may develop in several directions. But the universe of notation is two dimensional. That is it may expand in

1. Array.
2. Chain.

We know that any array is a sequence of coordinate class numbers. For example

<table>
<thead>
<tr>
<th>41</th>
<th>42</th>
<th>43</th>
<th>44</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>Japan</td>
<td>S.E.Asia</td>
<td>India</td>
<td>Persia</td>
</tr>
</tbody>
</table>
Whereas a chain is a sequence of subordinate class numbers. For example in case of "4 Asia ".

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Asia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>China</td>
<td>42</td>
<td>Japan</td>
</tr>
<tr>
<td>445</td>
<td>North India</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4452</td>
<td>Uttar Pradesh</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Following is a chain

4  
Asia  
44  
India  
445  
North India  
4452  
Uttar Pradesh

Hence the hospitality is possible in array and chain.

**Hospitality in Array:**

Hospitality in array means to provide the accommodation to the new comers at both the ends of the array, or between any two existing class numbers in array.

**Devices used by schemes of classification to achieve hospitality:**

1. **Chronological Device**: This device is used to achieve the hospitality in array. This enunciates as follows:

   "Chronological device is a device which consists in using the appropriate chronological number for the formation or the subdivision of an isolate which is
...35...

capable of chronological formation or subdivision or when the individualisation of the isolate or the sub-isolates may be made to defend conveniently on the period of origin or birth or on the year of first invention or on the year of discovery or on the year of initiation or commencement or on the year of occurrence or on the year that may be definitely associated with the respective isolate in any manner or for any reason.

This device is used in those arrays where isolates are based on the time factor. It is used by colon classification at many places.

1. To individualise an author in the main class literature

For example in the case of English literature

William Shakespeare 0111,264
George Bernard Shaw 0111,356

2. In classification of "systems" in "Physics" "Medicines" "Economics" "Education" "Psychology".

For example in case of Psychology we see

<table>
<thead>
<tr>
<th>CC</th>
<th>Name of system</th>
<th>UDC</th>
<th>DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA</td>
<td>System of Psychology</td>
<td>?</td>
<td>150.19</td>
</tr>
<tr>
<td>SM</td>
<td>Experimental Psychology</td>
<td></td>
<td>150.72</td>
</tr>
<tr>
<td></td>
<td>(1874)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SM9</td>
<td>Psychoanalytic Psychology</td>
<td></td>
<td>131.34</td>
</tr>
<tr>
<td></td>
<td>(1915)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN</td>
<td>Jestalt Psychology (1907)</td>
<td></td>
<td>150.19</td>
</tr>
<tr>
<td>SN1</td>
<td>Behaviouristic Psychology</td>
<td></td>
<td>130.19</td>
</tr>
<tr>
<td></td>
<td>(1912)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN14</td>
<td>Individualistic Psychology</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1914)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN17</td>
<td>Reflexology (1917)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN2</td>
<td>Eidetic Psychology (1925)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN3</td>
<td>Field Psychology (1935)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN36</td>
<td>&quot;We&quot; Psychology (1935)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
UDC and DC are not able to arrange all the systems of psychology in their chronological sequence by the use of chronological device but colon classification is able to individualise the isolates with chronological device and is able to achieve the hospitality in the notation by translating the time element concerned.

In spite of these this device is used to increase the hospitality in array in the main class "P linguistics" where the grammar of Artificial language is individualised by chronological device. For example

<table>
<thead>
<tr>
<th>Class</th>
<th>DC</th>
<th>UDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM37</td>
<td>Esperanto (invented in 1337) 403.92</td>
<td>403.92</td>
</tr>
<tr>
<td>PN2</td>
<td>Hom-ljomo (invented in 1923) ?</td>
<td>?</td>
</tr>
</tbody>
</table>

Hence CC is able to accommodate any number of these languages in the last sector of language facet of P linguistics. It provides under "Artificial languages" the nine distinct class numbers for nine distinct artificial language.

Whereas Decimal classification arranges places to the "Artificial linguistics in its main class linguistic. The class number "403 collections" accommodates the division "403.9 artificial language" where only three artificial languages are given

<table>
<thead>
<tr>
<th>Class</th>
<th>Artificial Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>403.91</td>
<td>Volpuk</td>
</tr>
<tr>
<td>403.92</td>
<td>Esperanto</td>
</tr>
<tr>
<td>403.93</td>
<td>Interlingua</td>
</tr>
</tbody>
</table>

So Decimal classification is unable to provide the hospitality to any number of artificial languages.

Similarly UDC provides under 463.9 "Artificial or planned
languages" and "463.92 is Esperanto".

Hence we see that UDC and DC makes no provision for the use of chronological device.

This device was provided as a device of achieving hospitality till edition 2 of Prolegomena to library classification on (1957) but in edition of "Prolegomena" this device is omitted.

2. Alphabetical Device:

This device is enunciated as follows by Dr. Ranganathan.

"The alphabetical device consists in representing a category by the first letter or the first few letters in its name. If the names of the two or more categories coming in the same array begin with the same letter than one of them is represented by that letter and the others are represented by the first two letters in their respective names. If the names of two or more categories begin with the same two letters. Then one of them is represented by there two letters and the others are represented by the first three letters in their respective names."

But this device is used as a last resort since it is unable it does not arrange the array, isolates in the helpful sequence. Hence its use is permitted when no other device more helpful than the alphabetical device.

This device is thought to be unhelpful due to following reasons.
1. Alphabetical arrangement should not used for arranging the subjects or isolate ideas or numbers in a array because it will not give a helpful arrangement.
2. Secondly the names of the subjects or isolate ideas are stable. They can change after time. This will prove inconvenient time to time for the rearrangement purposes.

3. Effect of synonymus: The natural language is full of synonymus such that the two different words are used for the same term. It will prove inconvenient in the arrangement since the same word may be arranged at two places due to occurrence of synonymus in the natural language.

For example acoustics and sound are the one and the same words. But of them will go to 'A' group and other to 'S' group.

Effect of homonym: One and the same term can be used in two or more senses. For example the term 'Number' itself represents the integer, rational number, irrational number, transcendental number, simple and complex number etc.

So due to above reasons.

Colon Classification: It uses the alphabetical device quite often. For example it is used for the arrangement of
1. Works of literary and classical authors
2. Arrangement of makes of cycles and bicycles.
3. Different strains of an agricultural crop or cultivar.

For example the varieties of rice are individualised by colon classification.

<table>
<thead>
<tr>
<th>J381K</th>
<th>Kuruval</th>
</tr>
</thead>
<tbody>
<tr>
<td>J3813</td>
<td>Sirumai</td>
</tr>
<tr>
<td>J381V</td>
<td>Vadansamba</td>
</tr>
</tbody>
</table>

In case of cycles makes it uses as follows:

| D5125A | Atlas Cycle |
Decimal classification - DC (edition 17) in its "Editor's introduction" also rules out the alphabetical Device but provides it as an option. It says "In relatively few places, for example, at 598.8 and at area table 74-79, where a subject has many coordinate subdivisions with accepted names, the option is provided of alphabetical arrangement instead of systematic arrangement".

Under 598.3 it says

"598.3 Passeri forms (Passerine, perching birds) Divide by families as below; if preferred arranged alphabetically by families".

Hence DC does not use it freely but uses an alternative or optional is the systematic arrangement.

Universal decimal classification - It provides for the use of alphabetical device. It says "The main U.D.C. tables, with the various auxiliaries, serve to group subjects, but not specify individual names. To do this the appropriate names or initials (in brackets, if desired) have to be added.

For example

061.5 Firms, businesses etc.

AEG Allgemeine Elektricitats Gesellschaft (General electricity cooperation).

1(Hegel) Hegelian Philosophy

320 (Shak) The works of Shakespeare

92 Schiller Biography of schiller

92 schiller Biography of schiller
Hence colon classification and universal decimal classification provides for this device whereas Decimal classification use it as an optional device.

This device was included in prolegomena edition 2 (1957) but it is excluded as a device for achieving hospitality in edition 3 (1967).

**Subject Device:**

The device is used to achieve hospitality in the earlier edition of prolegomena.

This device is communicated as follows:

"The subject device consists in using the appropriate class characteristic for the formation or the subdivision of an isolate which is capable of such formation or subdivision, or when the individualisation of the isolates, or sub-isolates, may be made to depend conveniently on a class that may be definitly associated with the respective foci in any manner or for any reason".

This device is used to sharpen the isolate of one class by borrowing the isolate from the other class.

This device is used in the fourth zone where the isolates are used under the packeted notation. This is used to increase the hospitality of the different arrays of P, E, S.

In GC it is used in Engineering, Economics, Fine Arts for individualising.

For example:

- X3 (J) Agricultural Economics
- 56,3(M7) Textile Machinery
- X3 (M7) Textile Industry
In DC it is also provided by giving "Divide like Direction" on several places.

For example, under
025.33001-.33999 Subject heading
Divide like "001 - 009" For example
Subject heading in Science 025.335
Subject heading in Mathematics 025.3351

In UDC it is provided to attach the different isolates with the help of relation sign.
159.3137 Psychology for teachers
325.91 Geopolitics
314.63 Agricultural Statistics

We see that CC has formed a systematic sector of 4th gone to represent different varieties of machines by the use of (SD) and has considerable enriched the hospitality of the second order array under the (IN)3 in P2 of D6 standing for Mechanical engineering and of II order array (IN)8 and X economics standing for industry. Whereas in DC and UDC they are scattered.

**Common Isolate Device :-**

In colon classification common isolates are represented by the Roman smalls. These digits a,b,......z are of ordinal value lower than 1. So these can be used to increase the hospitality in the being of array.

For example:

<table>
<thead>
<tr>
<th>CC</th>
<th>Term</th>
<th>UDC</th>
<th>DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>21K</td>
<td>Library publicity</td>
<td>021.4</td>
<td>021.7</td>
</tr>
<tr>
<td>21P</td>
<td>Organization</td>
<td>.02</td>
<td>.20</td>
</tr>
</tbody>
</table>
The array of colon classification array isolates numbers is systematically classified. These are arranged in helpful sequence.

The array can be extrapolated with the help of sector (S-a) accommodating the Generelia class material.

Whereas in DC and UDC the sequence is not helpful. The generelia approach material is scattered due to the unhelpfulness of the common isolate digits used in DC and UDC.

Similarly in the case of "antioriising common isolates" The "Za Bibliography on law" will be filed before Z, the basic subject.

Whereas in UDC and DC it will be filed after the basic class number.

Sector Device :-

To overcome the difficulty when the number of classes is more than nine and the base of notation is limited to nine the Decimal classification used the "Others Device". But in this device the co-ordinate classes look like the subordinate classes.

S.K. Ranganathan decided to sacrifice the digit "9". Digit nine was used as the door-mate which passed through it all digits and making them co-ordinate to the earlier set. This process of not using the digit "9" created the 3 more coordinate set of digits called "sectors" (previously known as "Octaves").
In the words of S.R. Ranganathan the "others" principle of Decimal classification has been extended into what is called octave principle. Nine is not used to individualize any class.

Nine was reserved for certain arrays in edition 1 as the octave principle was not consciously and explicitly laid down when it was published. But this and other divisions being set right in the forthcoming editions. "Octave principle" has not only accommodated all the new comers but also has a reserve for any number of classes.

This device is enunciated as follows.

Sector device consists in representing the isolates in any array by the successive digits 1, 2, ....... 7, 8, 91, ... 97, 98, 991 ....... 997, 998 ....... The first eight classes are said to form the first sector; the second eight classes the second sector, and so on. The digit 9 is called the emptying digit. That is it does not generally represent an isolate by itself.

S. Parthasarthy states that "groups of octaves (sectors) are formed in array by the use of three species of digits".

He defined three type of octaves (sectors).

1. First octave as "the totality of the infinity of octaves with an arbiic numerals as the first significant digit.

2. Prefirst octaves "the lower case letter a....to...z coming after the first octaves".

3. Panultimate octave as "9A to 9Z" before the last octave.

"First sector was used for classes derived on the basis of characteristic special to a subject."
Prefirst octave was used to accommodate the common subdivisions.

Last octave was used for the isolate either got by chronological device or subject device.

For example:

<table>
<thead>
<tr>
<th>Isolate No.</th>
<th>Term</th>
<th>Device</th>
<th>Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td>India</td>
<td></td>
<td></td>
</tr>
<tr>
<td>44L</td>
<td>Moghui</td>
<td>Chronological</td>
<td>Last</td>
</tr>
<tr>
<td>449E</td>
<td>North</td>
<td>Enumeration</td>
<td></td>
</tr>
<tr>
<td>44999D</td>
<td>Engineer</td>
<td>Subject Device</td>
<td>Penultimate</td>
</tr>
</tbody>
</table>

Application of Sector Notation to pure base of Indo-Arabic numerals:

Consider the sequence

1,2,3,---------3,91--------98,991--------

Here though the number 91 has two digits but here 9 has no meaning by itself, but 91 is meaningful. It is used to represent a class coordinate with the class represented respectively by the digits 1 to 8. So it is with the number 92 to 98, and 901 to 998 etc. Digits 1 to 8 form a single array. Similarly 91--93 form a singly array. So we can say that the array 1--8 has been lengthened to the infinity by sector device.

The range 1--8 of array is denoted by symbol (S-1)

The range 91--98 of array is denoted by symbol (S-91).

Similarly the range of 9991--9998 is denoted by symbol (S-9991).
Each number of them is a sector notation.

Application to pure base of Roman capitals.

Similarly, the array A------Y can be lengthened with the use of Z as an emptying or sectorising digit.

For example the array

A, B, ------------ Z

can be extended to

A, B, ------------, Y, ZA, ZB, --------, Y, ZA, ------, ZY------.

So the infinite hospitality can be achieved.

Similarly it can be achieved in the case of pure base of roman smalls.

The array a, b, -----------, z.

can be extended to

a, b, -----------, y, za, zb, --------, zy, zza, -------, zzy

This is used at various places in the colon classification.

For example in "T Education".

1 Audio-visual
3 Medium of instruction
4 Heuristic method
5 Catechism
7 Case Study
3 Experiment
91 Direct method
92 Dramatisation
93 Discussion method
97 Lecture method
98 Discussion method

UDC and DC does use the "Sector Device". But they
they use '0' zero as an empty digit for extrapolation at the beginning of an array of order 2. DC also uses this.

Class Number | UDC | DC
--- | --- | ---
00 | Prolegomena Fundamentals | Generalities knowledge and culture
001 | Science and knowledge | Knowledge in general
01 | Bibliography and catalogues | Bibliographies and catalogues.

The term "Generalities" need not have been inserted to make it appear as if '0' (zero) was not empty, but not semantically rich.

**Extrapolation at the beginning of the array:**

The problem of extrapolation at the end of an array is shown in the above. The hospitality in the array at the beginning is also suggested for future but not used in the 6th edition of DC.

**Solution suggested:**

1. Using a sector whose array isolate numbers have an ordinal value less than 1.

The sectors whose isolate numbers satisfy this condition are those in zero (E-ξ) that is sectors (E-α), (E-ζ), and sector (E-ζ) which will mean the unhelpful sequence since it will have a conflict with the "Generetic class materials".

2. Use of sectors starting with a zero is also possible.

They may be arranged as
(S-00a) having range 00a --------00y
(S-001) " " 001 --------008
(S-00A) " " 00A --------00Y
(S-0a) " " 0a --------0y
(S-0za) " " 0za --------0zy
(S-09a) " " 09a --------09y
(S-091) " " 091--------098
(S-09A) " " 09A--------09Y

So the infinite hospitality can be achieved.

But this arrangement will lead to the unhelpful
arrangement of class number.

3. Another solution suggested to deprive (S-za) of its
anteriorising value and use it for the array division.
This amounts the releasing of the isolate number
beginning with the "z" in the zero (Z-a) for array division.
But this appeals to the necessity of releasing the
sectors in the zone (Z-a) for the array division.

So we see that by using the sector notation CC
achieves a lot of hospitality.

Zone-Analysis :-

Another device use by the CC motational system
is zone-analysis.

"The range of an array made of class numbers
beginning with one or the other of the digits of one and
the same species of digits.

The specialized use of species of digits has been
resulted in the formation of easily recognisable zones
in an array. This zone formation-prefirst octave, first
octave and the last octaves with subzones of later two-
has brought to notice the new and powerful concept of

versatility of notation.

In the idea plane isolates were divided into

a. Special isolates.

b. Common isolates.

Each of them was further subdivided on the basis
of the mode of formation either by enumeration or formed
by the application of device.

So an array was divided in the four kind of
isolates

1. Enumerated special isolates (ESI)
2. Enumerated common isolates (ECI)
3. Deviced special isolates (DSI)
4. Deviced common isolates (DCI)

The sequence of above four was decided on the basis
of findings of idea plane.

The above four isolates forming an array in idea
plane were accommodated in the notational plane as
follows:

1. Zone 1 - It accommodated the enumerated special
isolates represented by the roman smalls.

   a,--------,y, z----

and denoted by (7- a)

2. Zone 2 - It accommodated the enumerated special
isolates represented by the indo-arabic-numerals

   1,2,----------3,-----

and denoted by (7- 1).

3. Zone 3 accommodated the deviced special isolates
represented by the roman capitals
\((A)\) ----------- \((Z)\) 

and denoted by \((Z-(A))\).

**Hospitality and zone analysis:**

Every array was divided into zones on the basis of species of digits used. Each zone has the infinite hospitality. So the array can be extended up to infinity.

For increasing hospitality, the concept of zone was applied to space and time facet. As a result, the zones could be used for the both facets facilitating the accommodation of different kinds of space and time isolates. In these time space facets, the various levels were provided with the help of zone analysis, the level two of the time facet was accommodated in the zone 1 as follows.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Sector</th>
<th>Nature of Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>Meteorological</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Diurnal</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Lunar</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Week days</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Calendar month</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Centuries</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>Eras</td>
</tr>
</tbody>
</table>

Similarly, the levels of the space facet were also accommodated.

**Capacity of a Notational System**

The following table the array isolate numbers available in each zone in each of its sectors.

Table for boundary condition that array isolate number can have only one apparent digit.
From this table it follows that the total number of one-digited array isolate numbers available in any array of order 1 of a facet is apparently 112. In the case the digit y, 3, and 7 are made empty digits. The hospitality achieved is infinite.

Table for boundary condition 2:

In this table the boundary condition is that the array isolate number cannot have more than two apparent digits.
So far an array isolate number of order the number of sectors available is, 24 and the number of Array Isolate numbers is 40C.

Similarly when the Array Isolate Number can only not more than three apparent digits then the calculation gives that the number of sectors available is 73 and the number of Array Isolate Numbers available is, 1,30C.

So we see that by zone analysis the capacity of any array of accommodating the new array isolate numbers is infinite.
Interpolation in array :-

"Interpolation in array means" an array of class numbers or of isolate numbers should admit of the interpolation of any number of new co-ordinate numbers at any point in the array.

For this purpose the following devices are employed.

1. Gap Device :- Gap device consists in leaving certain gaps in the notation for the interpolation of new classes or isolates at some point in array.

In BC and UBC the gaps occur in some arrays. For example in the following array in UBC the class number "163" is not used.

161 Fundamentals of logic
162 Conclusions, Argument, Reasoning
164 Logical conclusion. Symbolic Logic

But after sometime this gap may checked up and the array will not provide for the further interpolation.

BC also uses it for example in "650 Business and discipline".

651 Office Services
652 Writing
653 Shorthand
654
655 Printing and related activities
656
657 Accounting
Colon classification also uses it at some places:

T4 Anthropo Geography
T5 Political Geography
T6 Economic Geography

7

T8 Travel expedition. Voyage.

So DC and UDC provides it various places whereas CC uses it on some places only. Since this device is not helpful due to the danger of gaps get choked up and the scheme will not provide interpolation.

2. Mixed base :-

The extrapolation of a zone or sector may be taken as the case of interpolation in array provided the mixed base is used.

For example in the first sector (S-1) and the penultimate sector (S-A) the extrapolation of (S-1) can be taken as the case of interpolation between (S-1) and (S-A).

1,2,---------7,3,9, A,B,---------X,Y

After extrapolation of (S-1)

1,2,---------7,8,91, A---------X,Y

This device cannot be used due to the use of the pure base of indo-arabic numerals.

3. Introduction of new species of digits :-

"A digit of new species, with a defined ordinal value, can be interpolated between any two digits in an array".

This device was given by Dr. Ranganathan in 1939 in edition 2 of colon classification. In this year new
main subject "Mystian and spiritual experiences" was recognised and accommodated or interpolated between "M Useful Arts" and "M Fine Arts".

M Useful Arts

Mysticism and spiritual experiences

M Fine Arts

The ordinal value of " was fixed between "M Useful Arts and "M Fine Arts".

In edition 4 (1952) Greek letter were used for two purposes.

1. Accommodating newly emerging and newly recognised main subjects.

2. Accommodating the Partial Comprehensions of two or more succeeding consecutive main subjects.

Use of Greek letters in the various editions.

<table>
<thead>
<tr>
<th>Greek letter</th>
<th>Subject</th>
<th>Nature of subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>(beta)</td>
<td>Mathematol Sciences</td>
<td>Partial comprehensions</td>
</tr>
<tr>
<td>(Gamma)</td>
<td>Physical Sciences</td>
<td>Partial comprehensions</td>
</tr>
<tr>
<td>(lambda)</td>
<td>Animal Husbandry</td>
<td>Main subjects</td>
</tr>
<tr>
<td>(mu)</td>
<td>Humanities and social sciences</td>
<td>Partial comprehensions</td>
</tr>
<tr>
<td>(Delta)</td>
<td>Spiritual experiences and Mysticism</td>
<td>Main subject</td>
</tr>
<tr>
<td>(Nu)</td>
<td>Humanities</td>
<td>Partial comprehensions</td>
</tr>
<tr>
<td>(Sigma)</td>
<td>Social Sciences</td>
<td>Partial comprehensions</td>
</tr>
</tbody>
</table>

Discarding of using Greek letters:

Use of Greek letters was considered to be helpful due to following reasons:

1. Unfamiliarity with the Greek letters of the majority
of readers.
2. Difficulty in remembering the mnemonic value of interpolated Greek letters.
3. Most of the Greek letters were not available in the 26 type wasters.

No the use of greek letters was discarded as it was for only temporary use as all the considerations of notational elegance and other matters connected with the notation had to be postponed and taken up only later.

In edition 6 (1960) The Greek letters were retained only to represent the partial comprehension and the Main subject "spiritual experience and mysticism" since \( \Delta \) was the international symbol for the spiritual experience and mysticism. Thus in 1963 all the Greek letters were removed.

But it was criticized by various authors such as the use of different species (Roman and Greek Alphabets) in the main class has rendered the scheme quite clumsy. The main classes of practical classification must be represented by the distinct signports of only one and the same species to avoid confusion.

Emptying Digit :-
"Interpolation if new number between any two existing class numbers or isolate numbers in array is possible with the use of emptying digits.
Emptying digits :- "Emptying digit is a digit with its usual and also semantic value, and further having the power the deprive the preceding rich digit of its power of representing the idea."
In 1962 the digit "Z" was postulated to be having the power of emptying- that it will empty out of the semantic content of the preceding digit, but allow it to retain its ordinal value.

For example between "H Geology" and "I Botany" the mining was interpolated giving the term HZ

H Geology

HZ Mining

I Botany

The number "HZ" is taken as a whole that means mining. This admitted "HZ" mining as a class in the array of (MC) without making it subdivision of 'H Geology' and inspite of its being represented by a digit pair instead of a single digit. In other words 'though' HZ appears to be order Z when viewed from the Notational plane, the term represented by it is only of order 1 when viewed from the idea plane.

This concept provide the maximum hospitality for the notational plane between consecutive class numbers or isolate numbers in array.

The digits from T to Z were postulated as the Emptying digits.

So I, U, V, W, X, Y, Z were postulated as the emptying digits.

Change of "Z" to "X" :-

It was decided to change the 'Z' by 'X' in the four main class numbers

HZ Mining

KZ Animal Husbandry
These were changed to

HX    Mining
KX    Animal Husbandry
LX    Pharmacognosy
XX    Social Work

This change or shifting Z to X was due to the reason that in context of the Telescoped Array of (NC), the digit 'Z' is also postulated is also having the power of comprehending of certain main classes. This disqualified the digit 'Z' to be the second digit of a main class number. Only the digits T to X are qualified to be second digits of main class numbers.

Use of Emptying Digits in the edition 7 of colon classification:–

In edition 7 to be brought out in future the following main class have been interpolated in the respective filiatory positions demanded by the Idea plane for them in the array of main class. This too has been done with help of postulate of Emptying digits.

GX    Microbiology
JX    Forestry
LT    Public health
FX    Communication theory

Advantages of Emptying digits:–

The emptying digits were used to represent the partially comprehensive classes. These classes previously represented by the Greek letters. These were changed to following in edition 6 by the use of the digit 'Z' as an emptying digit.
2. These digits, emptying digits were also used in the "geographical schedule" of edition 7. For example

<table>
<thead>
<tr>
<th>Digit</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td>India</td>
</tr>
<tr>
<td>44T</td>
<td>Nepal</td>
</tr>
<tr>
<td>44U1</td>
<td>Sikkim</td>
</tr>
<tr>
<td>44U2</td>
<td>Bhutan</td>
</tr>
<tr>
<td>44V</td>
<td>Ceylon</td>
</tr>
<tr>
<td>44X</td>
<td>Pakistan</td>
</tr>
<tr>
<td>45</td>
<td>Iran</td>
</tr>
</tbody>
</table>

Empty-Emptying Digits :-

Digits V, W, Y, W were postulated as empty-emptying digits. This means that they were itself empty but possessing the power of emptying.

Disadvantages :-

Danger of homonym :-

With the postulation of the digits T to Z emptying digits, such that power of emptying the previous digit to retain its semantic value, it will be necessary to avoid the addition of any of these digits to an isolate number to represent the subdivision of an isolate represented by it. Since the addition of any of these digits can only produce a number representing a co-ordinate isolate idea, and not a sub-ordinate.

For example in schedule of "Chemistry" in CC edition 6 we see in "EChemistry", foci in
These all subjects " E92" "E92Z1" "E92Z2" seems to be co-ordinate with "E Chemistry" instead of being sub-ordinate to it.

Similarly in " M Useful Arts ".

MW4       Science of war
MW41      Military Science
MW45      Naval Science

Here "MW45,"MW4T etc. represents the co-ordination with " M useful Arts" instead of representing the sub-ordination to the main class " M Useful arts ".

2. Conflict with the phase device :-

21. Anteriorising common Isolates :- An anteriorising common isolate number should be added to the host class without any connecting digit. There is possibility of a homonym arising if the host class number ends with the digit zero and anteriorising common isolate number attached to it has one of the emptying digits attached to it.

For example if the digit pair "2T" represents the anteriorising common isolate 'Guide Book'.

0111, 2M50aT = A guide book to an English dramatist born in 1880.

= Relation of a English Dramatist born in 1880 with education.

Solution suggested :- For this purpose a connecting symbol or indicator digit " " is suggested for the anteriorising common isolates in edition 7 of colon classification.

Previously the symbol (double code) was suggested but
Conflict with the Alphabetical Device:

We know alphabetical device consists in using the first or first two, or first three initial letters of the name of an entity existential or conceptual for formation or subdivision of isolate.

**Space Isolate**:

Alphabetical device is used in the space isolate. The isolate number of the physiographical feature is individualised by alphabetical device.

- **44.97** Western Ghats
- **441.pl** Vaigai River

In future it may be necessary to interpolate the isolates representing the recognised Physiographical features in the existing schedules. Emptying digits T to Z may be for the formation of new isolates.

For example the physiographical feature "Canyon" may be represented by the number (g1T) and interpolated between "gl Valley" and "g2 Plateau".

- **44.glt** = Canyons of India
- **44.glt** = Tiger Valley of India

3. Generilia class: In future there may be interpolation between "z Generilia" and "1 Universe of subjects". Then of the emptying digits are used then may be given the isolate number zT, zU, zV, --------zZ.

It will be in conflict with rule 9s2 of CC which states "If the exposition is confined only to Generilia materials by and on a specific person, the digit "z" should be amplified by alphabetical device using the name of person concerned."
For example 20 Gandhiana
25 Vinoba

So the use of 25 for Vinoba and for the interpolated digit 25 will give rise to homonym.

Solutions:-

For this purpose an indicator digit should be used having the following qualities.
1. It should have the power to empty the rich digit immediately preceding it.
2. It should be remantically empty.
3. The use of digits should secure filatory sequence among the subjects represented by the class number.
4. Its ordinal value should be higher than that of starter bracket.

Digit suggested :-

The digit (inverted V) is suggested to be used in the cases where the homonyms are likely to occur.

Hospitality in chain :-

Hospitality in chain :- A chain of numbers contains a succession of sub-ordinate numbers beginning with the number representing the whole universe of entities. It will have to show its hospitality to a new comer by accommodating it only either at the end or between any two consecutive succession of co-ordinates numbers; for a subordinate number cannot obviously be accomodated above the number at the top which is the largest in the chain.

Hospitality is possible in two ways :-

1. Extrapolation in chain :-

The chain should be able to accomodate the new numbers at the end that is it should be flexible.
the numbers of higher order at its end.
CC, BC and JBC all the schemes provides the hospitality in chain at end by using various devices.
1. Gap device
2. Decimal Fraction device
3. Phase device
4. Facet device
5. Superimposition device
Gap device :- Gap device consists of leaving a certain number vacant places between the class numbers of two or more classes which appear to be consecutive at the time of enumeration of these classes in order to accommodate new classes claiming their filiatory sequence among that gap.

But this device is unhelpful, because the number of gaps provided in respective arrays will be insufficient in respect to the growth of knowledge and developing ideas. This means that scope of the hospitality in chain is not much possible through this device.

This is not used by any of the schemes in consideration. Only library of congress and Bliss classification use this device for the achievement of hospitality.
Decimal Fraction Device :-

Decimal Fraction device consists of treating each class number as a pure decimal fraction.

In this device each class number is treated as a pure decimal fraction and not as an integer or the mixture of an integer and a decimal fraction.

This device was devised by Melvit Dewey and is indedly used in his scheme as well as in colon classification.
tion etc. While using this device the use of decimal point before the class number is not necessary.

In a chain of class numbers a new class is created by subdividing the last link of chain on the basis of an additional characteristic. So a new digit is added in the last link representing the additional or new characteristic. This subdivision may be continued up to infinimum. So the chain can also extrapolate up to infinity.

Colon classification uses this device at various places. For example in "Geography".

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>U28</td>
<td>Geography</td>
</tr>
<tr>
<td>U286</td>
<td>Meteorology</td>
</tr>
<tr>
<td>U2862</td>
<td>Physical and chemical phenomena</td>
</tr>
<tr>
<td>U28627</td>
<td>Physical phenomena</td>
</tr>
<tr>
<td>U28627</td>
<td>Magnetic phenomena</td>
</tr>
</tbody>
</table>

So CC provides infinite hospitality by the use of this device.

BC also uses it everywhere in the schedule. For example in "370 Education".

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>370</td>
<td>Education</td>
</tr>
<tr>
<td>373</td>
<td>Secondary education</td>
</tr>
<tr>
<td>373.1</td>
<td>Secondary School</td>
</tr>
<tr>
<td>373.11</td>
<td>Teaching and teaching personnel</td>
</tr>
</tbody>
</table>

UDC also provides it being prototype to BC

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>611</td>
<td>Anatomy</td>
</tr>
<tr>
<td>611.8</td>
<td>Nervous system</td>
</tr>
<tr>
<td>611.81</td>
<td>Brain</td>
</tr>
<tr>
<td>611.814</td>
<td>Bioccephalon, Pituitary.</td>
</tr>
</tbody>
</table>
Defects in Decimal fraction device is not helpful to provide the co- extensive class numbers in BC.

For example

373 Secondary School
373.11 Teaching personnel in Secondary Schools
373.112 Professional qualifications
373.222 Non public, secondary schools
373.224 Public, secondary schools

If we have to provide number for "Professional qualifications of teachers in public schools". It may be classified either in qualifications of teaching personnel in secondary schools" or in "Public schools".

In UBC this handicap is not much more. The two numbers belonging to various arrays can be connected with the help of connecting symbols as devices by the scheme.

Phase Device:- "Phase device consists of attaching one class number to another by means of a connecting symbol of ordinal value less than that of any connecting symbol used for a facet".

This device used in colon classification at full extent for providing infinite hospitality whereas UBC also provides it but not as coextensively as CC.

Provision in CC:

CC provides as follows in edition 7 of CC

a. The indicator digit and (ampersand) to indicate phase relation in the class number.
b. A Roman small letter to indicate the varieties CC has recognized the six type of relationship among the subjects.
1. General relation
2. Bias relation
3. Comparison relation
4. Difference relation
5. Tool relation
6. Influencing relation.

The above phase relations may occur between

1. Two basic or compound subjects.
2. Two isolate ideas enumerated in the same scheme and forming a facet of a compound subject.
3. Two co-ordinate array isolates occurring in one and the same array in one and the same schedule.

The above phase relations are denoted by the levels of phase-relation. We have three levels of phase relations.

1. Intra-subject
2. Intra-Facét
3. Intra-Array

UBC-45

In UBC the digit ";" (colon is used to indicate phase relation in the class number for a complex subject. But it is also used as an indicator digit for facet and other kind of relation.

Bonker Buyvis has suggested the following indicator digits for different varieties of phase-relations:

<table>
<thead>
<tr>
<th>Kinds of relations</th>
<th>Digit</th>
<th>Kind of relation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mutually passive relationship</td>
<td>.. ..</td>
<td>General comparison and difference</td>
</tr>
<tr>
<td>2. Mutually active relationship</td>
<td>.. ..</td>
<td>Influence</td>
</tr>
</tbody>
</table>
3. Passive Active relationship

4. Active-Passive relationship

So CC provides the hospitality in chain. The class number constructed on the basis of intra-facet phase device secures another single fold infinity for hospitality.

UBC also provides the above provision for achieving hospitality but it does not give the co-extensive class numbers to each of the different varieties of complex subjects.

BC does not provide the hospitality by using the phase device since it has no provision for connecting the two class numbers.

Facet Device:

S.R. Ranganathan defines this device as:

"Facet device consists of adding, after a class number of any number of links, a digit of ordinal value less than that of least of all the substantive digits and adding thereafter a set of digits instructed on the bases of train of characteristics related to one another but unrelated to those previously used.

"The digit first added is called a connecting symbol".

"The set of digits thereafter is called a facet".

This device secures a manifold infinite hospitality in chain for it can be applied resplendly. It is used by UBC and CC.

Due to this device the chain of a class number
can be lengthened not only at the end of the last facet, but also at the end of anyone of the earlier facets.

To achieve this CC uses the various connecting symbols for the various facets. UDC notation also uses it to some extent since UDC is not a faceted scheme.

<table>
<thead>
<tr>
<th>Connecting digits for</th>
<th>CC</th>
<th>UDC Edition 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Edition 6</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>' (Inverted Comma)</td>
<td>&quot;&quot;</td>
</tr>
<tr>
<td>Space</td>
<td>.  (Dot)</td>
<td>( )</td>
</tr>
<tr>
<td>Energy</td>
<td>;  (Colon)</td>
<td>-or .0 or ;</td>
</tr>
<tr>
<td>Matter</td>
<td>;  (Semi-colon)</td>
<td>-or .0 or ;</td>
</tr>
<tr>
<td>Personality</td>
<td>,  (Comma)</td>
<td>-or .0 or ;</td>
</tr>
</tbody>
</table>

So in CC by the use of various connecting symbols for the various facet it demonstrates that the hospitality in chain resides not only at the end but also at each of the junctions between the brains of characteristics.

**Super-imposition device**:

"Superimposition device consists of dividing an isolate by the restriction of its extension to the portion of it falling within another isolates of the some category."

In other words super-imposition device is concerned with attaching of one number with another number in the same facet with a distinctive connecting symbol for this purpose.

The connecting symbol used for this purpose is hyphen (-). For example in case of "British Africa", here the isolate "Africa" is divided by the British which of of greater extension. So the class number for it is 44-56.

Similarly in "Y Sociology" in the subject "Sociology"
of "Y Sociology" but can be represented by two isolates in some facet

Y11-35

Where Y11 stands for "Child" and "X35" for "City"

Here "child" is divided by the restriction of its extension to the position of it i.e. to the group of "Children" residing in the city area falling within another isolate representing the city community of the same category i.e. of the same facet.

UDC and DC do not provide this device. In DC some of the numbers like 366.37; 367.3; 367.9 for Portugese Guiana, Angola, Mozambique.

Similarly UDC also enumerates some of the numbers for example

Indian Villages (340-392)

Here the India is divided by villages while restricts the extension of India in respect to the villages.

For the other isolates belonging to the same facet or array in UDC, can be connected by the symbol : (colon).

Interpolation in chain :

Interpolation in chain means that it should admit of any number of links between any two consecutive links in the chain.

No satisfactory notational appears to be available to interpolate a missing link or a newly emerging link calling for interpolation in chain.

In edition 14 DC has provided the missing link for
notation".

626/627 Hydrantc Engineering as the missing link between "62 Engineering" and the array 626 canal engineering "and" 627 River engineering".
CHAPTER 3

Mnemonic quality of CC, DC and UDC
Memonics

Memonics is an important quality of notation. It is concerned with providing the memory aid to the reader for remembering certain concept by always representing them with the same digit or set of digits.

Concept of memonics:

Memononic originates from a Greek word meaning "to remember". Its dictionary meaning is "the art of assisting memory; a mode of recalling to mind any facet or number or a series of disconnected terms or figures".

Feeling the necessity of memonics E.J. Coates in his paper presented to International study conference on classification for information retrieval says "besides being composed of digits of generally understood ordinal values, which must also be easily and accurately retained during the time lag between being read in the catalogue and being read on the document location".

Regarding the memononic use of notation Sayers observes that "there is a very general quality in modern classification notations which ingenious and within limits of great value to classify. This is its memononic quality its power of assisting the memory and of reducing the work of reference to tables and indexes to the minimum. By memononic notation we mean a notation which has always the same significance wherever it appears in the classification".

J. Mills also recognises the importance of use of memonomics in the scheme by saying "notation should posses memononic qualities- i.e. qualities which assists the memory of the use of the scheme. They are quite useful to the librarians, but probably unrecognised by the readers".
So we can say that a mnemonic notation is one in which an isolate number represents the same idea to whatever host class it is attached.

It is also given support by Dr. S.R. Ranganathan in his prolegomena in the words "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."

Types of mnemonics:

Dr. Ranganathan gives four type of mnemonics.

1. Verbal mnemonics
2. Scheduled mnemonics
3. Systematic mnemonics
4. Seminal mnemonics

Abdul Rahman and T Ranganathan provides the two kinds of mnemonics.

1. General mnemonics
2. Restricted mnemonics

The restricted mnemonics is divided into three groups.

a. Schedule mnemonics
b. Systematic mnemonics
c. Seminal mnemonics

1. General mnemonics:

General mnemonics in the notational plane is defined as "In the field of library classification we represent each entity by an ordinal number. In fact an entity is first replaced by a complex of its essential differentiating
attributes—or characteristic essential to the subject context under consideration, stated in a helpful sequence.

Then each characteristic is represented by a digit or a set of digits deemed to have been frozen into a single one. These digits are written in succession. Each digit in unique as if it were a proper noun to the measure of the characteristics concerned, within the context of the sequence of digits containing it. The digit is an array isolate idea. The term equivalent to it is an array isolate term in the given subject context. This is general mnemonics in the notational plane. The entire sequence of digits—it may be an isolate number or class number as the case may be—amounts similarly to general mnemonics in the notational plane. The entire sequence of digit—it may be an isolate number or class number as the case may be—amounts similarly to general mnemonics in the notational plane.7

So we can say that general mnemonics in notation means that entire sequence of digits derived by different characteristics are arranged in a helpful sequence as it were a proper noun.

Application to colon classification:— Consider the class number P111,93,1:1 stands for the entity names "Pronunciation in English dialect". This class number is an ordinal number. The entity is first replaced by a complex of its essential differentiating attributes or characteristics essential to the subject context i.e. the above term is stated in a helpful sequence. The characteristics concerned may be mentioned in a helpful sequence as below:—
Linguistic (Language) (Variant. Stage), (Element) (Problem)

Each of the characteristic is replaced by the digit or set of digits deemed to have been frozen into a single one. In the class number P11,93,1+1. The language characteristic is replaced by the set of digits 111 deemed to have been frozen into a single one. The "Variant" characteristic is replaced by the digit 93, the element characteristic is replaced by the digit 1 and the last problem characteristic is replaced by digit 1. These digits 111,93,1+1 are written in succession in the class number. It can be said that each digit is unique as if it were a proper noun to denote the measure of the characteristic concerned within the context sequence of digits containing it.

In the formation of language facet the serial order of the characteristics, the group of languages belonging to Tutononic language is 3. The first characteristic used to derive the first order array is the first group of the families of languages:

First array derived from this characteristic is
1. Indo-European languages
2. Semitic languages
3. Dravidian languages
4. Other Asian languages

The second characteristic used to derive the second order array is the second group of languages belonging to array derived from this characteristic is
1. Tutonic language
2. Latin language
Third order array derived from this characteristic is

111  English
112  Dutch
113  German

So the isolate number 111 representing the English language consists of three digits which is considered to have beenrozen into single digit. This set of digits is unique as if it were a proper noun representing the English language to denote the measure of characteristics. Digit 111 is an array isolate number representing the third order array. Idea of an individual language represented by it is an array isolate idea. The term "English language" is the equivalent term to represent in the subject context.

So the set of digits 111 used to represent the English language is "General mnemonics in the class number F11,9B,141 in the notational plane.

The general mnemonics does not hold good in universal decimal classification and decimal classification because they are the enumerative schemes.

**RESTRICTED MNEMONICS**

In this restricted sense a digit or a set of digits represents the same entity irrespective of the sequence of digits among which it occurs.

They are divided as

1. Scheduled mnemonics
2. Systematic mnemonics

The fourth one may be taken as "Verbal or Alphabetical
SCHEDULED MNEMONICS :-

A scheme for classification should use one and the same digit or digit group as the case may be, to denote an isolate idea or an array isolate idea, in whatever subject it may occur.

This means that when the similar concepts occur in different places in different schedules they should be represented by the same digit on each such places.

Devices used in CC, DC and UDC secure the scheduled mnemonics :-

Devices used by CC :-
1. Facet device
2. Phase device
3. Common isolate device
4. Geographical device
5. Chronological device
6. Subject device

Devices used by DC :- To secure it DC uses the following devices

1. Subject device (use of divide-like-direction)
2. Common isolates

Devices used by UDC :-

To secure the property of scheduled mnemonics it uses

1. Table of common auxiliaries
2. Use of divide like direction
3. Use of special auxiliaries for the prescribed class.

Kinds of scheduled mnemonics :-

Abdul Rahman and T Ranganathan gave four kinds of scheduled mnemonics.
1. Common isolates
2. Isolates or sub-division of isolate got by subject device.
3. Isolates pertaining to two or a few basic classes running parallel.
4. Isolates with casual mnemonics:

(1) Common Isolates:

CC, BC and UDC both uses the concept of common isolates.

11 CC: In prolegomena common isolate is defined as "A common isolate in an isolate idea denoted by the same isolate term and represented by the same isolate number quite irrespective 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."

12 In BC edition 17 the definition of common isolates is provided. In BC they are recognised as "Standard subdivision" and defined as "Virtually any subject or discipline may be presented in various forms; as a synopsis, or outline, as a periodical, as a collection of writings. Similarly most subject have certain modes of treatment in common, theory, technique, study and teaching, history. These common forms and modes are known collectively as the "Standard subdivision and may be applied to any class to which they are appropriate."

13 In Universal decimal classification the common isolates or standard subdivisions are treated as "common auxiliaries" which are defined as those auxiliaries which do not stand alone but are attached to main UDC numbers denoting primary subject matter."
Application of common isolates in CC, BC and UDC:

1. CC has ten schedules of common isolates. These are as follows:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Nature of common isolate</th>
<th>No. of common isolate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Anteriorising common isolate (Applicable before space facet)</td>
<td>18</td>
</tr>
<tr>
<td>2.</td>
<td>Anteriorising common isolate (applicable after space facet)</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Anteriorising common isolate (applicable after time facet)</td>
<td>10</td>
</tr>
<tr>
<td>4.</td>
<td>Posteriorising Energy common isolates</td>
<td>12</td>
</tr>
<tr>
<td>5.</td>
<td>Posteriorising matter common isolates</td>
<td>Under investigation</td>
</tr>
<tr>
<td>6.</td>
<td>Posteriorising personality common isolates</td>
<td>14</td>
</tr>
<tr>
<td>7.</td>
<td>Time isolate of level 1</td>
<td>31</td>
</tr>
<tr>
<td>8.</td>
<td>Time isolate of level 2</td>
<td>12</td>
</tr>
<tr>
<td>9.</td>
<td>Space isolate of level 1</td>
<td>1440</td>
</tr>
<tr>
<td>10.</td>
<td>Space isolate of level 2</td>
<td>10</td>
</tr>
</tbody>
</table>

BC has provided the schedule for "standard subdivisions" as follows:

| 01   | Philosophy and theory |
| 02   | Miscellany |
| 03   | Dictionaries, Encyclopedias etc. |
In UDC the common auxiliaries are provided as follows.

1. **Common auxiliary of language**
2. **Common auxiliary of form**
3. **Common auxiliary of place**
4. **Common auxiliary of race and nationality**
5. **Common auxiliary of time**
6. **Common auxiliary of point of view**

These common isolates, auxiliary, standard subdivision

can forms to the scheduled mnemonics. For example

<table>
<thead>
<tr>
<th>CC</th>
<th>Term</th>
<th>DC</th>
<th>UDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qk</td>
<td>Cyclopaedia of Religon</td>
<td>203</td>
<td>2(03)</td>
</tr>
<tr>
<td>Rk</td>
<td>Cyclopaedia of Philosophy</td>
<td>303</td>
<td>1(03)</td>
</tr>
<tr>
<td>Szk</td>
<td>Cyclopaedia of Social Sciences</td>
<td>303</td>
<td>3(03)</td>
</tr>
</tbody>
</table>

So the the three schemes provide for the scheduled mnemonics. But DC (edition 16) violates it at some places.

For example, the number for "Bibliography" is provided under the General class. There is practice of using this number after the class number of any subject to represent the bibliographies on it.

<table>
<thead>
<tr>
<th>CC</th>
<th>Term</th>
<th>DC</th>
<th>UDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>2a</td>
<td>Bibliography of library</td>
<td>016.02</td>
<td>016:02</td>
</tr>
<tr>
<td>2a</td>
<td>Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2a</td>
<td>Bibliography of Science</td>
<td>016.5</td>
<td>016:5</td>
</tr>
<tr>
<td>2a</td>
<td>Mathematics</td>
<td>016.51</td>
<td>016:51</td>
</tr>
<tr>
<td>2a</td>
<td>Bibliography of Physics</td>
<td>016.53</td>
<td>016:53</td>
</tr>
</tbody>
</table>

So the DC (edition 16) and UDC do not provide, Bibliography as one of common isolate but treat it as a main class. But even though it does not violate the scheduled mnemonics since "016" is consistently used for bibliography.

In edition 17 of DC the provision for "Indexes" is provided where it gives " class bibliographies: prefer 016." In
UBC it is provided with the subject concerned.

22 Isolate by subject device:

The second kind of scheduled mnemonics is the isolate got by subject device.

CC, DC, UDC all of them uses the subject device for the sharpening of an isolate.

16 CC defines subject devices as "the subject device consists in using the appropriate class characteristic for the formation or the subdivision of an isolate which is capable of such formation or subdivision or when the individualisation of the isolates, or sub-isolates, may be made to depend conveniently on a class that may be definitely associated with the respective for in any manner or for any reason."

17 According to DC edition 17 "divide like means to divide like the secondary sequence to the extent that is appropriate to heading, definition and scope governing the primary sequence.

For example class Bibliography of agriculture under 016 and divide like "001-999" with no digits common to secondary sequence. It will be 016.63.

In UBC the relation sign is used to connect the two UDC numbers. For example

Bibliography of agriculture 016:63

For providing the "subject device" the direction of divide like is also found in UDC but it is given in the form:

297 Islam

297.1 Philosophy, doctrines, practices,

As 291 e.g.

.18 Sources, the Koran
Subject device in CC :- CC indicates the rules or the cases where the subject device can be applied. The part of an isolate number, got by the subject device is dored within brackets.

CC confirms to scheduled mnemonics as obvious from the following cases.

For example the class number (53 is assigned to X-rays under the class Physics. New number can be constructed by the use of these digits

(53  X-rays )

MC53  Manufacture of x-ray apparatus

X5(MC53)  Economic of x-ray apparatus industry

N6,8(C53)  Machinery for X-ray

So CC confirms to the canon because the same digit C53 is used at every place.

Subject Device in BC :-

BC specified the places where subject device can be applied, whether fully as the main classification or restricted to a particular range of main classification. For example in 390 "customs and Folklores"

390.4  Specific occupations

(Divide like 920.1-928.9 for example of lawyers 390.434).

Sometimes it provides for the division like whole of the schedule. For example under 392 International trade

392.45  Secondary products and services

(Divide like 001-999 for example Clothing 392.456 87)
Subject Device in UBC :-

UBC also provide for schedule mnemonics. For example in "2 Religon".

Under 296 it provides to divide like 291. Similarly in 295 and 297 it gives the same direction.

291.8 Sacred literature
295.18 Mithraism, sacred literature
296.18 Judaism, sacred literature
297.18 Islam, sacred literature

So here 8 is used as mnemonics and hence UBC confirms the scheduled mnemonics.

3. Parallel Schedule of Isolates :-

An array is formed by the various array isolate numbers presenting the various array isolate ideas. These ideas or characteristic may recur in any array of some order or other of several classes. It will be an aid to memory if the isolates in each array of such a set occur in a sequence parallel to those in every other array of the same set and the same isolate number of digits is used to represent the corresponding isolates in all the arrays.

Use of parallel Schedule for achieving the mnemonic property in CC :

CC uses the parallel schedules of array isolates to confirm the scheduled mnemonics. There are two advantages of providing the parallel schedule.

1. It helps to cut the length of schedule in the scheme.
2. It serves as an aid to memory.

A long list of parallel schedule used in CC is provided by Abdul Rahman and T Ranganathan. Here are some important examples of the parallel schedule in CC.
<table>
<thead>
<tr>
<th>S.N.</th>
<th>Basic Class</th>
<th>Facet</th>
<th>Parallel Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>2 Library Science</td>
<td>M</td>
<td>Same as focus in P for General bibliography</td>
</tr>
<tr>
<td>2.</td>
<td>P Technology</td>
<td>P</td>
<td>Same as in E Chemistry and additions.</td>
</tr>
<tr>
<td>3.</td>
<td>G Biology</td>
<td>E</td>
<td>4 Pathology (To be divided as in L Medicine)</td>
</tr>
<tr>
<td>4.</td>
<td>I Botany</td>
<td>E 2P</td>
<td>As in G Biology and some additions</td>
</tr>
</tbody>
</table>

Parallel schedule of isolates in BC:—

"BC provides no parallel schedule of isolates.

What appears to be parallel schedule by the device of 'divide like' occurring throughout the schedule are due merely to subject device or to facet device."

But in edition 17 Decimal classification uses the parallel schedule. For example

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Transport phenomena in solids</td>
</tr>
<tr>
<td>2.</td>
<td>Transport phenomena in liquids</td>
</tr>
<tr>
<td>3.</td>
<td>Transport phenomena in gases</td>
</tr>
<tr>
<td>4.</td>
<td>Transport phenomena in dynamic geology</td>
</tr>
</tbody>
</table>

UBC:—Scheduled mnemonics also holds good in UBC. On some places the one digit represents the similar ideas in various schedule or example

| Plant physiology | 581.1          |
| Animal Physiology| 591.1          |
| General Physiology (Medicine)| 612.01         |

4. Isolates with Casual mnemonics:—

"Schedule with casual mnemonics differs from—"
scheduled mnemonics, in that only a few isolates in the array correspond with one another instead of all the isolates. Here is a list of casual mnemonics. It holds good only in WV. DC and UBC do not make use of this type of scheduled mnemonics.

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Basic class</th>
<th>Facet</th>
<th>Parallel schedules</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bl3</td>
<td>E</td>
<td>Only 1, 2, 3, and 6 are parallel to the canonical division of B Mathematics.</td>
</tr>
<tr>
<td>2</td>
<td>B6</td>
<td>E</td>
<td>Only 1, 2, 3, and 6 are parallel to the canonical division of B Mathematics.</td>
</tr>
<tr>
<td>3</td>
<td>S</td>
<td>F</td>
<td>Only 1, 2, 3, 5 and 6 correspond to 1, 2, 3, 5 and 6 of P of T education.</td>
</tr>
</tbody>
</table>

**Systematic mnemonics**

The second kind of restricted mnemonics is the systematic mnemonics.

Mr. S.R. Ranganathan has defined it as "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 principle for helpful sequence will arrange the array isolate ideas."

Principle of helpful sequence means that the isolates in an array of isolates should be arranged in a helpful sequence. This sequence should be helpful to the majority of readers. When the array isolate numbers will be arranged in such a sequence they will provide the mnemonic facility to the readers automatically.

When the arrangement of isolates in an array is got by the enumeration of the special isolate in it in a systematic way the following principles are used by CC for such a systematic arrangement.
1. Principle of later in time
2. Principle of later in evolution
3. Principle of spatial contiguity
4. Principle of quantitative measure
5. Principle of increasing complexity.

1. Later-in-time:

<table>
<thead>
<tr>
<th>Subject</th>
<th>CC Edition 6</th>
<th>DC Ed.17</th>
<th>UDC Ed.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stratigraphy</td>
<td>H5</td>
<td>551.7</td>
<td>551.7</td>
</tr>
<tr>
<td>Archeozoic</td>
<td>H51</td>
<td>551.71</td>
<td>551.71</td>
</tr>
<tr>
<td>Primary</td>
<td>H52</td>
<td>551.72-</td>
<td>551.73</td>
</tr>
<tr>
<td></td>
<td></td>
<td>551.75</td>
<td></td>
</tr>
<tr>
<td>Secondary</td>
<td>H53</td>
<td>551.76-</td>
<td>551.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td>551.77</td>
<td></td>
</tr>
<tr>
<td>Tertiary</td>
<td>H54</td>
<td>551.78</td>
<td>551.78</td>
</tr>
<tr>
<td>Quarternery</td>
<td>H55</td>
<td>551.79</td>
<td>551.99</td>
</tr>
</tbody>
</table>

So it confirms the principle of later in time, which says that 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. So in this particular example CC, DC and UDC all confirm to the systematic mnemonics.

But at some places DC and UDC violate it. For example in "Q Religion" we observe as follows:

<table>
<thead>
<tr>
<th>Subject</th>
<th>CC</th>
<th>DC</th>
<th>UDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Religion</td>
<td>Q</td>
<td>200</td>
<td>2</td>
</tr>
<tr>
<td>Vedic</td>
<td>Q1</td>
<td>294.1</td>
<td>294.11</td>
</tr>
<tr>
<td>Post-Vedic</td>
<td>Q2</td>
<td>294.5</td>
<td>294.2</td>
</tr>
<tr>
<td>Jainism</td>
<td>Q3</td>
<td>294.4</td>
<td>294.35</td>
</tr>
<tr>
<td>Bhuddhism</td>
<td>Q4</td>
<td>293.3</td>
<td>293.3</td>
</tr>
</tbody>
</table>

Here UC follows the principle of later in time have violated the principle (to some extent) in respect
of the religions of Indian origin.

2. Evolutionary sequence (Principle of later in-evolution)

The principle says that if the subjects in an array of subjects or isolates belngs to the different ages of evolution, they should be arranged parallel to the evolutionary sequence. For example.

<table>
<thead>
<tr>
<th>Subject</th>
<th>CC</th>
<th>BC</th>
<th>UDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Botany</td>
<td>1</td>
<td>581</td>
<td>58</td>
</tr>
<tr>
<td>Thallophyta</td>
<td>I2</td>
<td>589</td>
<td>532.22</td>
</tr>
<tr>
<td>Bryophyta</td>
<td>I3</td>
<td>5883</td>
<td>532.32</td>
</tr>
<tr>
<td>Pteridophyta</td>
<td>I4</td>
<td>587</td>
<td>532.35</td>
</tr>
<tr>
<td>Gymnosperm</td>
<td>I6</td>
<td>585</td>
<td>532.42</td>
</tr>
<tr>
<td>Monocotyledon</td>
<td>I7</td>
<td>584</td>
<td>532.52</td>
</tr>
</tbody>
</table>

So CC arranges them in the sequence of later in evolution. BC arranges in the quite reverse order. UDC arranges in the sequence of later in evolution. So all the schemes confirms to the systemetic mnemonics.

3. Spatial contiguity :-

The principle of spatial contiguity for helpfull sequence says "if the subjects in an array of subjects or isolates in an array of isolates occur contingously in space- roughly along an undirectional line or a radial link or a circle- they should be arranged in a parallel spatial sequence.

For example in the "main class Botany" we observe that entities are arranged bottom upwards.

<table>
<thead>
<tr>
<th>Subject</th>
<th>CC</th>
<th>UDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root</td>
<td>I,3</td>
<td>581.43</td>
</tr>
<tr>
<td>Stem</td>
<td>I,4</td>
<td>581.44</td>
</tr>
<tr>
<td>Leaf</td>
<td>I,5</td>
<td>581.45</td>
</tr>
</tbody>
</table>
So CC and UBC arranges them in the same sequence in which the principle of spatial contiguity arranges them. Hence both respects the systematic mnemonics.

For arranging the space isolates under Asia it follows the sequence.

<table>
<thead>
<tr>
<th>Isolate</th>
<th>CC</th>
<th>BC</th>
<th>UBC</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>41</td>
<td>51</td>
<td>$10</td>
</tr>
<tr>
<td>Japan</td>
<td>42</td>
<td>52</td>
<td>520</td>
</tr>
<tr>
<td>Indo-China</td>
<td>431</td>
<td>596/7</td>
<td>597</td>
</tr>
<tr>
<td>Thailand</td>
<td>433</td>
<td>593</td>
<td>593</td>
</tr>
<tr>
<td>Malay States</td>
<td>435</td>
<td>595</td>
<td>595</td>
</tr>
<tr>
<td>Indonesia</td>
<td>436</td>
<td>91</td>
<td>910</td>
</tr>
<tr>
<td>Burma</td>
<td>438</td>
<td>591</td>
<td>591</td>
</tr>
<tr>
<td>India</td>
<td>44</td>
<td>54</td>
<td>540</td>
</tr>
<tr>
<td>Ceylon</td>
<td>4498</td>
<td>543.9</td>
<td>548.7</td>
</tr>
<tr>
<td>Pakistan</td>
<td>4497</td>
<td>547</td>
<td>540</td>
</tr>
<tr>
<td>Iran</td>
<td>45</td>
<td>55</td>
<td>55</td>
</tr>
<tr>
<td>Arabian Peninsula</td>
<td>46</td>
<td>53</td>
<td>53</td>
</tr>
<tr>
<td>Asia minor</td>
<td>47</td>
<td>561</td>
<td>560</td>
</tr>
<tr>
<td>Siberia</td>
<td>48</td>
<td>57</td>
<td>57</td>
</tr>
<tr>
<td>Afghanistan</td>
<td>491</td>
<td>581</td>
<td>581</td>
</tr>
<tr>
<td>Manchuria</td>
<td>494</td>
<td>518</td>
<td>518</td>
</tr>
<tr>
<td>Korea</td>
<td>495</td>
<td>519</td>
<td>519</td>
</tr>
<tr>
<td>Mangolia</td>
<td>496</td>
<td>517</td>
<td>517</td>
</tr>
<tr>
<td>Sinkiang</td>
<td>497</td>
<td>516</td>
<td>516</td>
</tr>
<tr>
<td>Tibet</td>
<td>493</td>
<td>515</td>
<td>515</td>
</tr>
</tbody>
</table>
So CC, BC, and UDC uses the principle of spatial contiguity to arrange the isolates in the helpful sequence and hence gives confirmity to scheduled mnemonics.

**Quantity sequence**:

The principle of quantitative measure states that 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 or decreasing quantity.

For example in the "Architecture"

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Subject</th>
<th>CC</th>
<th>UDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Town planning</td>
<td>NB</td>
<td>711.43</td>
</tr>
<tr>
<td>2</td>
<td>Village</td>
<td>NB,1</td>
<td>711.437</td>
</tr>
<tr>
<td>3</td>
<td>Town</td>
<td>NB,3</td>
<td>711.434</td>
</tr>
</tbody>
</table>

So CC follows the sequence of increasing quantity and UDC the sequence of decreasing quantity.

**Complexity Sequence**:

This principle of increasing complexity states that if the isolates in array of isolates show different degrees of complexity, they should be arranged parallel to the sequence of increasing complexity.

<table>
<thead>
<tr>
<th>Subject</th>
<th>CC</th>
<th>BC</th>
<th>UDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychology</td>
<td>30</td>
<td>150</td>
<td>159.9</td>
</tr>
<tr>
<td>Perception</td>
<td>82</td>
<td>152.3</td>
<td>159.93</td>
</tr>
<tr>
<td>Consciousness</td>
<td>83</td>
<td>152.3</td>
<td>------</td>
</tr>
<tr>
<td>Cognition</td>
<td>84</td>
<td>153</td>
<td>159.95</td>
</tr>
<tr>
<td>Emotion</td>
<td>85</td>
<td>152.4</td>
<td>159.942</td>
</tr>
</tbody>
</table>

So the three schemes are able to arrange the array isolate numbers in the same sequence which is most helpful for the majority of readers.
Seminal mnemonics

Seminal mnemonics in a scheme of classification means that one and the same digit should be used to denote the semantically equivalent concepts in whatever subjects they may occur.

This concept was first called the "unscheduled mnemonics by Mr. Ranganathan, but later on, on the suggestion of B.I. Palmer and A.J. Wells it was changed to "seminal mnemonics."

**Difference between scheduled mnemonics and the seminal mnemonics**

In the case of scheduled mnemonics an isolate idea is represented by the same isolate term and denoted by the same digit throughout the schedules of the scheme of classification. This means that the relevant terms and the digits representing them, in all places of their occurrence in the schedule, have been mentioned in some one schedule of scheme of classification and from this the same digits are taken for mnemonic use in other subject context.

But in the case of seminal mnemonics there is no basic schedule for them anywhere in the scheme of classification. Here the similar concepts are represented by the same digit.

In the words of Ranganathan the difference between the two is described as " in scheduled mnemonics, the same concept is represented by the same term and the same number in all its places of occurrence. It is also possible to have the same concept represented by the same 'number' in all the places of occurrence but with different terms denoting it at different places------in the different
equivalent term current in the natural language has to be different in each schedule.

Use of seminal mnemonics:

BC and UBC do not use this concept of seminal mnemonics. CC is the only scheme which has recognised this concept. Following is the representation of such a pattern arranged in their spectral scatter of their seminal ideas.

Use of digit 1 as seminal mnemonic digit:

<table>
<thead>
<tr>
<th>Host class</th>
<th>Facet</th>
<th>Digit</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Library Science</td>
<td>P</td>
<td>11</td>
<td>World</td>
</tr>
<tr>
<td>C1 Physics</td>
<td>E 2P</td>
<td>621</td>
<td>Dimension</td>
</tr>
<tr>
<td>E Chemistry</td>
<td>P</td>
<td>11</td>
<td>Group 1</td>
</tr>
<tr>
<td>G Biology</td>
<td>P</td>
<td>11</td>
<td>Cell</td>
</tr>
<tr>
<td>L Medicine</td>
<td>2P</td>
<td>81</td>
<td>Solid</td>
</tr>
<tr>
<td>V History</td>
<td>F2</td>
<td>1</td>
<td>Head</td>
</tr>
</tbody>
</table>

So 1 represents the semantically equivalent concepts.

Similarly digit '2' is used to represent

Two dimensions

plane

Conics

Form

Structure

Anatomy etc.

Similarly digit 4, 5, 6, etc. are also used to represent the seminal mnemonic in notation.

Advantages of seminal mnemonic:

The seminal mnemonic is of much help in classification. Since sometimes a concept is not enumerated in a
particular scheduled but we may use a digit representing that concept semantically.

The last form of mnemonics enumerated in the Prolegomena is "Verbal mnemonics".

Verbal mnemonics: The canon of verbal mnemonics says that it should be rejected without any hesitation if a sequence more helpful to the readers or more filiatory than alphabetical sequence exists. Verbal if the alphabetical sequence is helpful than the any other sequence.

So CC provides for all kinds of mnemonic qualities in a helpful way whereas BC and UBC uses them in a limited manner.
CHAPTER 4

CANNONS
Br. S.R. Ranganathan has given a set of canons named as "Canons for work in the notational plane." These were enunciated by him as follows:

1. The notational system of a scheme for classification of any universe should satisfy the following two canons.
   A. Canon of synonym
   B. Canon of homonym

In spite of these two canons there is a set of 10 canons which fall into five pairs in such a way that each pair consists of a canon and its negation.

They are given as follows:

1. Canon of relativity and canon of uniformity
2. Canon of hierarchy and canon of non-hierarchy.
3. Canon of mixed notation and canon of pure notation
4. Canon of faceted notation and canon of no-faceted notation.
5. Canon of co-extensiveness and canon of under-extensiveness.

Under this chapter we will study the three schemes of classification CC, DC, and UBC in respect of their notation at system. Through this study it will be easier to find out the merits and demerits of the notational system of these schemes:

Canon of Synonym:

The class number of a subject in a system of class numbers and the isolate number of an isolate idea in a system of isolate numbers should be unique.

So in a scheme of classification a subject should be represented by the one class number. It should not be represented by two class numbers.
If the notational system provides two class numbers for one subject then synonym will be created and one book may be classified at two places. Synonym in CC is - notational system is careful about this fact. But at some places it deemed to create the synonym.

For example in "Geographical schedule". The class number 2 represents the "Mother Country" and the class number 44 assigned to India may represent the same concept. It may creat a homonym. But in practice it will not create the homonym because the rules part suggests the option of any of two and not of both.

In the some schedule
44 Q7 Pakistan
44Q71 East Pakistan
44Q72 East Bengal

The class numbers 44Q71 and 44Q72 create synonym because they stand for one and the same "geographical area".

Similarly "Madras" is represented by two class numbers
441 Madras (excluding the Indian States)
44111 Madras

Similarly also creates homonym in "W history".

The class number
V,4 stands for party
V,41 stands for party in office
V,45 stands for party in opposition
V,4A stands for specific parties by (CB)

This will create the homonym since if the book deals with "Congress Party". It will be classified as
V44,41 Congress Party (Party in office)
Suppose after some time it goes in opposition it class number will be
V44,45 Congress party (as opposition)
Similarly one may also classify it by the chronological device.
So this will create homonym.
So CC violates this canon at various places.

UBC = UDC notational system observes this canon to some extent.
The one obvious violation is the use of connecting symbol (:) colon.
It use is prescribed as follows in UDC.
"The colon sign is most important of the connecting symbols. It is used generally to link two or more UDC numbers denoting related concepts of approximately equal value the numbers being reversed to ensure the separate entries for the co-ordinate ideas.
For example
17:7 Ethics and morals in art
31:63 Statistics applied to agriculture
341.63(44:45) Arbitration between France (44) and Italy (45)
Other uses of this sign create homonym in the class number other uses are suggested as follows.
"Practical considerations call for maximum use of this sign and whenever doubt arises it should be preferred to the plus sign. It significance is not limited to strictly co-ordinate relationship; it may be used to separate several UDC numbers, which for charity and to avoid long combinations
For example

| 669.1:543 | Iron and steel Analysis |
| 546.22  | Sulphur (in iron and steel) |
| 546.815 | Lead (in iron and steel) |

J Mills in "Guide to UDC" recommends the use of colon (:) sign even when the special auxiliary is applicable. Regarding this he says:

"It is also used even when the provision already exists for specifying the compound in a briefer and more direct fashion by the special auxiliary, for example 633.1:631.35 Grain crops harvesting machinery, instead of 633.1:135; or 420:415.6 English syntax, instead of 420-56; 728(42):72.035 Architecture-houses England-revival styles, instead of 728(42).035; or even 616.2:616-053.2 Diseases-respiratory-system-children, instead of 616.2-053.2. This use of colon serves one clear and important purpose. By permitting the citation order of these parts, a separate and complete file on each part can be maintained.

| 633.1:631.319 | Grains crops-drill ploughs |
| 633.1:631.331 | Grain crops-sowing machinery |
| 633.1:631.35  | Grain crops-harvesting machinery |
| 633.1:631.43  | Grain crops-soil, physical property |
| 633.1:632    | Grain crops-diseases pests (and their control) |
| 633.1:632.954 | Grain crops - weed killers |

as well as

| 631.319:633.1 | Drill ploughs-grain crops |
| 631.331:633.1 | Sowing machinery grain crops |
| 631.431:633.1 | Soil, Physical properties-grain crops |
So by inverting the citation order the new class numbers are created which are different from the old ones. Hence one subject gets the two class numbers.

Besides the use of inverting the class number, creating the homonym, it is also possible the creation of homonym by the use of special auxiliaries.

For example while using colon

633.1 Agriculture, grain crops
633.1.631.55 Agriculture, grain crops, harvesting
633.1(02) Agriculture, grain crops (treatise on)
633.1"18" Agriculture, grain crops "19th century"
633.1(410) Agriculture, grain crops (Great Britain)
633.1.001.5 Agriculture, grain crops-research
633.11 Agriculture, grain crops, wheat

Using special auxiliary :

633.1 Agriculture, grain crops
633.1(02) Agriculture, grain crops (treatise on)
633.1"18" Agriculture, grain crops (Great Britain)
633.1.001.5 Agriculture, grain crops - research
633.1-155 Agriculture, grain crops- harvesting
633.11 Agriculture, grain crops, wheat

In this case also UBC notational system creates the homonym.

Decimal classification - DC Edition 17 is careful about the creation of synonym. But the edition 14 of DC violates the canon of synonym.

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Subject</th>
<th>DC Ed.17</th>
<th>DC Ed.14</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reading list of books for children</td>
<td>028.52</td>
<td>028.5 or 371.643</td>
</tr>
<tr>
<td>2</td>
<td>Forest ecology</td>
<td>581.5</td>
<td>581.5 or 634.946</td>
</tr>
</tbody>
</table>

The numbers in parentheses indicate special auxiliary numbers.
3. Veterinary hygiene 636.0894 614.9 or 636.0893

The above table shows that BC is now respecting the canon of hymonyn whereas CC and UBC violates it at various as the above mentioned discussion shows. Homonym in the notational planes:

The subject represented by a class number in a system of class numbers and the isolate ideas represented by an isolate number in a system of isolate number should be unique.

This canon implies that each class number should represent one and only one subject. No class number should represent more than one subject.

Let us examine the implications of this canon in these schemes.

Colon classification:

CC is a faceted scheme of classification. The enumerative class numbers are not provided. So the number of digits are not restricted in a class number. So the possibility of canon is removed to large extent. Since if the number of digits in class number are restricted (as in RIC) it will lead to the creation of homonym.

Violation:

CC observes this canon conciously but in some schedules such as schedule of geographical isolate the same class number represents the two geographical areas. For example

4435 North West Frontier
4435 Maharashtra

So the same class number 4435 represents the "North West Frontier" and "Maharashtra" which is obvious violation of this.
Similarly the class number
4436 Punjab
4436 Gujrat
It creates homonym.
Similarly the class number 4471 presents
4471 Orissa
4471 Madhya Pradesh
So CC deserves the canon except at some places it violates it.

DC :- DC is an enumerative scheme of classification. There are lot of homonymous class number. In edition 14 of 14 the violation is much but in edition 17 it is reduced to some extent.

For example:

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Nos.</td>
<td>Subject</td>
</tr>
<tr>
<td>294.4</td>
<td>Jainism: Sects of Jains</td>
</tr>
<tr>
<td>294.49</td>
<td>Sects and reform movement</td>
</tr>
<tr>
<td>294.493</td>
<td>Bigambara</td>
</tr>
<tr>
<td>535.3</td>
<td>Reflection, Refraction absorption</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

But edition 17 not only resolves the homonym but also creates them at several places as indicated by Dr. S.R. Ranganathan.

341.65 represents Compulsive measures short of war sanctions, pacific blockade, embargo, economic boycott, information delinquency.
597.58 represents Beryoidea, Zeaidea, Pecooidea,
Carangoidae, Soombroidae, Trachinoidae, etc.
So one class number represents more than one subject
which is the obvious violation of the canon.

UBC :- This scheme also violates the canon of homonym,
In "Common auxiliaries of form" we observe

(094.7) Regulations. Legal sources on the basis of
the autonomy, Provincial, Country, municipal

In schedules also it provides for creation of
homonym.

511.2 General properties of numbers. Congruences
and Diophantine equation of first degree.
Enter function \( (m) \). System of residues.
Quadratic residues. Quaternion with
integral coefficients. Complex numbers.
Division of the circle. Prime numbers,
Partitions.

So UBC creates the homonym at various places.

Reasons for creation of homonym.

According to S.R. Ranganathan there are two main
sources of creation of homonym in the class umbers.
1. Policy about length of class number :-
The policy of classificationist, restricting the
number of digits allowed in a class number, is source
for Homonym in the class number.

None of UBC, BC or CC restricts the number of digits
in class. So homonyms are not created due to this reason
in the notational system of these schemes.
2. Policy of non-faceted class number :- The policy of the
classificationist, restricting the class numbers to be only non-faceted is the source two for homonym. BC and UBC being almost faceted schemes creates homonym due to source two.

**Canon of Relativity and Canon of Uniformity**

Canon of relativity: The number of digits (including digit group treated as single digit) in a class number or in a isolate number should be the same as the order of subject or the isolate ideas, as the case may be represented by it.

This means that the number of digits in a class number should be proportional to the order of class it represents. This means that if the total number of digits is two then it should represent the class of order two.

But the canon of uniformity is the negation of canon of relativity.

Canon of uniformity: The number of digits in a class number or isolate number should be constant whatever be the order of subject or the isolate, as the case may be represented by it.

This means that number of digits in a class number should be constant whatever be the order of class it represents.

CC, BC, and UBC observes the canon of relativity as clear from the following examples.

<table>
<thead>
<tr>
<th>Subject</th>
<th>BC</th>
<th>UBC</th>
<th>CC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics</td>
<td>530</td>
<td>53</td>
<td>C</td>
</tr>
<tr>
<td>Light</td>
<td>535</td>
<td>535</td>
<td>C5</td>
</tr>
<tr>
<td>Diffraction</td>
<td>535.4</td>
<td>535.42</td>
<td>C5:3</td>
</tr>
<tr>
<td>Specturum technique</td>
<td>535.84</td>
<td>535.33</td>
<td>C5:31</td>
</tr>
</tbody>
</table>
Above table clearly shows that CC, DC and UBC observes the canon of relativity.

So we see that the class of greater extension should be individualised by lesser number of digits and a class of lesser extension should be individualised by the greater number of digits. The number of digits should be in relation of size of class. The classes of lower order will require the lesser number of digits whereas classes of higher order will require the more number digits. But at some place UBC and DC do not observe this canon. For example in the main class "Philosophy".

We observe
2. Second set of canon is canon of hierarchy and non-hierarchy.

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 numbers or the isolate number as the case may be.

The negation to this provided in the form of non-hierarchy.

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.

BC: In BC the canon of hierarchy is follows, i.e. it has the hierarchical notation. It defines it as 'hierarchy in notation means that, for the most part, each successive divisions of the discipline or subjects correspond to a lengthening of the significant notation by one digit.

For example

<table>
<thead>
<tr>
<th>600</th>
<th>Applied Sciences</th>
</tr>
</thead>
<tbody>
<tr>
<td>630</td>
<td>Agriculture and agricultural industries</td>
</tr>
<tr>
<td>631</td>
<td>Farming</td>
</tr>
<tr>
<td>631.5</td>
<td>Crop production</td>
</tr>
<tr>
<td>631.58</td>
<td>Special Cultivation method</td>
</tr>
<tr>
<td>631.587</td>
<td>Irrigation Farming</td>
</tr>
<tr>
<td>631.5872</td>
<td>By furrow system</td>
</tr>
</tbody>
</table>

We may observe that "600" in main class plus two zeros to fill out the three digit number, and "630" is division 62 plus one such zero. It will observe the space between the sixth and seventh digits of the last
number is left for ease, in reading.

Sometimes it does not conform to canon of hierarchy

For example in the case when it uses zero. It says

"The digit 0 is used to indicate a different basis for
the division of the discipline or subject represented
by the digits preceding the 0 (zero) for example

500  Pure Sciences
550  Earth Sciences
551  Physical and dynamic geology
551.4  Geomorphology
551.46  Oceans and sea waters
551.460  (Indicates special basis for division)
551.4601  Composition and properties of sea water
551.4609  Special oceanographic forms
551.461  North Atlantic ocean
551.462  Mediterranean and Block Seas

Here 551.4601-.4609 are used for topical (or
problem) subdivisions of the subject oceans and sea water
in general and 551.461-.469 are used for the specific
oceans and seas. 0 is never used as a terminating digit
following the decimal point; 551.460 is not itself used
and has no meaning.

The hierarchy of notation is also violated by
providing the "Centered headings". "Sometimes it will be
found, there is a step in the successive divisions of the
discipline or subject for which a position in the
lengthening the digital notation is not available. Such
steps are shown in table by centred headings. For 631-632
deals with the general principles of agriculture, 633-635 with the production of specific crops, 636-638 with animal husbandry. Each of these major subdivisions of 630 is without the possibility of digital expression in the notation and is shown in the tables, therefore, by a centred heading for example

633-635  Production of specific crops
633      Field crops
.1       Cereal grains
.11      Wheat

So here the notation is non-hierarchical.

CC 5 - Colon classification respects the canon of hierarchy. Being an analytico-synthetic scheme it given an hierarchical notation.

For example.
C5:335323 stands for Raman effect
if we analyse its hierarchical notation we see
C  =  Physics
C5  =  Light
C5:3 = Dispersion (spectroscopy)
C5:335323 = Raman effect

But at some places the notation is not hierarchical. On such case arises when the number of class in an array is definitely known to be considerably smaller than the number of places normally available in the array. In such case CC uses the "method of telescoping of Arrays".

Telescoping of arrays is defined as the "array of classes in a schedule of classification, made of coordinate and sub-ordinate isolates, as viewed from the idea plane, but whose class numbers appear to be co-ordinate, as
viewed from the notational plane.

When the method of telescoping of arrays is used the canon of hierarchy is violated because in this method the coordinate and subordinate array seems of one order.

For example in the geographical schedule of CC "World" is the only class of order 1 in the schedule so other digits of the array will be follows. But CC utilizes this array by accommodating the "5 continents" when this array is viewed from the idea plane the continents are of classes of order 2. But in the following table they seems to be of same order i.e. of order 1

<table>
<thead>
<tr>
<th>CC Array</th>
<th>Isolate term</th>
<th>Array isolate No.</th>
<th>BC Array</th>
<th>Isolate term</th>
<th>Array isolate No.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>World</td>
<td>1</td>
<td></td>
<td>World</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Telescoping of (A2) into (A1) begins</td>
<td></td>
<td></td>
<td>Telescoping of (A2) into (A1) begins</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Asia</td>
<td>4</td>
<td></td>
<td>Europe</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>Europe</td>
<td>5</td>
<td></td>
<td>Asia</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>Africa</td>
<td>6</td>
<td></td>
<td>Africa</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>America</td>
<td>7</td>
<td></td>
<td>North America</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>Australia</td>
<td>8</td>
<td></td>
<td>South America</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Australia</td>
<td></td>
</tr>
<tr>
<td>94</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the above table A2 = Array of order 2
A1 = Array of order 1

Similarly in Botany the telescoped arrays are used which are violation of canon of hierarchy.

UBC also uses the hierarchical notation. For example the class number Gall midge pests of
...105...

root crops in 633.4-2771.

63 Agriculture
633 Crops
633.4 Roots
633.4-2 Disease Fests
633.4-27 Insects
633.4-277 Diptera. Flies
633.4-2771 Cecidomyiidae. Gall midges

Like CC and DC, this scheme also violates the canon of hierarchy when the arrays are telescoped for example in main class "Zoology" we observe

Zoology

CC
Array Isolate No. Term UBC array Isolate No.

1 Invertebrate 2
Telescoping of (A2) into (A1) begins
2 Protostoma
3 Porifera
4 Cnidaria
5 Echinodermata
6 Vermes
7 Mollusca
8 Arthropoda
Telescoping of (A2) into (A1) ends
9 Chordata and vertebrata 6

So UBC follows the canon of hierarchy except some of exceptions.

CC, by means of its analytico-synthetic structure is able to give the hierarchy in class numbers to micro-
Other set of canon is
Canon of Mixedness Vs Purity :-
Canon of mixed base :-

The base of the Notational system of a scheme for classification should use two or more species of digits.

Canon of pure base :-

The base of the notational system of a scheme for classification should use one and only one species of digits.

Choice among two canons :- The first canon provides to use a mixed base whereas second provides to use the pure base. W.C. Berwick says first provided the canon of pure notation and advocated the pure notation but after some time he realised its limitations.

Richardson says that his ideal notation is one using the mixed symbols, but with a predominantly decimal base".

Bliss also supports mixed notation by stating "The base should provide for at least 20 main classes" and he also indicates his preference for an alphabetic base from which 0, 2, " and 8 if the later is likely to be confused with the figure 5" are omitted.

J Mills expressing his views on type of notation used in classification says clearly notation should, if possible avoid symbols other than letters or numbers or at least keep them to minimum (Even if only letters and numbers are used ) these must be given an ordinal value between them--i.e., a ruling as to whether letters file before or
after numbers), was once thought to be superior to a mixed one (using more than one type of symbol, and that the pure notation of BC is simplest notation". Commenting on pure notation Mills says "Pure notation will always have longer class number and so it is usual now to accept the superiority, all told of a mixed notation."

Dr. Ranganathan in "Prolegomena" provides his suggestion for the use of mixed or pure notation as follows:

For pure base:

1. If the number of subjects is less than 6x10 (that is 6000, thousands), a pure base of Indo-Arabic numerals can be chosen.

2. If the number of subjects is less than 2x10 (that is, 200 millions), pure base of Roman capitals can be chosen. For mixed by Ranganathan says

By using a mixed notation of Indo-Arabic numerals, Roman capitals Roman smalls we can give distinctive class numbers".

The main advantages of mixed notation are

1. It is possible to give the distinctive class number to each subject.

2. Mixed notation will provide the briefer class number in comparison with the pure notation.

3. By using mixed notation homonyms in the class numbers can be avoided.

This is the reason that many scheme started with pure base but ultimately adopted the
since due to growth of universe of subjects it is
difficult to accommodate all subjects by the use of
pure notation only.

**BC**

- BC edition 1-12 used a pure base of Indo-Arabic
  numerals.

**Edition 13** of BC recommended the use of Roman
capitals. **Edition 14** of BC also introduced a touch of
mixed notation by allowing the use of Roman Caps in
375 curriculum.

**Edition 16** of BC provided for the use of Roman
capitals for using the alphabetical device.

**Edition 17** of BC also recommended the use of Roman
capitals in Geographical numbers and language division.

In language division it states "if it is desired
to give the local emphasis and a shorter class number to
a specific language place it first by use of a letter
or other symbol".

For example.

41D Arabic language

741.093 P4 Penobocoolt river region

**UBC**

- UBC use the pure base of indo-arabic numerals for
the division of class but also provides the use of common
auxiliary "Alphabetical device. It prescribes to specify
the individual names or numbers" appropriate names or
initials can be added.

1 (Hegel) Hegelian Philosophy

820 (Shak) Shakespeare

928 Biography of Schiller

**CC**

- Colon uses the mixed base consisting of
1. Roman 2.000
2. Roman smalls
3. Indo-arabic numerals
4. Greek letters
5. Packeted symbols
6. Punctuation marks

By using mixed notation CC is able to give the co-extensive class number. Maximum flexibility is also possible. The class numbers are shorter than the schemes using the pure base.

Canon of Faceted vs non-faceted notation:

Canon of faceted notation:

A faceted notational system should be used when the
1. Length of the base of 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 millions or more entities or subjects.

Canon of non-faceted notation:

A non-faceted notational 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.
2. Length of the base is about 56 and the universe is likely to contain not more than 1,000 million entities.
CC follows the canon of faceted notation. S.R. Ranganathan shows that the capacity of a notation system which is non-faceted, with a long base of 56, can only provide about 10,000 million class numbers. On the other hand a notational system with an average of four facets...
provide as many as 1,000 trillion class numbers.

Whereas in the universe of subjects, the number of subjects is known to be very large—going beyond 1,000 trillions.

So due to this reason CC uses the faceted notation.

According to J. Mills "faceted notation, in which each facet is introduced by a distinctive indicator. This device, when taken with the faceted structure of the subject analysis, constitutes perhaps, Ranganathan's greatest contribution to library classification."

For each facet the indicator digits . ; & , ' are used.

By the use of faceted notation the maximum hospitality in chain can be achieved.

X415:93.56 Economics-Transport-Railways-Labour-Wages-Great Britain

UBC: UBC follows the canon of faceted-notation to greater extent so it is called almost faceted classification on account of its providing dozens of schedule of isolates, any one of which may occur as a facet in all compound subjects or in compound subject going with a particular specified subject.

In UBC

1. A short schedule of common isolates is provided in the form of common auxiliaries of Form. It prescribes the use of the digit group (0--- --- .) as the connecting device for "common isolate facet".
2. A short schedule of common space isolates, in any of which may occur as a facet in any compound subject, is provided in the form of "common auxiliares of place". The digit pair (-----) is used as the indicator digit for the space facet.

3. A short schedule of common Time isolate is provided as any one of them may occur as a facet in a compound subject.

Connecting digits for time facet is " " (double code)

So UDC is an almost faceted scheme respecting the canon of faceted notation.

DC :- DC is an almost enumerative scheme. The class numbers are enumerated but it provides the following schedules.

1. Schedule of common isolates (denoting form of exposition) any one of which may occur as a facet in a compound subject.

2. Short schedule of canon space isolates.

" In view of provision of these two schedules of common isolates for use as facets of any compound subjects DC is called an almost enumerative classification.

DC follows the canon of non-faceted notation to a large extent but due to provision common isolates and space isolates it tends to be a faceted scheme.

Canon of co-extensiveness and Under-extensiveness :-

Last set of canons provided by S.R. Ranganathan are canon of co-extensiveness and under extensiveness.

Canon of co-extensiveness :- "In a class number digits should be added successively so as to represent the measure of incidence of even the very last characteristic
in the succession of characteristics, admitted by the
universe classified and relevant to the purpose of
classification".

Canon of under-extensiveness:

In a class number it is not essential that the
digits should be continued so as to represent the
measure of incidence of each of the later characteristics
of in the succession of characteristics admitted by the
universe, classified and relevant to the purpose of
classification.

BC and UBC are enumerative and almost faceted schemes
respectively. In BC it is not possible some times to
give the co-extensive class number due to enumeration.

For example the class number 620.182 stands for copper.

620.182 Bombay
       Brass, Bronze, Muntz metal, phosphor,
       Bronze, Cun metal etc.

It can be easily seen that the class number 620.182
represents the two or more classes which leads to under
extensiveness.

The main disadvantage of the under-extensive class
number that they provide the homonymous class number.

CC is a freely faceted scheme it provides the co-
extensive class numbers.

Since it is an anlytico-synthetic scheme of
classification it is easy to construct the co-extensive
class number compared to BC

For example

<table>
<thead>
<tr>
<th>Subject</th>
<th>CC Edition 6</th>
<th>BC Edition 17</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease of stomach</td>
<td>L24:14</td>
<td>616.33</td>
</tr>
</tbody>
</table>
Functional disorder  L24:453  616.332
Gastric indigestion  L24:453  616.332
Disorders of secretion  L245:4  616.332
Gastric Ulcer  L245:474  616.334

In this way CC provides co-extensive class numbers.

So we see that CC follows the various canons for notational plane whereas the other schemes which were not following these canon in past are intended to follow them in future.
CHAPTER 5

CC, DC and UDC on Machine
Past and present concept of notation

First of the schemes initiated in the late 1800 was Dewey Decimal classification. This period S.R. Ranganathan calls the "Pre-faceted" because this scheme was of enumerative type. Main characteristics of this scheme were that firstly this used a notational system of ordinal numbers to mechanize the arrangement of books and their entries; secondly it used a pure decimal fraction in the notational system. Although this scheme used the decimal fraction device for the achievement of hospitality on notation, but this was done unconsciously.

Transition into facet period:-

To meet the demand of classification of the micro-documents embodied in the periodicals, a new scheme Universal Decimal classification was evolved. It is "essentially a practical system for numerically coding information, so designed that any item once coded and filed correctly, can be readily found from whatever angle it is sought".

With this scheme there was a
1) Venture into the work of arranging in a helpful sequence the main entries in a periodicals-micro thought as we call them.
2) Venture into pulling out of some of the subjects certain facets such as time facet and space facet capable of getting attached to any host class whatever and also another kind of facet called analytical divisions capable of getting attached to any host class falling within the area of a single main class.
3) Venture into the use of mixed notation not for lengthening the base of the notation but for use as distinctive connecting symbols for different kinds.
This scheme was revised with the need of time.

Restricted facet formula period :- When the mainly monolithic enumerative schemes proved insufficient, Dr. S.R. Ranganathan the doyen of librarianship, gave his colon classification, with the following features.

1. Starting with short schedules of basic class.
2. Providing for each basic class a short restricted facet formula.
3. Providing for each basic class a short schedule of isolates for each of the facets mentioned in facet formula.
4. Providing connecting symbols between the facets.
5. Providing schedule of common isolates for time, space and anteriorising common isolates. Provision were made in the notational plane for adding new digits to any isolate number in any facet and not merely in last facet.

Unrestricted facet formula period :-

In this period there was

i) Working upon each isolate facet of a subject as the manifestation of one of five fundamental categories.
ii) Prescription of different connecting symbols for the different fundamental categories.
iii) Hitting upon generalised facet formula.
iv) Concept of rounds and levels developed
v) Appreciating the need of lengthening the base of notational system of each array by some means and doing so in actually by the used of mixed notation.

In the Chicago conference on Bibliographic organisation
(1950) the various kinds of hampering rigidity of a restricted predetermined facet formula were systematically exposed.

**Working Period**:

After working conference new developments were made in notation. Non-hierarchical notation have been experimented up to considerable extent in U.K. Such a notation is bases on a theory not accepting the canon of co-extensiveness. Problem of interpolation within an array was discussed. A systematic study of zone analysis and of different sectors falling with each zone was started.

The notation ow developed has six species of digits a/z, 1/9, A/Z (a/z), (1/9), (A/Z). For any given class for which a very extensive sequence of equal arrays needs to be represented, the following sequence is available if we assume a three-figure maximum for any given class number.

a/y, za/zy, zza/zzy, zz1/zzz, zzA/zzX, zz1/zS--------------. This sector notational system can accommodate some 1300 classes and expressing their hierarchical equality so long as the emptying digits are remembered for what they are.

The enormous hospitality of sector notation allows very large assemblies of different arrays within a facet. Terms from different arrays may be compounded by linking their number by hyphen. This technique was largely used in the production of depth schedules.

Various depth schedules such as "Motor Vehicle production; Depth classification "Production Engineering
of spring. Depth classification, Production Engineering
of boiler, Depth classification".

Application on Machines :-

Here we are concerned with the mechanical methods of searching specially those which involve the use of a computer and the extent to which they can effect the classificatory techniques. "For when mechanised searching is employed, it is clear that classification can play a large part, although it need not necessarily do so. In all indexing and searching operations a classified arrangement provides a systematic general to specific approach and enables the enquirer to readily broaden or narrow down his search when possible.

U.B.C. on machine :- Commenting on the application of UBC to machines B.C. Vickery says, "Terms are codes on to cards for mechanised search. Some systems have used UBC class numbers directly for this purpose, but it is extra vagrant misuse of coding space. Machine searched document card systems typically cover only a restricted subject field. Two of factors leading to long UBC notations are felt as grave disadvantages; the repetition of main class in the class number and the longer numbers of common facets. It seems that UBC notation is not useful for mechanised search systems although the schedules themselves provide a valuable source of terms and hierarchies for such systems.

But Robert R. Freeman was not of this opinion. According to him "the notation which yielded class numbers of the length common to UBC represented no problem". He
further says "notation of UBC along with a well
convieved A/Z index was uniquely well qualified to meet
the requirement. In this respect J. Mills says "Its
notation is often hierarchical and is really usable as a
code (for punched-cards, says) expressing hierarchical
relations. However coding directly by UBC class numbers
is usually wasteful of coding spaces."

Decimal classification:

Application of Decimal classification to machines
is of no use. As Theodre C. Hones says "Since both systems
(Decimal classification and library of congress) would
require schedule look up for machine search and this involves
for the computer, comparisons rather than straight mani-
pulations, neither system has any particular machine
advantage.

Colon classification:

Hierarchical subject classifications and
reorganising stored information are possible only with
freely faceted analytic synthetic classification. The
only well known general scheme of this kind for
bibliographic classification os of Ranganathan colon
classification.

As the efficiency of date processing machines
depends on its conceptful contents, that is, the structure
of data to handled and it is the colon classification
which structural technique. The concept of facet
analysis, of fundamental categories provides the most
helpful application of CC to machines.

In short we can say that we use any of the
methods either coordinate indexing method, punched...
method or the computer, for the information process we can never avoid the use of classification for arrangement. Since library classification is concerned with the linear arrangement of books but the purpose of machine code is not to arrange the documents.

We can say in the words of S. Parthasarathy that "the machine code is for location only. It does not indicate the structure of the subject. As such it is not helpful for the proper enunciation of the subject on which information is sought. Alphabetical approach can not indicate subject relationship and a proper approach is not possible. This is only through a structural and faceted class number".
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