Development in the Use of Digits In Colon Classification.
(Classification problems. 31).

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[In 1924, CC began with 35 Semantically Rich Digits available for use in the array of Main Subjects. Thirty-three of these were available for use in other arrays. Further, two Indicator Digits were used to indicate Facet and Phase Relations respectively. Only these 37 digits were used in CC ed 1 (1933). In successive stages the following additional digits have been introduced : △ (delta) for use in the array of Main Subjects and seven additional Indicator Digits, thus making a total of 45 digits.

In CC ed 7 (1970), it is proposed to add three more Indicator digits and to release the digit 0 (zero) from its function as an Indicator Digit thus bringing the total number of digits used in CC to 48. This paper explains the happenings noticed in the universe of subjects at successive stages demanding addition of new Indicator Digits.

CC ed 7 will use z, 9, and Z as Empty Digits to form sectors in an array. It will use T, V, and X as Emptying Digits to make it possible to interpolate Main Subjects in the array of Main Subjects and further it will use V, W, and Y as Empty-Emptying Digits to make it possible to interpolate even more Main Subjects. Thus, the accommodation in the array of Main Subjects will increase from 36 in ed 1 (1933) to 5,520 in ed 7 (1970). The new quality given to the digits T to Y will allow interpolation in the schedule of space isolates. In the schedules of Personality, Matter, and Energy Isolates the array isolates formed by Alphabetical Device will come into conflict with the use of the digits T to Y for interpolation. Therefore, CC ed 7, will use ∧ (inverted V) as an Empty-Emptying Digit to allow interpolation in some schedules of personality, matter, and energy isolates ; this may even be avoided by other means. It will use the digit ↑ (upward arrow) to represent anteriorisation. This will release each of the Roman smalls from having anteriorising quality. This will increase the Hospitality in Array. It will use the digit & (Ampersand) as the Connecting Digit for phases. This will restore the digit '0' (zero) to its natural ordinal value and will avoid its dual use. It will make the digit '0' (zero) an empty digit and it will increase the number of sectors in an array by about fifty per cent and thus, it will increase the hospitality in an array].

Abbreviations Used

CC = Colon Classification	EC = Expressive Classification
DC = Decimal Classification	LC = Library of Congress Classification
[E] = Energy Facet	

[M] = Matter Facet   SC = Subject Classification
[P] = Personality Facet   [T] = Time Facet
[S] = Space Facet   UDC = Universal Decimal Classification

Select Glossary of Technical Terms

The following definitions of terms are a selection made from Ranganathan's *Prolegomena to library classification*. Ed 3. 1967. More details and the definitions of other terms in classification are given in that book.

11 Digit.— A single, isolated, primary symbol occurring in a notational system.

12 Species of Digits.— Digits which conventionally go together. Numerals, Roman smalls, Roman capitals form three different species.

13 Indicator Digit.— A digit prefixed to an isolate number to indicate the fundamental category of which the isolate is a manifestation. Till recently it was called 'Connecting Digit'.

14 Base of Notational System.— The totality of distinct digits, other than Indicator Digits, used in a scheme for classification.

15 Length of Base.— Number of distinct digits in the base.

16 Mixed Base.— Base containing two or more species of digits.

21 Empty Digit.— A digit with ordinal value but without semantic value.

22 Emptying Digit.— A digit in a Main Subject Number or in an Isolate Number losing its preceding digit of its semantic value but allowing it to retain its ordinal value.

23 Empty-Emptying Digit.— A digit which is both empty and emptying.

31 Array.— A set of co-ordinate numbers.

32 Zone.— The range in an array consisting of numbers beginning with one or other of the digits of one and the same species.

33 Sector.— The range in a zone, consisting of numbers beginning respectively with a semantically rich digit, or with one empty digit, or with two empty digits and so on.

Example

    (S — 1)   stands for Sector 1, 2, ⋯ 8. Similarly,
    (S — 91)   stands for Sector 91, 92, ⋯ 98;
    (S — A)   stands for Sector A, B, ⋯ Y;
    (S — Z1)   stands for Sector Z1, Z2, ⋯ Z8;
    (S — ZA) stands for Sector ZA, ZB, ⋯ ZY.

34 Sector Device.— A device for increasing the capacity of an array with the aid of one or more Empty Digits.

41 Basic Subject.— An idea or idea complex that can be a subject by itself.

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

43 Compound Subject.— A subject with a basic subject and one or more isolate ideas as components.

44 Facet.— A generic term used to denote any component — be it a basic subject or an isolate idea — of a compound subject. Thus, 'Basic Facet', 'Isolate Facet', 'Personality Facet', and so on.

45 Complex Subject.— A subject formed by coupling two subjects. The exposition of the first in some way limited by the second. So also, complex subject may be formed coupling more than two subjects in succession.

46 Phase.— A component subject in a complex subject.

5 Partial Comprehension.— A subject comprehending several subject, succeeding and usually consecutive.

6 Subject Device.— The device of using a whole class number for the formation or the subdivision of any isolate number wherever necessary and possible.

0 Historical Background

Sections 01 to 06 are on semantically rich digits generally used in representing a subject.

01 NUMERALS AS DIGITS IN DC

Melvil Dewey was the first to popularise the use of notational system in classifying subjects embodied in documents. With uncanny shrewdness he introduced the notational system in as simple a form as possible to get it accepted. Acceptance of notational system was naturally one of the main objectives of his. To achieve this objective, he used in his DC (1876) the universally familiar digits — the Indo-Arabic numerals only (4). We shall hereafter denote this species of digits by the simple term 'Numerals'. It is usual to refer to the notational system of DC by the term 'Numeral System'. The pursuit of this — he achieved a great success in this objective — did not make it necessary for him to work out an elaborate and dynamic theory of classification for guidance of work either in the idea plane or in the notational plane.

02 LETTERS AS DIGITS IN EC

In his EC (1893), Charles Ammi Cutter used the Roman capitals as digits. We shall hereafter denote the species of digits consisting of Roman capitals and Roman smalls by the term 'Letters'. It is usual to refer to the notational system of EC by the term 'Literal System'. I have not come across any writing of Cutter giving any substantial reason for adopting 'Literal System'. I shall be thankful if somebody can mention any source in which Cutter has given his reason. At present the conjecture is that he adopted it because the Numeral System had already been adopted by DC.

03 NUMERALS AS DIGITS IN UDC

The notational system of UDC (1896) which used DC as its core is naturally 'Numeral'.

04 LETTERS AND NUMERALS AS DIGITS IN LC

The notational system of LC (1904) consists of both Roman capitals and numerals. The Roman capitals were used to represent main subjects. Occasionally, they were also used to

represent subdivisions of Order 2. The numerals were used
to represents subdivisions of Order 1.

05 LETTERS AND NUMERALS IN SC
    The notational system of SC (1906) consists of Roman
capitals and numerals. Letters were used to represent main
subject and the numerals subdivisions.

06 LETTERS AND NUMERALS IN CC
    The notational system of CC (1933) consists of bo h
letters and numerals. In respect of letters, it uses Roman capitals
as well as Roman smalls. It regards these as two different species
of digits.

07 SEMANTICALLY RICH DIGIT
    The digits mentioned so far, are used to represent a posi-
tive idea — that is, a subject or an isolate idea. A digit of this
kind will be said to be 'Semantically Rich' (33).

08 DUMMY DIGIT
    DC felt, as it were, that three consecutive digits in a
number would be the optimum for the comfortable pick up by a
single sweep of eye and comfortable retention in memory — in
other words, suitable to the physiology of the eye and psychology
of the memory (28). Therefore, it inserted a dot — a dummy
digit — after the first three digits. By 'Dummy Digit' is meant
a digit which is semantically empty and without any ordinal
value. Evidently, DC did not anticipate, in those early years,
that the number of digits in a class number to exceed six digits.
Therefore, it did not prescribe the insertion of the dummy digit
"dot" (.) after every group of three consecutive digits coming
after the first group. However, in the attempt to keep step with
the deepening of subjects, DC prescribes the insertion of a space
after every group of three consecutive digits succeeding the first
group (3). But many years earlier, UDC had begun the practice
of inserting a dummy dot after every group of three consecutive
digits (2). LC also uses dot as a dummy digit to separate integral
numbers representing subdivisions of Order 2 and the group of
digits representing subdivisions of Order 3.

091 INDICATOR DIGIT
    In some cases, UDC felt the need to combine two class
numbers, using the digit colon (:) as the indicator digit to make
the class number coextensive with the subject. UDC used also
other indicator digits such as the following:

Indicator Digit	for
" ... "	Time Facet
(···)	Space Facet
(0 ···)	Form Division
=	Language Number
·00	View Point
·0	Analytical subdivision
−	Analytical subdivision
,	Synthesis

SC uses the digit . (dot) as the indicator digit between a host class number and a number representing a categorical division of it.

092 SEMANTICALLY POOR DIGIT
Each indicator digit has an ordinal value. It has also some semantic value in as much as it indicates the nature of the succeeding facet. But it is not 'semantically as rich' as the digits mentioned in Sec 01 to 07. Therefore, a indicator digit is said to be "semantically poor".

093 PLACE VALUE OF DIGITS
In all schemes, other than LC, the class numbers are to be read as pure decimal numbers. In other words, a dot (.) should be taken to be understood at the very beginning of every class number. Because all class numbers are supposed to begin with dot indicating decimal fraction. The decimal dot is not actually written but taken to be understood. The dot used in DC and UDC are not indicating the change over to the decimal fraction part of the class number.

094 ADVANTAGE OF PURE DECIMAL FRACTION NOTATION
The use of pure decimal fraction notation for class number automatically secures infinite hospitality in chain (5, 39, 51).

095 DISADVANTAGE OF INTEGER NOTATION
On the other hand Integer Notation of LC has to leave gaps between integers to provide for hospitality in chain. This gap has to serve also the purpose of hospitality in array. Apart from this dual purpose, the gap often mischievously gets choked up where its use is needed and retains some small gap where it is not needed.

1 Chronological Table of the Use of Digits

Ser N	Purpose	Digit	Considered during	Used in	
				Year	CC
1	Base of the notational system	Numerals and Roman capitals	1924	1933	Ed 1
2	To prevent the freezing of the intermediate facet	: (colon) as the connecting digit	1928	1933	Ed 1
3	To give approach doc ments a position anterior to the regular expository documents, on a subject	Roman smalls with anterio-rising value	1930	1933	Ed 1
4	To make the problem facet in History, free	Insertion of : (colon) before [T]	1930	1933	Ed 1
5	For indicating phase relation	0 (zero) as indicator digit for Phase relation	1933	1933	Ed 1
6	To represent Spirit al experience and Mysticism, as a Main Subject	Δ (delta) as a main subject number	1939	1939	Ed 2
7	To form superimposed or compound isolate with s bfacets	- (hyphen) as indicator digit	1937	1939	Ed 2
8	To increase the capacity of an array	9 is made semantically empty	1937	1939	Ed 2
9	To represent 'Animal Husbandry' as a main s bject	λ (lambda) as a main subject number (provisional)	1952	1952	Ed 4
10	To represen Partial Comprehension of Main Subjects	β (beta) τ (gamma) μ (mu) ν (mu) Σ (sigma) (provisional)	1952	1952	Ed 4

6

Ser N	Purpose	Digit	Considered during	Used in Year	CC
11	Indicator for the nature of s c- coeding facets	, for [P] ; for [M] : for [E] . for [S] and [T]	1949 to 1952	1952	Ed 4
12	Indicator for a stretch of Time	← (backward arrow) between end epoch and beginning epoch	1948	1952	Ed 4
13	Indicator for future	→ (forward arrow) after the year number	1948 to 1952	1952	Ed 4
14	To represent 'Mining' as a main subject	¶ (eta) as a main subject number (provisional)	1957	1957	Ed 5
15	To avoid homo- nym is when s b- jects device is treat the subject device number as a single digit	((starter) at the beginning and the end	1950 to 1954	1957	Ed 5
16	To avoid the use of Greek letters λ and η	Z as if it were an Emptying Digit	1959	1960	Ed 6
17	To represent the partial comprehension 'Lan- guage and Litera- ture'	Z as if it were an Emptying Digit	1959	1960	Ed 6
18	To resolve the homonymous use of Z to re- present partial comprehension and to inter- polate main subjects	X as if it were an Emptying Digit	1963	1963	Ed 6 (revised)
19	To replace all the Greek letters except △ (delta)	Z as if it were an Emptying Digit exclusively for use in the repre- sentation of par- tial comprehen- sion	1963	1963	Ed 6 (revised)

Ser N	Purpose	Digit	Considered during	Used in Year	Used in CC
20	To have separate indicator for [T]	' (single inverted comma) as an Indicator Digit	1961	1963	Ed 6 (revised)

PROPOSALS FOR USE IN CC ED 7 (1970)

Ser N	Purpose	Digit	Considered during	Used in Year	Used in CC
21	To interpolate Main subjects in the array of main subjects and new countries in the schedule of Space isolates	Making T, V, and X as Emptying Digits, and U, W, and Y as Empty-Emptying Digits	1963	1970	Ed 7
22	For connecting abbreviations of the component words of a multinomial term for use in Alphabetical Device	= (Equals to sign) as an Indicator Digit	1965	1970	Ed 7
23	To release the digits T to Y for normal use as an array isolate and to release it from being used as Emptying Digit	∧ (inverted V) as an Empty and Emptying Digit in the Schedule of Isolates	1966	1970	Ed 7
24	To release the 0 (zero) from use as Indicator Digit for Phase and to give it its normal ordinal value	& (ampersand) as an Indicator Digit for Phase	1968	1970	Ed 7
25	To increase the capacity of an array	Making as 0 (zero) as semantically empty for use as Sectorising Digit	1965	1970	Ed 7
26	For use as an anteriorising digit and taking away anteriorising value of the Roman smalls, thereby increasing the capacity of an array	↑ (upward arrow) as an Indicator Digit for Anteriorising Common Isolates	1968	1970	Ed 7

2 Digits in CC Edition 1 (1933)
21 LENGTHENING OF THE BASE
211 *Mixed Base*

I saw a copy of DC for the first time in 1924, when I was appointed as librarian of the Madras University Library and deputed to study library science in the University College of London. I then found that the main subjects Philosophy, Religion, Linguistics, Fine arts, Literature, and History were represented in DC by a single digit in the array of main subjects. But that the main subjects in Social Sciences, Pure Sciences, Applied Sciences, and the main subject Geography were represented by digit-pairs. Recourse had to be taken to the use of digit-pairs because the base of the notational system of DC contained only 10 digits while the number of main subjects was far greater than 10. This made me realise the need for the notational system of a scheme for classification to have as large a base as possible. Therefore, it was decided in November 1924, to adopt a mixed base consisting of the numerals and the Roman capitals. W C Berwick Sayers gave his support to this decision.

212 *Use of Digit-Pairs in Schedules of Isolates*

Again, some of the arrays of isolates also needed a larger base than 10. In such cases, DC used "9 others" to represent the group of residual unclassified isolates. This was called "Other Device". CC followed up this idea by subdividing 9 to individualise each of the residual isolates. In other words the residual isolates were represented by numeral digit-pairs.

22 CONNECTING DIGIT
221 *Frozen Facet in DC*

In my study of DC in 1924, I came across another difficulty. It is illustrated by the following example where the class numbers are constructed according to the latest edition of DC.

SN	Subject	DC Ed 17	CC Ed 1
1	Rice	633·18	J381
2	Development of Rice	633·12	J3881 : 5
3	Kuruvai Rice	633·18 (followed by another digit to represent the strain)	J381KU
4	Development of Kuruvai Rice	?	J381KU : 5

The crop number needs the addition of a digit at the end to represent a particular strain of Rice. But the additional digit has been used to represent 'Farming Divisions'. Therefore. it is not po si le in LC to use an d itioral digit to represent various st ins of Rice. Thus, the 'Crop Facet' is Frozen in DC. This is an intermediate facet. In general the intermediate facets in DC Number are Frozen. It is only the last facet number that can be sharpened by the addition of another digit. That is, it is a Free Facet.

222 *Avoidance of Freezing of Facet in CC*

No doubt, the term 'Facet' or its concept had not been properly and consciously brought into use in 1924. But for convenience of exposition this paper uses the terms 'Facet', 'Frozen Facet', 'Free Facet', and 'Indicator Digit' which were all brought into use only in later years. The existence of frozen facet in DC was just sensed in 1924. No way could be found to make a frozen facet a free one. The struggle went on for a few weeks. While this problem was lurking in mind, I happened to visit one of the Selfridge's stores in London. There I saw for the first time a Meccano set. The shopkeeper demonstrated the making of a variety of toys with the help of a few slotted strips, wheels, strings, and bolts and nuts. This gave me the clue. The isolates from different schedules can be assembled in different ways so as to yield distinct class numbers for each of a variety of compound subjects. The numbers of main subjects and of the different kinds of isolate found in the schedules correspond to the strips, wheels, etc. Picking out a particular main subject number and any desired isolate numbers from the different schedules of isolates, we can assemble them so as to form the class number for a compound subject. To make the assembly in a Meccano toy, rigid and fixed, we want bolts and nuts. Similarly in CC, the digit " :" (colon) in a class number was improvised to function as 'bolt and nut'. It is now called a Connecting Digit as it connects two consecutive facet numbers. It may also be called a separating digit as it separates two consecutive facet numbers. It may also be said to introduce a new facet number. According to Palmer and Wells (15), it may also be called 'Facet Indicator' or simply 'Indicator Digit', as it indicates the nature of the succeeding facet. In this paper, we shall use the term 'Indicator Digit'. Then came the fixing of the ordinal value of the digit " :" (colon). Somehow it was felt that it must be greater than that of '0' (zero) or greater than Z. Then a number of class numbers with colon along with the names of compound subjects represented by them were arranged in a helpful sequence. This disclosed that the ordinal value of the digit

" :" (colon) should give it a place between the digits ' 0' (zero) and '1'. The use of the indicator digit " :" (colon) removed the freezing of an intermediate facet number as can be seen from col 4 of the table given in Sec 221.

223 *Fault in the Early Stage of CC*

When the indicator digit " :" (colon) was introduced, ideas were not quite clear as to what exactly the function of the indicator digit was although we now say it in well defined terms. Therefore, in 1924, it was wrongly felt that the indicator digit was not necessary if the last digit of the earlier facet and the first digit of the later facet belonged to different species of digits. The absurdity of this wrong feeling was not seen till 1930 — that is, till about 30,000 books had been classified. The absurdity was experienced quite often in the class numbers of compound subjects going with the main subject "V History". Consider, for example, the following sequence in which the subjects were thrown as a result of the omission of the indicator digit between the Problem Facet (as it was called in those days) and the Time Facet. In these examples, the isolate numbers have been taken from the schedule of Problem Isolates in "V History" of ed 1 of CC.

V56: 255M85	Franchise in Great Britain upto 1885
V56: 25M85	Political rights and duties in Great Britain brought upto 1885
V56: 2M85	Constitution of Great Britain brought upto 1885

This violates the Canon of Decreasing Extension (38, 49). Although the canons were not enunciated at that time, there was an involuntary revolt against this as unhelpful arrangement. This fault was rectified in 1930 by the insertion of the indicator digit " :" (colon) between the Problem Facet Number and the Time Facet Number. The resulting arrangement was as follows:

V56: 2: M85	Constitution of Great Britain brought upto 1885
V56: 25: M85	Political rights and duties in Great Britain brought upto 1885
V56: 255: M85	Franchise in Great Britain brought upto 1885

Even in ed 1 of CC this idea was incorporated.

224 *Correction of Class Number*

By 1930, about 3,000 books had already been classified in the main subject History in the Madras University Library.

The class number of each book had been written in three places
in the book itself — the tag on the spine, the date label, and on
the back of the title-page. Further, it occurs on an average
in five catalogue cards, one shelf register card, and one accession
card. It also occurs in the book card. This makes a total of
eleven places. The " :" (colon) had to be inserted in all these
eleven places for each book. My colleagues were young. They
had all the enthusiasm of a pioneer. They were proud that they
were doing something new. They were also convinced that
nothing new can be found without "perspiration". Therefore,
we all did this correction work as a pick up work in addition to
their normal work. This correction work arose out of the trial
and error method used in designing CC in those years, without
any guiding principle. Today, we have guiding principles and
yet correction work becomes necessary on account of continuing
developments in the universe of subjects beyond the control of
library profession. Such correction work is necessary whatever
be the scheme for classification used. But unfortunately some
librarians of today continue to use outmoded old editions of CC,
DC, and UDC. because they are too idle to make the correction.
To hide their idleness they speak of practical difficulties in
"administration" standing in the way of correction work. The
Laws of Library Science, particularly Law 5, would urge them to
give up this attitude and carry out the corrections in Class Numbers
made necessary by developments in the universe of subjects.

23 INDICATOR DIGIT FOR PHASE RELATION
    Even before 1933, we came across books in which one
subject was brought into phase relation with another. The digit
'0' (zero) was used as the Indicator digit between the component
class numbers of the two subjects.

24 PRECEDENCE FOR APPROACH DOCUMENTS
    By 1928, the experiment in the Madras University Library
led to the belief that readers want generally the regular expository
book on a subject to come after certain types of works relating
to the subject, such as

Bibliography	Report of travel and expedition
Atlas	History
Cyclopedia	Biography
Periodical	Collected works
Serial	Syllabus

These are called 'Approach Documents'. Many of these are
not expository books admitting of continuous reading. A few,

such as History and Biography, do admit of continuous reading
and yet the reading of them is, generally speaking, preparatory
to the reading of the regular books giving a systematic exposi-
tion of the subject concerned.

25 ANTERIORISING VALUE FOR ROMAN SMALLS

To secure anterior position to approach documents,
I decided to use the Roman smalls to represent the different kinds
of approach documents and postulated that Roman smalls have
anteriorising value when attached to a Host Class Number with-
out an indicator digit. Thus, we get for example the sequence:

Ca	Bibliography on physics
Cm	Periodicals on physics
Cy	Syllabus in physics
C	Books on physics
C3a	Bibliography on sound
C3m	Periodicals in sound
C3y	Syllabus of sound
C3	Books on sound

26 WELCOME BY WESTERN SPECIALIST READERS

A confirmation of the helpfulness of this sequence — that
is, approach documents and then positive expository documents
on a subject — came to me for the first time in 1954 at the FID
Congress in Belgrade from non-librarian specialist readers of
the western countries. I was asked to explain and demonstrate
the use of the anteriorising digits. In that meeting practically
all the users, said in effect. "We had been all along wishing to
have such a sequence as you mention. But as members of the
FID Classification Group we could not implement this wish in
the notational plane. For, to distinguish the class numbers of
approach documents from the class numbers of the host subject,
we have necessarily to add a digit after the host class number.
This necessarily placed the approach documents after the regular
expository documents on the host subject. Your postulation of
anteriorising value to the digits individualising the kind of approach
documents gives a neat solution. This never occurred to us."
Then they asked me whether something similar could not be done
in DC and UDC. I suggested postulation of the digit '0' (zero)
of DC, the digit-pair '(0' of UDC to have anteriorising value.

3 New Digits and New Use of the Digit 9 in CC Edition 2 (1939)
31 INTRODUCTION OF A NEW MAIN SUBJECT

By 1939, need was felt to recognise 'Spiritual Experience
and Mysticism' as an independent Main Subject. This term

Ranganathan addressing a Classification Study Group at the International Federation for Documentation at Belgrade in 1954.

denotes trans-intellectual, direct apprehension of the "thing-in-itself" through intuition. In contrast, the intellect has to reconstruct a whole view of the thing-in-itself by synthesising the partial views supplied by the primary senses and the intellect by itself. The compound subjects going with this subject call for its own distinctive schedule of isolates. It is for this reason it was included in the schedule of Main Subjects in ed 2 of CC (1939).

32   THE DIGIT ' $\triangle$ '

The Greek letter $\triangle$ was used to represent the new main subject 'Spiritual Experience and Mysticism'. Because, this digit has been used as a symbol for the subject in all civilisations from the earliest times.

33   ORDINAL VALUE OF $\triangle$

The ordinal value of $\triangle$ was fixed to lie between M and N. The main subjects represented by the digits A to M make a progress from the abstract to the concrete; and $\triangle$ is the most concrete. Again, the main subjects represented by the digits N to Z regress from the natural to the artificial; and $\triangle$ is the most natural.

The words used by General Smuts to define the position of a new discipline which he calls "Personology" will with a slight modification apply with equal force to the position assigned to the Main Subject $\triangle$.

Its province falls within a large debatable territory between science and philosophy; between theory and practice, which has been very little explored and is still *terra incognita* to all intents and purposes. Its difficulties are immense; from that wide and wild No Man's Land between sciences and humanities it rises like some forbidding mountain peak into the heavens; and no daring spirit, except the Mystics, the Seers, and the Rishis, has yet ventured to approach it, let alone to scale its dizzy heights. But beyond a doubt, it is going to occupy a foremost place in the attention of even the ordinary inquirers in future. And the time may come when the main subject $\triangle$ may be the very keystone of the arch, and serve to complete the full growing circle of organised human knowledge. It will then synthesise all sciences and humarities and become the basis of a truer spiritual outlook than we can possibly have in the ignorance and confusions of our present state of knowledge.

That time is not yet; but it may be ventured to hope that the assignment of a proper place to the Main Subject $\triangle$ in the map of knowledge such as has been attempted here will help to direct attention to what is undoubtedly one of the greatest and

most potential fields for cultivation (24). Mystic apprehension it must be emphasised is of the "Thing-in-itself" unmediated by the intellect and the primary senses. It is thing-dependent (vastu-tantra in Sanskrit) and not doer-dependent (kartru-tantra in Sanskrit). A fuller account on this is given by me elsewhere (57).

34 USE OF THE DIGIT "−" TO FORM COMPOUND ISOLATE NUMBER
    Till 1933, the digit " :" (colon) alone was added to the stock of ordinal numbers of CC. From 1933 onwards, necessity was experienced to combine two or more isolate numbers taken from one and the same schedule and to form a compound isolate number. Therefore, need arose to introduce a new indicator digit to indicate the components of a compound isolate number. In 1937, the digit "−" (hyphen) was used for this purpose. To be helpful, it was found that its ordinal value should lie between those of the digits " :" (colon) and "1". This new indicator digit was finally included in ed 2 of CC (1939). The combining of the two isolate numbers was then called 'Auto-bias Device' (22, 25). Later, it was called 'Super-imposition Device'. For a long time, the resulting number was called a superimposed number. We now call it 'Compound Isolate Number'. At the suggestion of Jack Mills, each of the components in a com-pound isolate is called a subfacet. He suggested this at the second International Study Conference on Classification Research at Elsinore in 1964 (16).

35 OCTAVISING DIGIT
    In Sec 213, it was stated that isolates in array of order 1 in excess of 8 in number were generally represented by digit-pairs beginning with 9. In most of those cases some term was improvised to comprehend all such extra isolates and that term was given against the bare digit 9. But by 1937, several cases arose in which such a comprehensive term could not be found. Then it struck me that it would be advantageous to deprive '9' of any semantic value but allow it to retain only ordinal value — in other words, the digit '9' is made semantically empty. It must be noted that the digit 9 is not made a dummy digit as the digit dot in DC and UDC (*See also* Sec 08).

36 OCTAVE
    We can thus have in an array

    1, 2, ⋯ 8
    91, 92, ⋯ 98
    991, 992, ⋯ 998 etc

Each of such blocks in an array has eight numbers. Therefore, in those years, the digit '9' was called Octavising Digit and each block was called an 'Octave'.

37 CONCEPT OF ARRAY

Viewed from the notational plane, the semantically rich digits in Octave 2 will appear to form array of order 2. So also the semantically rich digits in Octave 3 will appear to form array of order 3 and so on. But viewed from the idea plane, all the numbers mentioned in Sec 26 form only a single array of order 1. The digit-triad 991 is treated as if it formed a single digit. Whenever we speak of array of order 1 in the notational plane, we should understand it to be only as it is in the idea plane and we should not be misled by the initial empty digit(s) making an isolate number to have more than one digit. The same is true for arrays of all orders.

38 OCTAVE DEVICE

The formation of blocks of eight numbers and making the numbers in all the blocks coordinate was then called 'Octave Device'. Now it is called 'Sector Device' (*See* Sec 872).

391 CAPACITY OF AN ARRAY

The Octave Device enables the introduction of any number of coordinate numbers in an array. In other words, it enables making the capacity of an array as large as necessary.

4 New Digits in CC Edition 4 (1952)

41 NEW DIGIT FOR THE MAIN SUBJECT "ANIMAL HUSBANDRY"

In the earlier editions, the subject "Animal Husbandry" was included in the miscellaneous group of applied sciences called "M Useful Arts". It was represented by the digit-pair MK. All along there was a feeling of dissatisfaction. Animal Husbandry is an application of "K Zoology". Therefore, it should come immediately after K Zoology even as J agriculture comes immediately after 1 Botany. But the exigencies created by the base of the notational system led to the use of the next letter L to represent Medicine. Therefore, Animal Husbandry was pushed out of its helpful position in the array of main subjects and it took refuge under the hold-all "M Useful Arts". That was why that it was represented by the digit-pair "MK". In 1952, it was decided to restore Animal Husbandry to its legitimate place and represent it provisionally by the Greek letter λ (lambda). The choice of the letter λ was determined by the fact that it corresponded phonetically to the letter L: Its ordinal value was fixed to lie between those of the letters K and L.

42 Digits for Partial Comprehension

In the earlier editions, the digit "A" was used to represent partial comprehension of Natural Sciences. Against the letter G the term Natural Sciences (General) and Biology was inserted. But now we realise that proper way is to put the term 'Biology' alone. Thus, the letter G represents the Main Subject 'Biology' and not a partial comprehension of the succeeding main subjects collectively known as Biological Sciences. "A Science (General)", now denoted by the term 'Natural Sciences', did not prove sufficient to meet the need felt to represent other partial comprehensions. There were documents with a smaller range of partial comprehension than the Natural Sciences taken as a whole. Here are some possibilities, with illustrative documents.

421 Mathematical Sciences

The term 'Mathematical Sciences' denotes partial comprehension of the range "B Mathematics" to "D Engineering".
Examples:

1 *Memorial des sciences mathematiques*

2 *Proceedings* of the Tokyo Mathematico-Physical Society

3 *Zeitschrift fur angewandte mathematik und physik*

The helpful place for this partial comprehension is between "A Science (General)" and "B Mathematics". But no Roman capital exists between A and B. Therefore, the Greek letter 'β' (beta) was provisionally used to represent the partial comprehension 'Mathematical Sciences'. The choice of the letter 'β' was determined by the fact that it corresponded phonetically to the letter B. Its ordinal value was fixed to lie between those of the letters A and B.

422 Physical Sciences

The term 'Physical Sciences' denotes the partial comprehension of the range "C Physics" to "F Technology".
Examples:

1 *Australian journal of scientific research: A Series: Physical sciences*

2 *Annals*, Sociedad Espanola de Fiscia y Quimica

3 *Annale de chimie et physique*

The helpful place for this partial comprehension is between "B Mathematics" and "C Physics". But no Roman capital exists between B and C. Therefore, the Greek letter Γ (gamma)

was provisionally used to represent the partial comprehension "Physical Sciences". The choice of the letter Γ was determined by the fact that it corresponded by its position in the Greek alphabet to the letter C in the Roman alphabet. Its ordinal value was fixed to lie between those of the letters B and C.

423 *Humanities*

The term 'Humanities' denotes the partial comprehension of the range "N Fine Arts" to "S Psychology'. Humanities figure as a group of subjects in the discussion of the curriculum for educational courses. An oft-occurring subject is "The place of humanities in the course for pure or applied sciences." There are also some books covering the range of Humanities. The helpful place for this partial comprehension was then taken to be between " $\triangle$ Spiritual Experience and Mysticism" (which is preceded by M Useful Arts) and "N Fine Arts". The digit $\angle$ (delta) was exotic and there exists no Roman capital letter between M and N. Therefore, the choice of the Greek letter ν (nu) was determined by the fact that it corresponded phonetically to the letter N. Its ordinal value was fixed to lie between those of the digits $\triangle$ and N. For a later change made in the position of the partial comprehension 'Humanities' *See* Sec 73.

424 *Social Sciences*

The term 'Social Sciences' denotes the partial comprehension of the range "T Education" and "Z Law".
Examples

1 Murdock (George Peter), *Ed.* Studies in the sciences of societies. 1937.

2 Madge (John). Tools of social sciences. 1953.

3 Hoselitz (B F), *Ed.* Readers guide to social sciences. 1959.

The helpful place for this partial comprehension is taken to be between "S Psychology" and "T Education". But no Roman capital exists between S and T. Therefore, the Greek letter 'Σ' (sigma) was provisionally used to represent the partial comprehension "Social Sciences". The choice of 'Σ' was determined by the fact that it corresponded phonetically to the letter S. Its ordinal value was fixed to lie between those of S and T.

425 *Humanities and Social Sciences*

The term 'Humanities and Social Sciences' denotes the partial comprehension of the range " $\triangle$ Spiritual Experience and Mysticism" to "Z Law". The helpful place for this partial

comprehension was then taken to be between "M Useful Arts" and "△ Spiritual Experience and Mysticism. The Greek letter μ (mu) was provisionally used to represent the partial comprehension "Humanities and Social Sciences" taken together. The choice of 'μ' was determined by the fact that it corresponded phonetically to the letter M. Its ordinal value was taken to lie between those of M and △.

43 THREE NEW INDICATOR DIGITS
    As early as 1944, it was conjectured that every isolate facet in a compound subject might be taken to be a manifestation of one and only one of one or other of the five fundamental categories: Personality, Matter, Energy, Space, and Time (31). In the same year, it was decided that the sequence of the five fundamental categories, given above, satisfied the Principle of Decreasing Concreteness (29, 36). Later in 1950, this sequence proved helpful. This brought out the Principle of Inversion (42). In 1949, it was decided that there should be distinct indicator digits for [P], [M], [E], [S], and [T]. However, it was at that time believed that one and the same indicator digit might be used for [S] as well as [T]. (See also Sec 74 to 76). This belief was caused by the fact that there can be no ambiguity since all Space Isolate Numbers would begin with a numeral and all Time Isolate Numbers would begin with Roman capitals. Accordingly, the indicator digits for the different fundamental categories were fixed as follows (44):

SN	Name of the Fundamental Category	Indicator Digit	Name of the Digit
1	Time	.	Dot
2	Space	.	Dot
3	Energy	:	Colon
4	Matter	;	Semicolon
5	Personality	,	Comma

431 *Avoidance of Consecutive Colons*
    When " : " (colon) was used as the only connecting digit for all facets, there was a cluster of two or more colons, when

intermediate facets were absent in subjects. Consider the follow-
ing example:

D66: : : 4   Designing in Electrical Engineering

D66: 121: : 4   Design of Electrical Generator

D66: 121: 2: 4   Design of coils of copper wire of an Electrical
        Generator

In example 1, two intermediate facets were absent — namely,
Secondary Work Facet and Part Work Facet. (We are using the
terms used till 1950). Therefore, three colons occur consecutively
in the class number.

In example 2, the Part Facet alone is absent. Therefore two
colons occur consecutively in the class number.

In example 3, no intermediate facet is absent. Therefore,
there is no cluttering of colons.

Such a cluttering together of colons in a class number was
irritating. A cynic among my colleagues in the Madras Univer-
sity Library, who had never learnt either Colon Classification
or any other library technique but was depending on the support
of a political party, used to make fun of this cluttering of colons.
When a reader noted down the call number of a book on the
bespeaking card, he would tell the reader, "Put some more colons.
Our librarian will be pleased." The introduction of different
indicator digits for different fundamental categories totally
avoided such a cluttering of colons. The result is shown in the
new class numbers of the above-mentioned three subjects. They
are:

D66: 4   Designing in Electrical Engineering

D66:121: 4   Design of Electrical Generator

D66,121,2:4   Design of coils of wire of an Electrical
        Generator

S Parthasarathy was the first to conjecture that this would become
possible if we could take freedom to use more than one indicator
digit to introduce each of the succeeding facets (35).

432   Ordinal Values

To secure the arrangement of documents in a way helpful
to the majority of readers and to satisfy the Principle of Increasing
Concreteness on the shelf (41), the ordinal values of the different
indicator digits are fixed as follows, when arranged in the
sequence of increasing ordinal value:

0 (zero)   . (dot)   : (colon)   ; (semicolon)   , (comma)
– (hyphen)

All these indicator digits indicating the fundamental category of the succeeding facet lie between 0 (zero) and 1 as indicated above.

44 INDICATOR DIGIT TO INDICATE AN INTERVAL OF TIME

Normally, a book traces the history of any event down to an epoch of time. The epoch of time in whi h the event begins is often vague, nebulous, and some times not very important. Therefore, CC usually represents only the end epoch in Time Facet. However, some books make the beginning epoch also meaningful and definite. Therefore, they mention both the beginning epoch and the end epoch. Here are a few examples:

1   Black (J B). Reign of Elizabeth, 1558–1603. 1937.

2   Davis (Godfrey). Early Stuarts. 1603–1660. 1937.

3   Ensor (R C K). England, 1870–1914. 1936.

In these cases, the Time Isolates are represented as follows:

Period	Time Isolate Number
1558–1603	K03 ← J58
1603–1660	K60 ← K03
1870–1914	N14 ← M70

The use of the digit arrow to indicate a stretch of time was suggested during a discussion with my olassmate H Burgess at Southampton in July 1948 (37).

441   Reason for Using "←"

The reason for using "←" (backward arrow) is made on the following presumption. The interest of majority among readers is more in the culmination of the event at the end epoch than in the beginning stages of the event in the beginning epoch. Therefore, the books should be arranged according to end epoch. Therefore "←" (backward arrow) is used to indicate the specific stretch of time.

442   Ordinal Value of "←"

The "←" (backward arrow) has been given anteriorising value. Among the digits with anteriorising value its ordinal

value should be the least. To illustrate the helpfulness of this decision, let us consider the result of making the ordinal value of "←" (backward arrow) greater than that of 'a' by taking a set of examples:

> V56·K03a
> V56·K03J←58a
> V56·K03J←58
> V56·K03

Obviously, this is not a helpful sequence. The bibliography on the subject British History in 1603 is separated from the books on the host subject by a number of other subjects. This violates the Canon of Helpful Sequence (48). Thus, by *reductio ad absurdum* we fix the ordinal value of "←" (backward arrow) to be less than that of any of the Roman smalls. Its helpfulness can be seen by arranging the set of examples, according to this decision. Here it is:

> V56·K03 ← J58a
> V56·K03 ← J58
> V56·K03a
> V56·K03

45 INDICATOR DIGIT TO INDICATE FUTURE

We have books embodying an account of the future of a subject. For example, we can have a book: "Future of Education in India" published in 1969. It has been proposed to represent it by the following class number:

> T. 44'N69→

In this context, the "→" (forward arrow) is meaningful and obviously indicates future. The Canon of Helpful Sequence (48) indicates that this book should come after all the books in which the History is brought upto 1969. That means, its ordinal value should be the greatest among the ordinal values of connecting digits used in CC.

5 New Digits Used in CC Edition 5 (1957)

51 SUBJECT DEVICE

In ed 1 of CC (1933), the concept of Subject Device was introduced (20). This was described as the device of using a class number to form or subdivide an isolate number.

52 CREATION OF HOMONYM IN CLASSIFICATORY LANGUAGE

By 1950, it was sensed that the use of Subject Device led

to homonyms. Consider the CC number T: 3,U·44. It could represent both
   1 Teaching of Geography in India; and
   2 Teaching of Geography of India.
Thus, the class number became a homonym. And homonyms are fatal in classificatory language. They should be avoided. In CC number given above, there was no means of indicating whether the last facet number—space facet number—belonged to the entire number preceding it or only to its latter part ir.tro-duced by Subject Device. This kind of homonym had been challenging us for over thirty years. Various makeshifts were made. In every case, the cure appeared worse than the disease. One summer night in 1950, in a deep discussion with S Partha-sarathy, the idea occurred that the Subject Device part of a class number might be enclosed in circular brackets — that is may be "packeted". Thus, we decided to call it Packet Notation. But there was mental resistance to the adoption of this notation. Part of this resistance was due to the unexpressed subconscious question, "Are we to add further to the mixedness of the nota-tion?" There were also a few other difficulties (43). Further, there was the fear that the addition of further digits in the nota-tional system, would produce adverse reactions from librarians. The question was taken up again and again in the Library Research Circle in Delhi; and every time it was abondoned with-out coming to a firm decision.

53 ACCEPTANCE
   In June 1954, this problem was brought up at a meeting of the Classification Research Group in London. There the experiences of specialist librarians working in libraries of indus-tries and government departments, brought up a number of problems which could not be solved by them by any device in the different schemes for classification used by them. They asked me if I could help them. I showed that many of these problems admitted a neat solution with Packet Notation. So, far from resisting the packet notation, the British librarians welcomed it with great relief. Their reaction made me feel immediately that packet notation would be resisted only by those who have never experienced these difficulties. This made me decide at once that I need not take into consideration any adverse reaction from librarians without experience. Therefore, I decided to implement this in ed 5 (1957) of CC (23).

54 FUNCTION OF CIRCULAR BRACKETS
   The brackets in packet notation do the same work, as they do in mathematical language, where, as well as in classifi-

catory language, they transform a set of two or more digits into a single digit for the purpose on hand. This is a very helpful transformation called 'Association' in Mathematics. Whatever be the number of digits. including connecting digits, whatever be the number of facets or phases. in the number within brackets, it has only the status of a single-digited isolate number in the entire class number. It has actually only the status of a part of a facet number — that is, the status of an isolate number in an array. It may be a complete isolate number or an array isolate number — that is, h number occurring in an array of order more than order one in an isolate number.

55 ORDINAL VALUE OF BRACKETS

In order to satisfy the Principle of Helpful Sequence, the ordinal value of "(" (starter bracket) is fixed to be greater than that of Z. Among the digits used in CC "(" (starter bracket) has the greatest ordinal value. The ordinal value of the")" (arrester bracket) is fixed to be the lowest.

6 New Use of Digit " Z " in CC Edition 6 (1960)

61 USE OF "Z" FOR REPRESENTING INTERPOLATED MAIN SUBJECT

In ed 6 (1960) of CC. the digit "Z" was used in the representation of some of the interpolated main subjects — old or new. The following table gives a last of them:

Interpolated Main Subject	Class Number in CC, ed 5 (1957)	Class Number in CC. ed 6 (1960)
Mining	η (eta)	HZ
Animal Husbandry	λ (lambda)	KZ
Pharmacognosy	L: 6	LZ
Social Work	Y: 4: 6	YZ

The Greek letters η (eta) and λ (lambda) represented main subjects in ed 5 (1957) of CC. These were replaced in ed 6 (1960) of CC by the digit-pairs HZ and KZ respectively. Pharmacognosy and Social Work were treated as compound subjects going with L Medicine and Y Sociology respectively in ed 5 (1957) of CC. It was, however, realised that they were really independent main subjects. Therefore, in ed 6 (1960) of CC they were represented by the digit-pairs LZ and YZ.

62 USE OF Z FOR PARTIAL COMPREHENSION

Till 1960, classification of books or periodicals on Literature and Language — for example, "Modern language and literature"—was giving trouble. They were classified either as Linguistics or as Literature. This was not helpful. By 1960, it was realised that this was a case of partial comprehension. Therefore, 'Literature and Language' was represented by the number NZ.

63 HOMONYMOUS USE OF DIGIT Z

A comparison of Sec 51 and 52 shows that the digit Z has been used for two purposes — namely,

1 In the representation of new main subjects; and
2 In the representation of partial comprehensions.

This is a fault in classificatory language. Therefore, it had to be removed.

7 New Digits and New Use of Digits in CC Edition 6 (Revised) (1963)

71 REMOVAL OF FAULT IN THE USE OF Z

In order to remove the fault mentioned in Sec 63, in 1963 I decided to use the digit X in the representation of new main subjects and retained the digit Z for use in the representation of partial comprehensions only.

72 NEW USE OF X IN THE SCHEDULE OF MAIN SUBJECTS

In the revised ed 6 of CC, the digit X was used in the representation of the following main subjects:

Main Subject	Digit-Pair Representing it in	
	CC, ed 6 (1960)	CC, ed 6 (revised) (1963)
Mining	HZ	HX
Animal Husbandry	KZ	KX
Pharmacognosy	LZ	LX
Social Work	YZ	YX

73 USE OF Z IN REPRESENTING PARTIAL COMPREHENSIONS ONLY

In revised ed 6 (1963) of CC, all the Greek letters used for representing partial comprehensions of main subjects were

replaced by the digit-pairs of Roman capitals, ending with Z. The following table gives a list of them:

Partial Comprehensions of Main Subjects	Digits Used in	
	CC, ed 6 (1960)	CC, ed 6 (rev)
Mathematical sciences	β (beta)	AZ
Physical sciences	Γ (gamma)	BZ
Humanities and social sciences	μ (mu)	MZ
Humanities	ν (nu)	MZA
Literature and language		NZ
Social sciences	Σ (sigma)	SZ

The ordinal value of 'MZA' was fixed to be less than that of $\triangle$. Thus, "$\triangle$ Spiritual Experience and Mysticism" was included in the partial comprehension "MZA Humanities" (*See also* Sec 423).

The digit-pair "NZ" was inadvertently printed as "NX" in CC, ed 6 (revised) and the "Σ" was left unchanged again inadvertantly.

74 INDICATOR DIGIT FOR TIME FACET: 1952 TO 1963

As stated in Sec 43, ed 4 (1952) of CC prescribed one and the same indicator digit — namely, "." (dot) — to indicate the beginning of Space as well as Time Facets. It was then thought that this prescription would not give rise to any ambiguity since during that time all Space Isolate Numbers in use would begin with a numeral, and all Time Isolate Numbers in use would begin with a Roman capital.

In his paper on "Role of Connecting Symbol" presented to the All-India Library Conference (10) (Hyderabad) (1953), S Ramabhadran mentioned as an unsolved problem the designing of different indicator digits for Time and Space Facets (17). This suggestion he made by way of abundant caution and in order to satisfy the Law of Impartiality (45). In the dsicussion on that paper during the Conference, J B Reid and A Neelameghan suggested the use of "(double inverted comma) as the indicator digit for Time Isolate. I rejected it on the ground that no diffi-

culty had arisen in using the same indicator digit for Space and
Time isolates. In doing so, I was prompted by the Principle of
Okham's Razor, a corollary of the Law of Parsimony (46).

75 IMPACT OF DEPTH CLASSIFICATION

As Rapporteur General of the FID/CA (Committee on
General Theory of Classification of the International Federation
for Documentation), I engaged myself in the problems of depth
classification from 1951 to 1961. In working out schedules of
Space isolates and of Time isolates, it was found that Level 2 had
to be provided for Space and Time Isolates (56, 58). The use
of the same indicator digit for both Space and Time isolates created
difficulty. Various experiments were made to get over it. One
of them was to partition the Zone $(Z - a)$ into two sets — the
set a to n and the set p to z (40, 44). The first part was used
to represent a new Level of Space and the second to represent
a new Level of Time. Further, a little later need was felt also
for one more Level. All these makeshifts led to the conviction
that the first order array of the schedule for Time isolates as well
as the schedule for Space isolates had to be given the freedom
to occupy all the zones — $(Z - a)$, $(Z - 1)$, $(Z - A)$. This
made it necessary to use different connecting digits for Space iso-
lates and Time isolates.

76 USE OF SINGLE INVERTED COMMA TO INDICATE TIME
ISOLATES

This brought me back to the suggestion of Ramabhadran,
Reid and Neelameghan (*See* Sec 64). While I was still vacillating over
it, P B Roy came to work with me in Bangalore during January
and February 1961 (27). While discussing the problem with him,
he suggested the use of " (double inverted comma) as the indi-
cator digit for Time isolate, though he had no prior knowledge
of this having been suggested at the Hyderabad Conference in
1953. I suggested the use of a ' (single inverted comma). Both
these digits were tried out by typing as well as printing the class
numbers containing them. It was felt that in print the digit
double inverted comma was far too dominant. Therefore, it
was finally decided to use single inverted comma as the indicator
digit for Time isolate.

77 ORDINAL VALUE OF SINGLE INVERTED COMMA

Time is the least concrete of the five fundamental catrgo-
ries (55). This taken with the Principle of Inversion indicated
that the ordinal value of the indicator digit ' (single inverted
comma) should be fixed as the one next below that of "." (dot)
(26, 54).

78 IMPLEMENTATION
     The decisions in Sec 74 to 77 were implemented in the revised ed 6 (1963) of CC.

8 New Digits and New Use of Digits Proposed for CC Edition 7 (1970)

81 EMPTY DIGITS
811 *Emergence of New Main Subjects*
     Recent experience has brought to notice the need for interpolating new main subjects in the array of main subjects. For, main subjects in excess of those already scheduled are springing up frequently. Some of these attract books on themselves, while all attract articles in periodicals. The Canon of Helpful Sequence (48) generally fixed their positions among the already scheduled main subjects. The following are some examples:

SN	New Main Subject	To be interpolated between the Main Subjects		
1	Reading Method	3	Book Science and	4 Journalism
2	Notes Taking		do	
3	Space Physics	C	Physics and	D Engineering
4	Medical Technology	L	Medicine and	LX Pharmacognosy
5	Applied Psychology	S	Psychology and	T Education

812 *Unconscious Use of Emptying Digits in CC Edition 6 (Revised)* (1963)
     Now let us go back to Sec 72. There HX used to represent the main subject Mining makes it appear as if 'Mining' were a subdivision of H Geology. Similarly, KX used to represent the main subject Animal Husbandry makes it appear as if Animal Husbandry were a subdivision of K Zoology. So also YX representing the main subject 'Social Work' make it appear as if Social Work were a subdivision of Y Sociology. So also with partial comprehensions. For example, BZ Physical Sciences appeared as if it were a subdivision of Mathematics. Similarly, NZ Language and Literature appeared as if it were a subdivision of N Fine Arts: and SZ Social Sciences appeared as if it were a subdivision of S Psychology. This fault came to be sensed in 1963 (34). To remove this fault, each of the digits X and Z were

postulated to be an emptying digit. This means that it empties the preceding digit of its semantic value but allows it to retain its ordinal value. This is indeed a neat solution. This postulate threw open to interpolate other new main subjects in their respective filiatory places.

813 *Two More Emptying Digits*

To meet the demand for interpolation of two or three main subjects between two already existing consecutive main subjects, I postulated each of the 2 digits T and V a so to be an Emptying Digit.

814 *Main Subjects Previously Treated as Compound Subjects*

Again, this led to examine the schedule and pick out subjects which were in reality main subjects but which had been shown as subdivisions of scme main subject, for want of digits in the array of main subject numbers. Here are a few examples:

SN	Main Subject	New Main Subject Number	Old Compound Subject Number
1	Astronomy	BV	B9
2	Astrophysics	BX	B9 : (C)
3	Draughtsmanship	DV	D : 4
4	Microbiology	GT	G91
5	Forestry	JX	JB
6	Medical Jurisprudence	LV	L : (Z)
7	Industrial Economics	XX	X8(A)

815 *Number of Possible Interpolations in the Array of Main Subjects with the aid of T, V, X, as Emptying Digits*

In the revised ed 6 of CC (1963), the number of main subjects represented by single digits is 32. (Here the digits z and A have to be treated as if they were main subjects). The digits 5, 6, 7, and 8 are left vacant in revised ed 6 of CC (1963). These are bound to be used sooner or later to represent some main subjects. In fact, 5, 6, and 8 have already been earmarked for inclusion in ed 7 of CC (1970). Thus, the number of single-digited main subject number is 36. The number of intervals

created by these 36 digits is 35. In this context, the digit △ has been omitted (57). For other reasons, the interval following A, M, and N are not to be considered. Thus the surviving number of intervals is 31. In each it is possible to interpolate three main subjects, each represented by a digit-pair. Thus, the total number if interpolated main subjects can be 93. This will be utilised in CC ed 7 (1970) onwards.

82 EMPTY AND EMPTYING DIGITS
By way of abundant caution, provision is being made in CC ed 7 for interpolation of more main subjects each represented by a digit-triad. For this purpose the digits U, W, and Y have been postulated to be both Empty and Emptying (32).

Example :

KZ	Medical Sciences
L	Medicine
LT	Medical Technology
LU5	Public Health
LV	Medical Jurisprudence
LX	Pharmacognosy
LY1	Nursing
LY8	Hospital and Sanatorium
M	Useful Arts

It was not helpful to treat all these main subjects between L and M as if they were subdivisions of L Medicine as was done in the past. After an Empty-Emptying digit we can add 53 substantive digits to represent new main subjects. In each interval, with the aid of one Empty-Emptying digit we can interpolate 53 digit-triads to represent new main subjects. By using all the three Empty-Emptying Digits we can interpolate 159 digit-triads in one interval to represent new main subjects. Thus, in all the 31 intervals taken together we can interpolate 4,/929 new main subjects, each represented by a digit-triad. Thus, the total number of main subjects that can be accommodated with the aid of Empty digits and Empty-Emptying digits in CC is 5,022. This is apart from new main subjects that can be added by using the empty digit 9 as the first or second digit in a number. Thus, today the notational plane throws a challenge, as it were, to the idea plane to produce main subjects sufficient in quantity to occupy all the numbers — single digited, two digited, and three digited — provided by it. On the other hand in 1933, the position was the reverse. The notational

system of CC could not find sufficient main subject numbers to
accommodate even the few main subjects then known.

83 SCHEDULE OF SPACE ISOLATES
In the schedule of space isolates, the empty digits and the
Empty-Emptying digits can be used for interpolaticn afrer any
isolate number in any array. Because, Alphabetical Device
will not be used in Level 1 of Space Isolates.
Example :

Country	Isolate Number	
	New	Old
India	44	44
Nepal	44T	44974
Sikkim	44U1	44973
Bhutan	44U2	44971
Ceylon	44V	4498
Maldive Islands	44W1	
Pakistan	44X	44Q7
Afghanistan	44Y1	491
Iran	45	45

The old isolate numbers represented the sovereign countries
shown between India and Afghanistan, as if they were subdivisions
of India. This was due to the incapacity of the notational system.
Now, the versatility of the notational system has increased by
the concept of Empty and Emptying digits (8). This will be
implemented in ed 7 of CC (1970).

84 SCHEDULE OF TIME ISOLATES
To release the digits T to Z for use as Emptying digits
and as Empty-Emptying digits and to avoid conflict with division
by Chronological Device (52), the schedule for Level 1 of Time
isolates needs mcdification. We can retain upto and including
"R 2ː00 to 2299 A D".   Thereafter S should be used as a Secto-
rising Digit. The next Time isolate number should be "SA 2300
to 2399 AD" and the succeeding Time isolate numbers should
also be changed accordingly.

85 A New Digit as Empty-Emptying Digit
851 *Genesis*

In the schedules respectively for Personality, Matter, and Energy Isolates, Alphabetical Device (21) will occur. Therefore, the use of a Roman alphabet for interpolation will come in conflict with it. Nor can we use any other species of digits for interpolation as there will be even greater chance for conflict. This was brought to my notice by A Neelameghan, G Bhattacharyya, and A K Gupta (13). Mrs S C Goonetilleke came across this difficulty while doing her project in the design of schedule for depth classification for 'Rubber Cultivar' in DRTC (7). I was satisfied that the avoidance of this conflict was absolutely necessary. I therefore, did not yield to the importunities to the Principle of Okhams Razor a corrollary of the Law of Parsimony (46, 53).

852 ∧ *as Empty-Emptying Digit*

I am considering the use of ∧ (inverted V) as Empty-Emptying Digit (59) as few schedules of isolates for [P], [M], and [E] as possi le. It is a new digit to be introduced to the notational system. It also involves addition of two digits in the case of every interpolation — ∧ (inverted V) and a semantically rich digit. The occasion for the use of this interpolation digit will not be many in the schedules for [P], [M], and [E] as they make ample use of all kinds of mnemonics.

853 *Ordinal Value of* ∧

The ordinal value of ∧ (inverted ∧) should be greater than that of the (' (starter bracket). This is because the Canons for Filiatory Sequence (50) fix the position of the newly interpolated isolate in an array should come after all the array isolates derived from the preceding isolate. We may have to use packet notation to represent subdivisions of that preceding isolate.

854 *Non-Uniformity Explained*

We have thus provided two different ways for interpolation, one for the array of main subjects and for any array in the schedule of space isolates, and another for any array in the schedules of isolates for [P], [M], or [E], though it leads to non-uniformity. For, we should like to respect the Law of Parsimony (46) by saving a digit wherever possible, in the representation of interpolation of main subjects or space isolates in their respective schedules.

86 New Indicator Digits
861 *New Indicator Digit for Phase Relation*

At present, we use the digit '0' as the indicator digit for phase relation. It appears to be rather a waste to use a numeral

as an indicator digit. In depth classification, we have often to use the first digit of a sector in an array 'for representing a quasi-isolate — that is, the characteristic on the basis of which the succeeding isolate ideas enumerated within the sector are derived. This is to make the isolate number and the class number as short as possible. The number of quasi isolates are found occasionally to be more numerous than the number of sectors available at present. We can use '0' with its normal ordinal value thus bringing it just before the digit 1; we can also use it as an empty and sectorising Digit. Thereby the number of sectors in an array will be increased from 42 to 66. This is being pressed on me by A Neelameghan and M A Gopinath during the last three years (14). The only difficulty in the matter has been finding a suitable substitute as an indicator digit for phase relation. Neelameghan suggested the use of the digit & (ampersand) (10), as a substitute. I find it really meaningful because that digit stands for "and". In a complex subject, we have two subjects, the first subject and the second subject. This 'and' and the symbol '&' are of equivalent meaning.

862   *Ordinal Value of* '&'
    As & (ampersand) takes the place of the digit '0' as the indicator digit for phase relation, the ordinal value of '&' should be the same as the original ordinal value of the digit 0 (zero) — that is, less than that of the digit ' (single inverted comma).

863   *A New Indicator Digit in Alphabetical Device*
    Alphabetical Device is prescribed to form new isolates or array isolates wherever expedient (21). If the term involved in Alphabetical Device is a single worded term, there is no difficulty. In the case of a multi-worded term, we have to use Alphabetical Device for each of the component words. We cannot write all the resulting letters in a single chain without inserting some indicator digit to indicate change of components. Therefore, at first the digit hyphen (–) was tried out as an indicator digit for the component numbers got by Alphabetical Device in a multinomial terms (18). But it was soon discovered that a homonym would then result in classificatory language. For, when we form a compound isolate by linking together two or more isolate ideas taken from the same schedule and if the two component isolate numbers are Roman capitals, the same compound isolate numbers may also represent multinomial terms got by Alphabetical Device (9). This would result in a homonym in classificatory language and this is fatal in a classificatory language. This is because we use one and the same indicator digit '–' (Hyphen) for two different purposes. This homonym in classificatory

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language should be resolved at any cost, even, if it be necessary, by introducing a new digit. Here, we cannot yield to the Principle of Okham's Razor, a corrollary of the Law of Parsimony (46). To resolve this homonym, S Seetharama suggested the use of the digit '=' (equals to sign) as the new indicator digit to indicate a component later than the first one, occurring in a multinomial term. A little trial showed that its ordinal value should be taken to lie between those of '−' and '0' (with the new ordinal value given to it in Sec 852 — that is, its normal ordinal value (9).

864 *Indicator Digit for Anteriorising Common Isolate*

At present, each digit representing an Anteriorising Common Isolate is postulated to have anteriorising value. The uneconomic nature of this postulate was brought to notice while working on the design of a electronic Doc-Finder. A Neelameghan and S Venkataraman suggested that it will be easier to design and operate the Doc-Finder if anteriorising value can be concentrated on a single digit. This digit can be used as the indicator digit for introducing an anteriorising common isolate. This will serve the same purpose as the one served by making each of the Roman small an anteriorising digit. Further, because of their anteriorising value, all the numbers in Zone $(Z - a)$ have been excluded from use in certain array isolates, needed for depth classification. This had shortened the capacity of array of Order 2, Order 3, etc. This is the second reason for the desirability of concentrating all anteriorising value on a single digit. These findings led to the prescription of a new digit as an indicator digit for introducing an anteriorising common isolate (11). I am considering the use of ↑ (upward arrow) as the indicator digit for anteriorising common isolate. It is meaningful. For, it can be taken to suggest that the number got by adding it to a host number should be lifted above the host number. The ordinal value of ↑ (upward arrow) should be just greater than that of ← (backward arrow) and less than that of & (ampersand).

865 *Change over from '0' to '&' and the Insertion of ' ↑ '*

There is no doubt that the carrying out of the suggestions in Sec 861, 862, and 863 will require correction in 11 places in regard to each document involved (*See* Sec 224). In the case of change over from '0' to '&' the correction is simple and the number of documents needing correction will be relatively small. But the insertion of ' ↑ ' (upward arrow) in the case of anteriorising common isolates, though the correction work is simple, it will have to be done in a relatively large number of documents. The volumes of periodicals and serials will, for example, form

a considerable part in the collection of documents in a library.
But the labour involved can be staggered by the Method of
Osmosis (47).

87 NEW USE OF DIGITS z AND Z

871 *Two More Empty Digits*

Experience in depth classification has shown that in addition
to extending the Zone $(Z - 1)$ in an array, it is also necessary to
extend the zones $(Z - a)$ and $(Z - A)$. For this purpose, z and
Z have to be treated as Empty Digits in arrays of isolates (34).

872 *Sector*

In Zone $(Z - 1)$, the addition of isolate numbers was in
quanta of 8 digits — that is why the term 'Octave' and 'Octave
Device' were used in the earlier years. But in zones $(Z - a)$,
and $(Z - A)$, as a result of making z and Z empty digits, the
quanta of addition is 22 digits and 23 digits respectively. There-
fore, the terms 'Octave' and 'Octave Device' are no longer
applicable. Therefore, they are replaced by the terms 'Sector'
and 'Sector Device' respectively.

88 IMPLEMENTATION

It is intended to implement all these in ed 7 (1970) of CC.

891 *Suggestions Solicited*

Suggestions, on the intended use of digits mentioned in
Sec 8 of this paper, from librarians are solicited. In making
suggestions, it should be borne in mind that

1 The above proposals may not be necessary for the classi-
fication of books (macro documents) of yesterday and today;
but

2 They are necessary in the classification of articles in periodi-
cals (micro documents) — that is, in documentation work; and

3 As it has happened in the past, many a micro subject,
expressed only in an article in a periodical, may and almost will,
demand a regular book for its exposition at a later date.

91 Summary of the Use of Digits in CC

In ed 1 (1933) of CC, the number of class numbers available
to represent main subject was 35.

In ed 7 (1970) of CC, the number of class numbers available
to represent main subjects will be 5,520 (19).

In ed 1 (1933) of CC, the number of indicator digits used.
was two — namely 0 and :

In ed 7 (1970) of CC, the number of indicator digits pro-
posed to be used will be eleven — namely ← ↑ & ' . : ; , - = →.

This is apart from the use of '(' (starter) and ')' (arrester). This has increased the versatility of tl e notational system of CC. It enables the implementation in the notational plane to a large extent, of the new demands of the idea plane necessitated by the continuing developments in the universe of subjects.

92 Not yet Exhaustive

In spite of it, there are certain formations in the universe of subjects which cannot be met by CC as it is. For example, Donker Duyvis has endeavoured to meet some new demands in UDC by improvising the following new indicator digits (6):

SN	Relation	Proposed Indicator digit-group
1	Mutually active relation	: :
2	Mutually passive relation	: ..
3	Active-passive relation	. ı
4	Passive-active relation	: .

The two last mentioned cases are taken care of in CC, by the Actand-Action-Actor-Tool Principle (30). Therefore, the needs for indicator digit does not arise. The two first mentioned case however demand pursuit.

93 Problem for Investigation

At present both Material isolates and Property isolates are considered as manifestation of the fundamental category Matter. We call them Matter (Material) and Matter (Property) respectively. If both occur together, the latter becomes Level 2 of Matter and there is no conflict. Moreover, we use the Zone $(Z - a)$ to represent Matter (Property) isolates and zone $(Z - A)$ for Matter (Material) isolates. The zone $(Z - 1)$ is used for either purpose according to context (60). Some difficulty may lurk in this practice. This requires investigation.

94 Other Uses for "→'

In depth classification a specific range of values of an isolate idea has to be indicated occasionally. Here, the lowest value and the highest value of the range may be connected by a → (forward arrow) (1).

95 Fractional Number in Isolate Numbers Representing Measurement

In an Isolate Number representing a measurement involving an integer *cum* decimal fraction the decimal point may come into conflict with the indicator digit '.' (dot) used for indicator Space Isolates. This difficulty awaits to be solved. Numbers may be expressed in the multidimensional units, for example, 6 ft 2 in. Their representation in the notational plane needs investigation (12).

96 Bibliographical References

Note.—
1 The following is the list of documents used.
2 Col nin 1 gives the serial number of the documents included in it.
3 Col 2.in 2 gives the number of the section in the text, where the reference to the document occurs.

1 Sec 94 AFROZE FATHIMA. Use of arrows in CC (Her lib sc. 3; 1965; Paper ZA).

2 Sec 08 BRITISH STANDARDS INSTITUTION. Universal decimal classification. Ed 3 (revised). (BS 1000A: 1961).

3 Sec 08 DEWEY (Melvil). Decimal classification. Ed 16, 1958; also Ed 17, 1965.

4 Sec 01 ——. Introduction to Decimal Classification. Ed 12. 1926. (Reprinted in Dewey (Melvil). Decimal classification and relative index. Ed 17. 1965. P 66 and 83).

5 Sec 094 ——. ——. (——. ——. P 69 to 71).

6 Sec 92 DONKER DUYVIS (F). Policy of revision of Universal Decimal Classification (6): Specification of relationship in multidimensional classification. (Rev doc. 25; 1958; 83, col. 2).

7 Sec 851 GOONETILLEKE (S C). K bber c ltivar: Depth classification (DRTC Ser inar. 4; 1966; Paper S).

8 Sec 83 GOPINATH (M A) and (MALHOTRA (V K). Geographical schedule in CC, UDC, and DC. (Lib sc. 3; 1966; Paper K, Sec 40)

9 Sec 863 ——, NEELAMEGHAN (A), RANGANATHAN (S R), and SEETHA-RAMA (S). Connecting symbol for alphabetical device for m ltinominals. (Her lib sc. 4; 1965; Paper ZZA).

10 Sec 861 NEELAMEGHAN (A). Use of zero in the notational system of CC. (DRTC seminar. 6; 1968; Paper BL, Sec 73).

11 Sec 864 —— and BHATTACHARYYA (G). Extrapolation at the beginning of an array in Colon Classification. (DRTC seminar. 6; 1968; Paper BK).

12 Sec 95 —— and ——. Locomotive production engineering: Depth classification. (Lib sc. 3; 1966; Paper P, Sec 52).

13 Sec 851 ——, ——, GUPTA (A K). Interpolation in the notational plane: Case study. (Lib sc. 4; 1967; Paper C).

14 Sec 861 —— and GOPINATH (M A). Zero increases hospitality (DRTC seminar. 3; 1965; Paper D).

15 Sec 222 PALMER (B I) and WELLS (A J). Fundamentals of library classification. 1951.

16 Sec 34 PROCEEDINGS, International Study Conference on Classification. 2; 1964; Elsinore; Classification research; 95.

17 Sec 74 RAMABHADRAN (S). Role of connecting symbol. (Ranganathan (S R), *Ed.* Depth classification, reference service, and reference materials. 1953. Paper 1·6. P 80).